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FDR/UPSTREAM Client User's Guide
Version 3.2.1

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1 INTRODUCTION

1.1 Summary of Changes in This Release

The following summarizes the changes in this and the prior release. A complete listing of changes are discussed in the update notes available on the Innovation FTP site (accessible through www.fdr.com). Note that all releases include minor modifications and program fixes.

1.1.1 Version 3.2.1

FDR/UPSTREAM Workstation/Server v3.2.1 is a significant enhancement to the UPSTREAM product. New features include:

- UPSTREAM Rescuer: S/390 Linux and Solaris Disaster Recovery
- Windows Server 2003. Full support including system state and disaster recovery.
- UNIX backup of device files and FIFOs.
- UPSTREAM Notification. UPSTREAM now supports email and SNMP notification on event success or failure and the ability to email text files.
- Local incremental database. This is most useful in UNIX systems where there is no archive bit for incremental determination.
- Novell NLM support for the built-in multi-tasking functionality currently available for UPSTREAM for Windows and UNIX
- A number of significant updates to the UPSTREAM Director:
    - Execution from a web browser
    - Restart of pending backups or restores
    - File browser for all system target types
    - Selection of target system from a pull down in each function window without having to enter the target system dialog.
    - Run a job on a target system.

1.1.2 Version 3.2

FDR/UPSTREAM Workstation/Server v3.2 is the production release of the beta features in v3.1.7 plus the additional features of:

- NetWare 6 Cluster Services
- DBIID change detection for Lotus Notes incrementals

1.1.3 Version 3.1.7

FDR/UPSTREAM Workstation/Server v3.1.7 is a major release containing a number of new features and problem resolutions. This is a beta release.

New features include:

- UPSTREAM/SOS Local Backup Restore
- Improved UPSTREAM configurator for Windows
- Multi-session DB2 agent
- Multi-session SAP agent
- Windows 2000 Terminal Services licensing database
- SAP multi-channel backups

1.1.4 Version 3.1.6

FDR/UPSTREAM Workstation/Server v3.1.6 is a significant release containing a number of new features and problem resolutions.

New features include:

- Windows XP Automated System Recovery
- Novell GroupWise database backup agent
- Oracle support for the v2.0 of their MMAPI.
- Lotus Notes for Intel Linux
- The “build backup file” step in an FDR/UPSTREAM backup can now be performed during the backup.
- A number of new FDR/UPSTREAM Director features including support for the Microsoft SQL Server PlugIn and Host Reporting.
- Full system backup for NetWare servers

To reduce the size of FDR/UPSTREAM documentation, the following has been moved to separate manuals, stored in the /DOC directory on the FDR/UPSTREAM CD:

- OS/2 documentation into the *FDR/UPSTREAM Client OS/2 Supplement*. The file is OS2.PDF.
- SNA documentation (excluding OS/2 SNA) into the *FDR/UPSTREAM Client SNA Supplement*. The file is SNA.PDF.

WARNING: If you are using FDR/UPSTREAM in Windows 2000 on a domain controller you should do a first-time full backup to assure that the SYSVOL will be properly backed up.

NOTE: If you are using FDR/UPSTREAM in Windows XP, you should obtain the hot fix described in Microsoft KnowledgeBase article Q317949 to fix a bug in TCP/IP which affects the FDR/UPSTREAM Director. This fix is also available from Innovation tech support.

1.2 Overview

Congratulations! You have purchased security for your workstation or server that is second to none. FDR/UPSTREAM will assure that your valuable data is stored where it is safest; on your MVS mainframe. FDR/UPSTREAM's advanced features also make it ideal for overall storage management, software and data distribution, as well as file transfer.

Enterprise computing is a new far-reaching technological phenomenon. Companies are taking a close look at their "total" computing resources. Those that find ways to get the "parts" that comprise this "total" to work together, will emerge with a dramatic competitive edge.

Innovation Data Processing, with its FDR/UPSTREAM Unattended Backup Software, has taken the practical point of view for integrating open architecture, and internetworking within a cooperative processing environment. Now workstations, network file servers, and UNIX systems can backup and restore their respective hard disks to a MVS mainframe. FDR/UPSTREAM makes disaster recovery for workstations, networks and UNIX systems a reality today.

1.3 UPSTREAM Features

FDR/UPSTREAM is a state-of-the-art communications application. Its many features include:

- **Multiprotocol**

  FDR/UPSTREAM can use both SNA/APPC (Advanced Program-to-Program Communications) or TCP/IP to transmit data. APPC is IBM's communications component of SAA (System Applications Architecture), their blueprint for the future. And only APPC applications can take advantage of APPN (Advanced Peer-to-Peer Networking), IBM's networking architecture of the future.

  TCP/IP is the communications architecture for the Internet and is the open protocol of the future. FDR/UPSTREAM gives you the choice of both.

- **Unattended Operation**

  You can set up FDR/UPSTREAM to run at any combination of times. Backups and restores can be workstation scheduled to run daily, weekly, monthly, quarterly, and yearly in virtually unlimited numbers of combinations. If you leave your machine running, FDR/UPSTREAM will run, saving the current application and restoring it as if nothing had happened.

  Backups and restores can be started by host batch jobs which can be integrated into your existing scheduling system allowing totally unattended operation. You can even start backups or restores from other workstations or servers!

  Furthermore, you can be notified by mail or SNMP trap when an UPSTREAM operation succeeds or fails. Information can be attached to help you resolve any problems. Unattended operations have never been safer or easier to manage.

- **Fast**

  FDR/UPSTREAM uses APPC and TCP/IP, and due to its unique, efficient architecture, FDR/UPSTREAM is the fastest communications facility available today. Selective levels of compression combined with our unique Merge backup and duplicate file suppression facilities assure fast transfers on even slow links.

  The advanced Merge backup facility allows FDR/UPSTREAM MVS to construct a complete full backup without the workstation having to read or send all the files resulting in extraordinary performance. Using a sophisticated technique, the workstation sends a "picture" of the drive(s) to be backed up to the MVS software which uses prior backups plus changed files to construct the fulls. This technique is completely safe as it properly reflects deleted files, changed files, renamed files, and just about anything else.

  To improve restore performance, FDR/UPSTREAM supports local storage of backup data which allows much faster restores while maintaining the advantages of centralized control.

  FDR/UPSTREAM on MVS is a native VTAM or TCP/IP application written entirely in assembler. This provides the fastest possible transfers as well as MVS CPU efficiency.

- **Duplicate Files**

  Merge backups include a duplicate file transmission suppression facility. Often similar files are duplicated on many machines across your enterprise. These include operating system files, word processors, and other software packages. FDR/UPSTREAM can be set up to recognize certain files as duplicates not transmit them saving transmission time, and optionally reducing host storage requirements.

Determination of duplicate files can be performed manually, by manually backing up the files which are known to be duplicates to our duplicate file database. You can also activate our unique automated method which will identify duplicate files for you automatically.

If you store your duplicate files in our host repository and have duplicate files across your disk or server, FDR/UPSTREAM MVS will send only one copy of the file to the client and it will be written to all of its locations on the disk or server. This duplicate file restore facility reduces transmission time and is a unique feature of FDR/UPSTREAM.

- **Efficient**

  FDR/UPSTREAM can store your workstation data on the mainframe in compressed format. This conserves mainframe disk space. FDR/UPSTREAM can also write your data directly to tape for long term storage. If your mainframe shop has little free disk space available, your data remains safe.

- **Secure**

  FDR/UPSTREAM interfaces to the most common mainframe security systems including RACF, ACF2 and TOPSECRET. Access by remotely attached workstations can be protected using the security system you currently have implemented. This level of security is unavailable with any pure workstation backup system.

- **LAN Aware**

  A wide variety of LAN server file systems are supported including:

  - **Novell NetWare®**: FDR/UPSTREAM provides comprehensive support for NetWare 3.x, 4.x, 5.x, and 6.x including special NetWare file and directory characteristics, NetWare Directory Services, trustee rights, directory restrictions, clusters, unattended login and more... It is Novell SMS capable and carries the Yes/Approved label.
  - **Microsoft Windows NT, Windows/2000® and Windows XP®**: Support includes Active Directory, backup/restore of long file names, registry hives, system log files, enabling of privileges and more...
  - **IBM LAN Server®**: FDR/UPSTREAM provides comprehensive support for all versions of IBM LAN Server with backup/restore capabilities of file and directory extended attributes, HPFS386 ACLs and more...
  - **NFS:** All UNIX systems can be attached and backed up via NFS from any other UNIX system.

- **PC Workstations**

  FDR/UPSTREAM can back up your data through your TCP/IP, Novell or NetBIOS LAN. You only need to install the complete FDR/UPSTREAM product on a single workstation to provide *all* of the workstations in your internetwork with the advantages of FDR/UPSTREAM backup. The FDR/UPSTREAM ULTra (UPSTREAM LAN Transport) facility contacts LAN attached workstations using advanced IPX/SPX, NetBIOS or TCP/IP peer-to-peer communications, reducing configuration, installation and training time. Profiles can be set up which allow you to automate backups and restores for groups of workstations with a single workstation or host controlled command. Compression is performed by the workstation to improve performance.

  The FDR/UPSTREAM ULTra version also includes a program to perform workstation-to-workstation copies (LANCOPY) with the ease of XCOPY and the advantages of workstation-to-workstation copies not having to go through the server. LANCOPY will also allow directory listings of remote workstations showing *all* files including system and hidden files.

- **Multi-platform support:**

  FDR/UPSTREAM operates on a variety of operating systems platforms. Each version supports the base FDR/UPSTREAM functions of merge backups, single file, directory and full volume restore and more.

- **Windows NT/2000/XP**: Virtually all of the Windows NT specific features are supported including long file names, Unicode file names, registry hives, system event logs, security ACLs, alternate data streams, Windows 2000 System State and more... You can even run FDR/UPSTREAM as a service.
- **Unix**: FDR/UPSTREAM UNIX, which supports the popular AIX (IBM), HPUX (HP) and Solaris (Sun) variants (SPARC and Intel), Compaq Tru64, Intel and S/390 Linux as well as IBM's OS/390 UNIX on OS/390 platforms, is a native UNIX application allowing backups and restores of applications files and character special devices on all three primary AIX hardware platforms (Power-1, Power-2 and PowerPC), RISC Sun and HP platforms, Intel Solaris and System 390 mainframes. It also contains support for symbolic and hard links, preservation of the last access date, support for SNA Server (AIX) and TCP/IP and more...
- **Novell NLM:** FDR/UPSTREAM can run directly on Novell servers backing up NetWare data using Novell's SMS or with direct calls. FDR/UPSTREAM is NetWare certified and can back up servers from v3.11 through v6.x.
- **OS/2**: FDR/UPSTREAM OS/2 is a 32-bit Presentation Manager product that provides a graphical user interface, backs up and restores system files, includes client recovery tools, supports virtually every server system that can be connected to OS/2 and more...

❑ File Transfer

FDR/UPSTREAM allows you to transfer native files between your client and your host. Its extensive support includes text and binary files, a choice of host disk or tape, a variety of host file formats including GDGs, PDS members, flat files and more makes FDR/UPSTREAM a powerful tool for interchanging data between your different computer systems.

With its blazing speed and unattended nature, FDR/UPSTREAM allows you to easily integrate data on your different systems into your operational needs.

❑ Controllable

FDR/UPSTREAM has 4 ways that file data can be stored on the host:

- Directly to host tape (without having to be staged through a host file)
- SMS controllable disk files
- In a VSAM repository
- Batch archive to tape

Your data, where you want it.

You can also delete backups from a workstation, allowing a workstation administrator total control of his data.

❑ Safe

With FDR/UPSTREAM your mission critical data is saved on the most safe and secure repository in your company, your MVS mainframe.

❑ Data Sharing and Software Distribution

When your data is stored in a location common to all users, other users can easily retrieve it (subject to security constraints). Since FDR/UPSTREAM is so fast and easy to use, many of your data sharing and distribution requirements are easily solved.

FDR/UPSTREAM's fast, secure and unattended nature makes it ideal for software distribution. Since restores can be automated (with local or remote control), workstation users can backup their critical applications nightly, and at the same time retrieve new software and data updates.

Workstation batch files can be run by remote control, further facilitating distribution and installation of data and software.

An automatic update facility is included within FDR/UPSTREAM so that it's own workstation software can be automatically updated with fall back and sophisticated administrator control.

- **Restart/Recovery**

  FDR/UPSTREAM can restart a failed backup or restore that was terminated due to communications line failure, host unavailability, or just about anything else... at the point it failed. For backups, FDR/UPSTREAM also can remember files that were unavailable due to LAN data sharing issues, and retry those files as well.

- **Easy to Use**

  Because FDR/UPSTREAM is transparent in normal operation, there is nothing for a user to maintain on a day-to-day basis. A system administrator can set up a FDR/UPSTREAM backup system in a matter of minutes, not hours. The CUA screens are familiar and simple to use with point and shoot operation, thereby allowing you to select the backup or restore versions and files quickly and easily.

- **Intelligent**

  FDR/UPSTREAM always remembers where your data is. If you write your data to tape, FDR/UPSTREAM will remember exactly which tape it is stored on, thereby completely eliminating another user record keeping headache.

  FDR/UPSTREAM can *automatically* restore your files back to a specific date, intelligently combining restores of full and incremental backups.

- **Incremental Backups**

  FDR/UPSTREAM checks the archive bit before sending files from the workstation to MVS, thereby allowing you to send only changed files to the mainframe. UPSTREAM allows you to reset archive bits at your discretion allowing differential backups which provides even greater flexibility.

- **Verifiable**

  FDR/UPSTREAM logs backups, restores, communications failures, failed files, statistics, and just about every other significant event on BOTH sides of the operation. This ensures that both the workstation user and the mainframe administrator can monitor, control and verify every aspect of backups and restores.

  Workstation reporting includes all files backed up and restored, files deleted, as well as version and file information requested from the host.

  The FDR/UPSTREAM MVS reporting facility is available from a workstation allowing complex, comprehensive reports showing the status of all operations performed, all backups, sequential disk utilization, and more. Reports are displayed on the client and written to a text file for later viewing and manipulation.

- **True Migration**

  FDR/UPSTREAM can be used for true archiving because your data is stored on your company MVS mainframe. As free disk space on workstations and LAN servers become critically low, you can use FDR/UPSTREAM to back up those files which are rarely used and then automatically delete those files which have been successfully backed up. Inquiries and restores of migrated files is easy and trouble-free.

  FDR/UPSTREAM can automatically detect those files which have not been accessed for a given amount of time and automatically include them in a backup. Combining this process with the deletion process, you have true Grooming.

FDR/UPSTREAM can even automatically recall files from the host when a user accesses them on your Novell file server. This auto-recall facility gives you true mainframe like storage management on your file servers.

❑ FDRSOS Integration

There are a number of powerful features available for FDRSOS licensees:

- FDRSOS Physical Disk Local Backup. If FDR/UPSTREAM on your system and FDR/UPSTREAM MVS share a common EMC disk, FDR/UPSTREAM can use this physical disk for storage of data immediately available to the host, without transmission over the network. This vastly improves performance and reduces network overhead.
- FDR/UPSTREAM can be used in conjunction with FDRSOS to provide file level restores and restores of incrementals since your last FDRSOS full.
- FDR/UPSTREAM can be used to restore your FDRSOS backups if your disaster site does not have the appropriate hardware/software or you wish to restore your FDRSOS backups to a non-EMC disk.

❑ Physical Disk Backups/Restores

FDR/UPSTREAM can perform backups and restores of your entire disk for disaster recovery purposes. When used in conjunction with standard FDR/UPSTREAM backups/restores you have the advantages of high speed complete system disaster recovery. It can even be used with ULTra for a single diskette complete system recovery solution

❑ Central Control

With FDR/UPSTREAM storing workstation data centrally on your MVS mainframe, all the advantages of central storage including security, data sharing, and disaster recovery are realized while continuing to enjoy the performance, ease of use and other benefits of decentralized computing.

Backups or restores can be initiated by MVS batch jobs or a central workstation, allowing you control of your environment without user intervention.

You can optionally synchronize your workstation or file server's date and time to the mainframe's date and time assuring that all of your computers stay on track.

❑ Job Execution

FDR/UPSTREAM can run programs and batch jobs on the system using local or host control. This allows you to integrate your backup and recovery plans with existing databases and other applications.

Host jobs can also be submitted under client control. This helps integrate such functions as FDRSOS into FDR/UPSTREAM processing.

❑ Databases

FDR/UPSTREAM includes support for a number of databases including Oracle, SAP, DB/2, Microsoft SQL Server, Lotus Notes, Novell GroupWise and Microsoft Exchange. It also supports BMC's SQL-BackTrack allowing UNIX system backups of Oracle, Sybase and Informix as well as Windows NT backups of Oracle.

❑ Complete

FDR/UPSTREAM maintains all the information about the file. The file date and time, its original size and attributes are all maintained transparently.

1.4 What is FDR/UPSTREAM Client

FDR/UPSTREAM Client consists of several programs, each with their respective functions. Only the most significant programs are mentioned here. As a whole FDR/UPSTREAM allows you to perform backups, restores, software distribution, data sharing, file transfer and a variety of other useful benefits.

1.4.1 FDR/UPSTREAM Service - *uscmd* or *us.nlm* (NetWare)

The FDR/UPSTREAM Service *uscmd* or us.nlm (Novell) is a command line program primarily designed to be installed as a system service (a service in Windows NT, a daemon in UNIX or loaded in NetWare) and process remotely initiated FDR/UPSTREAM requests from the FDR/UPSTREAM host or the FDR/UPSTREAM Director.

The FDR/UPSTREAM Service performs all FDR/UPSTREAM functions: listening for remote requests, backup and restore, logging, and more.

The uscmd program is also capable of processing a single request based on command line parameters for integration into scheduling systems or as a command line API into FDR/UPSTREAM.

1.4.2 Local FDR/UPSTREAM (US.EXE)

Local FDR/UPSTREAM (the US.exe executable) is capable of providing the listening and processing facilities of the FDR/UPSTREAM Service, as well as some additional user interface functionality of building parameter files for unattended operations, inquiries, FDRSOS Local Backup Admin and more. In Windows and OS/2 it uses a graphical interface, in UNIX it uses a character interface.

1.4.3 Configurator (USCFG.EXE)

The configurator provides a way of specifying TCP/IP or SNA parameters for establishing communications connections and various other FDR/UPSTREAM parameters. It also allows you to specify Schedules and Personalization.

The Windows version of the Configurator combines the configuration functionality that was previously provided by a number of other unrelated FDR/UPSTREAM configuration programs such as SETNOV.EXE. It also automates the task of installing, upgrading and reconfiguring FDR/UPSTREAM to run on a Windows 2000 cluster system.

Schedules are specific dates and times that automatic backups occur. You can specify a very large number of schedules, thus allowing you to use FDR/UPSTREAM to perform a variety of functions. You could specify some schedules for automatic backups (incremental daily's, complete weekly's), some schedules for automatic restores (for software or other data distribution), and other schedules for data sharing. With FDR/UPSTREAM... the control is yours.

Personalization allows you to restrict access to specific FDR/UPSTREAM function (backups, restores, etc.), limit access to specific backup profiles or even specific directories. Personalization profiles can be set up to be multi-user aware and follow a user across workstations on a network.

1.4.4 UPSTREAM Director

A full featured GUI user interface for almost all FDR/UPSTREAM platforms, the FDR/UPSTREAM Director allows you to set up parameter files, specify backups and restores, perform profile management and configuration and more from a workstation anywhere in your network. Written in Java, the UPSTREAM director will run on almost any platform and allow you full control of UPSTREAM services anywhere in a large network.

1.4.5 Unattended Operations (USSTART.EXE)

Unattended operations are performed by a small control program. We recommend that you include this program in your system startup files (AUTOEXEC.BAT, STARTUP.CMD, etc.).

When USSTART loads, it reads the configuration file created by the configurator and memorizes the schedules specified. It then calculates the next schedule and waits for it to occur.

When it comes time to run FDR/UPSTREAM, USSTART displays a screen which allows you to skip this schedule if you are using your machine. When FDR/UPSTREAM returns, it calculates the next schedule to run.

1.4.6 Automated Novell Logins and ULTra Profiles (SETNOV.EXE)

For the LAN version using Novell NetWare® profiles can be defined, which allow you to automate SUPERVISOR access to file servers in a safe, secure manner. SETNOV.EXE is a program which allows you to define multiple server logins though the functionality is fully integrated into the UPSTREAM Configurator for Windows as well.

SETNOV can also be used to define ULTra profiles. These are groups of workstations which can be identified and backed up using a single FDR/UPSTREAM request. SETNOV also displays the ULTra workstations which are currently active on the LAN.

1.4.7 End-User Restores

FDR/UPSTREAM End-User Restores is a Java based facility which allows inquiry and restores of data stored on a local or remote system. Since it is a Java application it will run on almost any operating system platform and presents an Explorer-like familiar interface.

1.4.8 FDR/UPSTREAM ULTra (ULTra and LANCOPY)

If you have a TCP/IP, Novell or NetBIOS LAN, and have purchased the FDR/UPSTREAM ULTra version, you can direct FDR/UPSTREAM requests to go to workstations which have installed ULTra. ULTRA is a small TSR (about 20K) in DOS and a small control program in Windows, OS/2 and Windows NT which services file access requests across the LAN using IPX/SPX, NetBIOS or TCP/IP. Requestors which can use ULTRA's facilities include FDR/UPSTREAM (for backups, restores, as of...restores, clock setting, etc.), and LANCOPY which allows workstation-to-workstation file copies without going through a server.

1.4.9 FDR/UPSTREAM Novell Auto-Recall

The FDR/UPSTREAM Auto-Recall facility is a complex set of server programs (USRECALL.NLM), and optionally notification programs on the workstation (USNOTIFY.EXE) which provide transparent, unattended automatic recalls of migrated files. See the Novell and Migration chapters for more information.

1.5 FDR/UPSTREAM's Architecture

UPSTREAM on MVS maintains a repository for all backups. This repository contains all the backup information that you specified, information about the files (including file dates/times, attributes and the like), and the file data itself.

Backups are separated in several ways, hierarchically:

- Backup Profiles. These are user specified ways of identifying groups of backups. You can have many backup profiles for each machine, or limit it to one.
- Version Dates. Each backup is identified by a version date. This is the date and time (on MVS) that the backup was originally created. Combined with the backup profile, version dates allow you to identify a particular backup.
- File specs. Each backup can have one or more file specs. A file spec is a file specification combined with other information. This allows you to be able to backup whole drives, partial directories, some files, or one file and have them grouped together. File specs can also be used to exclude files or specify migration options.

Backup file data can be stored in four different ways on the host:

- Direct to tape. Each backup is written directly to tape. This allows for the smallest amount of mainframe disk storage at the cost of a limited number of concurrent backups or restores.
- Sequential disk files. Each backup is stored in a separate disk file which can be controlled by SMS or any other migration facility. This provides high backup performance and integration with existing services at the cost of temporary disk space.
- In a VSAM KSDS repository (Keyed/Duplicate). This provides high transfer performance, at the cost of mainframe disk space. This backup type is used with the predefined backup profile name USTDUPFL as the duplicate file database. Except for duplicate file handling, we do not recommend using Keyed backups because it doesn't support the merge facility.
- Archived to tape (Archive). All data is stored in the VSAM repository and then later off-loaded to tape. This provides high backup performance and good tape management at the cost of temporary mainframe disk space. We do not recommend using Archive backups because it doesn't support the merge facility.

Selective or complete inquiries or restore can be retrieved easily by a user from the FDR/UPSTREAM workstation screens.

1.6 Backup Strategies

There are virtually an infinite number of ways to integrate FDR/UPSTREAM into your workstation-to-host backup strategy. The merge backup facility is the easiest to use and the most powerful.

Merge backups allow FDR/UPSTREAM workstation to send a fraction of the total data on a disk (only slightly more than an incremental backup) and still end up with a complete full backup. Using a sophisticated technique, the workstation sends a “picture” of the drive(s) to be backed up to the MVS software which uses prior backups plus changed files to construct the fulls.

Advantages:

- A full backup is created with the workstation only having to send a tiny fraction of the total data.
- Easier to use, understand and manage. The beauty of a merge backup is that all the complexity is behind the scenes; it is actually as easy or easier to use than non-merge backups.
- If you are using tapes for incremental backups, you use fewer tapes.

A single backup profile name is used for full and incremental backups. It is recommended that this single profile represent a single, unchanging group of file specs (a single server, a single workstation disk, etc.). The facility is flexible enough for you to be able to add or remove drives, however it is not recommended that you use a profile for more than one entity.

The technique requires that you perform a first-time baseline full backup of the file specifications that you wish to maintain. In this backup you do transmit all the files. Once you have this full backup, you only perform incremental merge and full merge backups.

Incremental merge backups are backups where only the changed files are transmitted to the host. The first incremental merge backup after a full backup begins a new tape or disk file; subsequent incremental merge backups to tape can be appended to previous incremental backups. Subsequent incremental merge backups to disk create new host files.

Full merge backups are appended to the end of the incremental backup file (if the backup is on tape), or a new file is created (if the incremental backups are on disk). The workstation sends all the changed files as well as the directory entries for all files which it does not believe have been changed. FDR/UPSTREAM MVS then examines this list of files, retrieves from old backups (the last full or any of the prior incrementals) files which haven’t changed, and requests from the workstation files which it doesn’t have.

Before FDR/UPSTREAM will use a file from a previous backup, it will verify a match of the complete, qualified file name, the last modified date and time, and the file size. If any one of these conditions do not match, the host software will request a transmission of the file from the workstation. The result is a complete full backup without the workstation software having to read or send the vast majority of the data, and deleted files are properly reflected.

The following scenarios should help you understand the process.

1.6.1 Scenario #1: Full and Incremental Backups to Tape

Figure 2- shows a diagram of how a tape only system would work. This scenario's advantages are :

- No intermediate disk requirements. Data goes directly to tape without having to be staged through disk. This saves on host disk space.
- Good for large volumes of data.
- Only one tape is created per backup cycle (usually weekly). This saves on tape management.

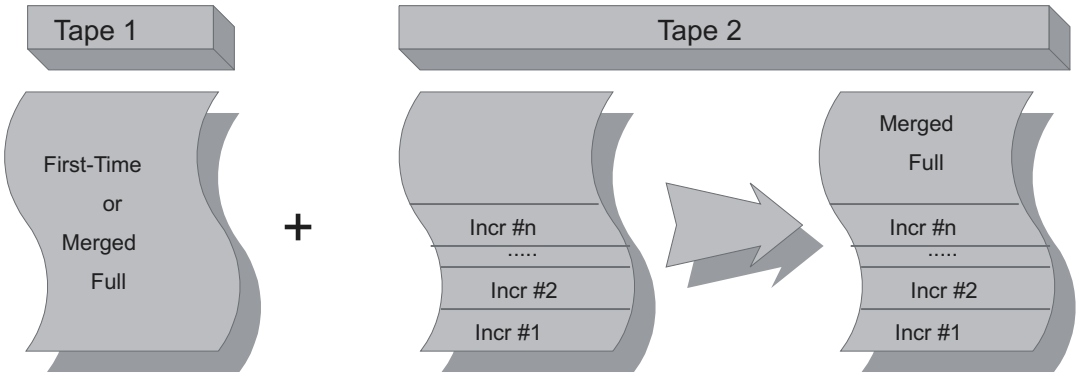


Figure 1-1
Full and Incremental Backups to Tape

When you run your first-time full backup, a new tape is created which holds all the data on your workstation or server (tape 1 in the figure). The first incremental after a full creates a new tape (tape 2 in the figure). Subsequent incrementals are appended to the end of the tape volume.

After your first-time full backup, subsequent full volume backups are merge full backups. In a merge full backup the workstation sends up all the files changed since the last incremental as well as a directory listing. The tape holding the prior full backup is mounted (tape 1) as well as the tape holding the incremental data (tape 2).

Any files that have not been changed will be copied from tape 1 to tape 2 unless they are in the incremental on tape 2 already. The files which were in the prior incrementals on tape 2 are recorded as being part of both the full and incremental backups. The host software then requests any files which could not be matched.

Note that if you are using retention periods for host tapes, the period begins with the first incremental. You will want to allow for this in your planning.

The result is a new full backup tape which will be used as the source for the next full backup.

1.6.2 Scenario #2: Full Backups on Tape and Incrementals on Disk

Figure 2- shows a diagram of how a system where full backups are stored on tape and incremental backups are stored on disk would work. You may want to choose this option if you have sufficient host disk space and do not wish to mount the backup tapes each day. In addition, recovery is quicker for incremental data.

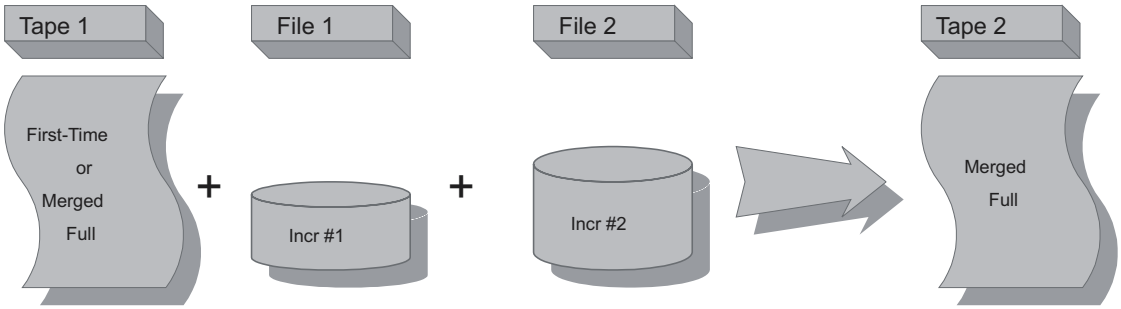


Figure 1-2
Full Backups on Tape, Incrementals on Disk

When you run your first-time full backup, a new tape is created which holds all the data on your workstation or server (tape 1 in the figure). The first incremental creates a file on disk (file 1). Subsequent incrementals create new files on disk.

When you run a merge full backup, the tape holding the prior full backup is mounted (tape 1) as well as the new tape for output (tape 2). The workstation sends up all the files changed since the last incremental as well as a directory listing.

The host software then copies the workstation files which were requested in the workstation directory listing from the incrementals or its most current backup on the last full (tape 1) to the new full (tape 2). The host software then requests any files which could not be matched.

The result is a new full backup tape which will be used as the source for the next full backup.

1.6.3 Scenario #3: Full and Incremental Backups on Disk

Figure 2- shows a diagram of how a disk only system would work. You may want to use this scenario for small backups or where restore speed is important.

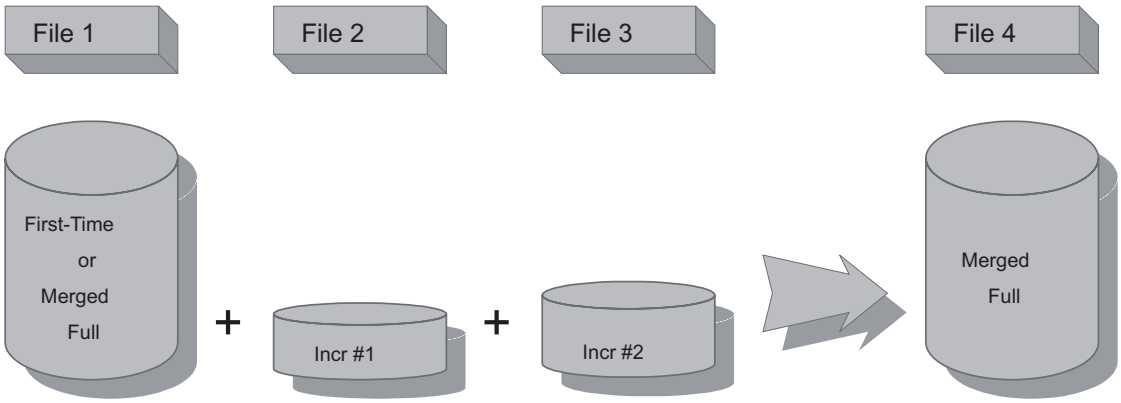


Figure 1-3
Full and Incremental Backups on Disk

When you run your first-time full backup, a new file is created on the host which holds all the data on your workstation or server (file 1 in the figure). Each incremental afterwards creates a new host file (file 2 and file 3).

When you run a merge full backup, the workstation transmits the changed files and they are written to the new full backup file (file 4). Then the host software takes the directory listing transmitted from the workstation and copies from the incrementals (file 2 and file 3) and the last full (file 1) all of the unchanged files.

The host software then requests any files which could not be matched. The result is a new full backup file which will be used as the source for the next full backup.

1.6.4 Duplicate Files

In many cases, software packages such as operating systems, word processors and others must be installed on every workstation or in separate directories. Most of the files associated with this software (executable programs, graphics, screen layouts, etc.) will be identical on each workstation; only configuration and data files are usually unique. Although FDR/UPSTREAM has no problem backing them up from each workstation or directories on the server, the additional overhead to backup many copies of this software when a new version is installed on many workstations or server directories may be considerable.

For example, if you installed Windows 95 on 100 PCs, the next full backup of each of those PCs would have to backup many megabytes of Windows data from each PC, most of which is identical on each PC. The slower the link between the PC and FDR/UPSTREAM MVS, the greater will be the impact of this duplication. This impact could be dramatically reduced if duplicated data can be transmitted to the host just once.

This is what the FDR/UPSTREAM Automatic Duplicate File Support does. Duplicate File Support keeps special backups of files which may be duplicated; during merge backups it will identify files that it already has in that list and include them in the backup without transmitting them. The duplicate backups can be built by FDR/UPSTREAM automatically without any effort on your part, or you can manually select duplicate files.

- If you enable the DUPLICATE=AUTO option in the FDR/UPSTREAM MVS configuration (see the FDR/UPSTREAM MVS manual) duplicate files can be identified without doing any special backups. For files with modification date/times over 30 days old, FDR/UPSTREAM MVS will monitor merge backups from all clients looking for apparent duplicates (same file name, modification date/time and size). When such a file has been backed up twice, a copy of that file will be saved under the USTDUPFL backup profile, just as if a Keyed backup had been done as described below.
- If you wish you can manually identify files which are known to be duplicates and perform Keyed backups using the USTDUPFL backup profile. It is recommended that when you know that files are about to be installed in multiple locations, that you do this thus allowing you to take advantage of duplicate checking immediately.

During a full or incremental merge backup, FDR/UPSTREAM Client will automatically transmit to the host any modified workstation file (based on the archive bit or for UNIX changed since the last backup), unless the modification date/time is greater than 30 days old (or any number of days that you specify). Files not modified or greater than 30 days are not sent; a placeholder record is transmitted. When FDR/UPSTREAM MVS gets to the final step in the backup where it identifies files that must be requested from the workstation since no current copy exists on the host, the duplicate backup support is invoked. Before requesting the unmatched files from the workstation, it will check to see if there is a backup of each such file with a matching name, modification date/time, and file size in the USTDUPFL backup profile. The check does not use the drive/directory qualifier so it will match files which were originally backed up on other drives or directories.

If a match is found under USTDUPFL, the matching file is including in the merge backup using the file as stored in the database. There are two options for processing matched files, controlled by either the **DUPLICATE** option in the host configuration or the **Don't Copy Duplicates to Backup** option in Profile Configuration for the backup profile used in the backup:

- **Copy:** The matching files will be copied from the Keyed backup into the merge backup output file. In subsequent backups, that copy will be carried forward by normal merge backup processing and the file in the Keyed backup will not be used again. This has the advantage that the backup files will be self-contained and the backups under USTDUPFL can be deleted once all workstations that require them has done backups.
- **Don't Copy:** The merge backup output file will be updated with pointers to the duplicated files in the Keyed backup. During any restore that requires those files, the Keyed backups in the FDR/UPSTREAM MVS file data cluster will be read. This has the advantage that the backups will be faster (since there is no data movement required for duplicate files), host storage

requirements are reduced, and you can use duplicate file restores. However it does require that the Keyed backups be retained as long as any workstation backup may point to them; it also requires that the current file data cluster be available during disaster recovery. If you set DUPLICATE=NOCOPY in the USTDUPFL profile definition as well, inadvertent deletion of duplicate files will be prevented. If the duplicates are deleted but are still pointed to by the backups of some workstation, FDR/UPSTREAM MVS will detect this and request the files from the workstation during the next full merge backup.

If you select the Don't Copy option (above), FDR/UPSTREAM MVS will automatically enable duplicate file restores. This facility reduces the amount of data transmitted through the host sending placeholder records to the client and one copy of a file which is stored on multiple locations in the restore. There can be a significant reduction in the amount of data transmitted if there are a large number of the same files stored on your system.

You should note:

- Duplicate file support will work only if the duplicate files are installed on the workstation without changing the modification date/time. The installation procedure used for most software will create the files with the same modification date/time on all workstations. This support can be used for files other than those associated with software packages, but the duplicate files must have the same modification date/time on each workstation.
- You may want to do the USTDUPFL backup even for existing software products if you plan to start doing new FDR/UPSTREAM merge backups for existing workstations/servers, so that those duplicate files do not need to be transmitted from each workstation. However, the first time full backup function will transmit all files on the workstation and will not invoke the duplicate file support. FDR/UPSTREAM no longer requires the use of the first time full backup, and we recommend that you perform normal full merge backups even if this is the first time for a system so that you can take advantage of duplicate file support.
- File names (not including drive or directory qualifiers) must be no longer than 30 characters.
- Files stored in the duplicate file database are stored using high compression if any compression was specified during the backup.

1.7 FDR/UPSTREAM Windows

FDR/UPSTREAM Windows is a powerful member of the FDR/UPSTREAM product line. Its many features include:

- Support for all standard FDR/UPSTREAM functions. These include standard backups/restores, merge backups, point-and-shoot restore of individual files, directories, and drives, host status and reporting, file transfer, and more...
- Support for virtually every feature of Windows NT/2000/XP/2003 including Active Directory, clusters, long file names, registry hives, system event logs, security ACLs, extended attributes, alternate data streams, mount points, compressed files, sparse files, user quotas, encrypted files and more...
- Support for backup, restore and display of Unicode (non-ASCII) file names.
- Ability to operate as both a Windows application and as a service.
- Support for the Automatic System Recovery (ASR) mode in Windows XP and Server 2003. This allows for fast recovery of a Windows system with simple and minimal pre-recovery steps.
- Single diskette recovery utilizing physical disk facilities and the FDR/UPSTREAM ULTra component.
- Windows NT/2000/2003/XP/95/98/ME and Novell file server support. A FDR/UPSTREAM Windows 2000/XP/2003 machine can perform complete file server backups for all of these server types. A FDR/UPSTREAM Windows NT machine can perform complete backups of Windows NT/95/98/ME and Novell file servers and a FDR/UPSTREAM Windows 95/98/ME can perform backups of Windows 95/98/ME and Novell file servers.
- Full Novell auto-recall support including notification.
- TCP/IP and SNA. TCP/IP support uses the powerful WINSOCK interface, allowing FDR/UPSTREAM to use the TCP/IP implementation included with Windows NT or any other vendor. FDR/UPSTREAM Windows NT supports the Microsoft SNA Server and SNA Workstation products as well as the IBM Personal Communications SNA product. FDR/UPSTREAM allows simple configuration of SNA Server/Workstation through the FDR/UPSTREAM Configurator.
- PC Scheduler. FDR/UPSTREAM includes a powerful scheduler that allows PC users or administrators to schedule any combination of backups or restores. The facility can even be used to schedule non-UPSTREAM programs.
- Powerful Host Control. Virtually every FDR/UPSTREAM Windows function can be controlled from the host including backups, restores, reporting, restarting failed backups, execution of local programs and host reporting. The SNA vendor supplied attach manager or the supplied FDR/UPSTREAM TCP/IP attach manager will even start FDR/UPSTREAM Windows NT if it is not running.

If you are running Windows 95/98/ME or Windows NT/2000/XP/2003 proceed to chapter 3 for the installation and configuration of FDR/UPSTREAM Windows and associated communications facilities.

1.8 FDR/UPSTREAM UNIX

FDR/UPSTREAM UNIX is a flexible member of the FDR/UPSTREAM product line. Its many features include:

- FDR/UPSTREAM UNIX will operate on any of the three main AIX hardware platforms (Power/1, Power/2 and Power/PC), Sun Solaris (RISC and Intel), HP HPUX, Compaq Tru64, Intel and S/390 Linux and OS/390 UNIX on System 390 hardware.
- Support for all standard FDR/UPSTREAM functions. These include standard backups/restores, merge backups, point-and-shoot restore of individual files, directories, and drives, host status and reporting, file transfer and more...
- The UPSTREAM Rescuer for disaster recovery on selected platforms.
- Support is provided for a number of UNIX specific features including long file names, case sensitivity, symbolic links, hard links and more...
- NFS attached file systems.
- Character special logical and physical volumes.
- FDR/UPSTREAM UNIX provides a full screen interface which will operate from the system console, an X terminal, dumb terminals or TELNET terminal emulation (except OS/390 Unix System Services).
- Command line version of FDR/UPSTREAM allows unattended host control or integration into applications.
- Backups and restores can be initiated locally, from the MVS host, another UNIX system, or a PC.
- TCP/IP and SNA. Both native TCP/IP facilities and SNA Server (AIX) are supported.
- Powerful Host Control. Virtually every FDR/UPSTREAM UNIX function can be controlled from the host including backups, restores, reporting, restarting failed backups, execution of local programs and host reporting.

If you are running UNIX proceed to chapter 4 for the installation and configuration of FDR/UPSTREAM UNIX and associated communications facilities.

1.9 FDR/UPSTREAM OS/2

FDR/UPSTREAM OS/2's many features include:

- Support for all standard FDR/UPSTREAM functions. These include standard backups/restores, merge backups, point-and-shoot restore of individual files, directories, and drives, host status and reporting, file transfer and more...
- IBM, and Novell file server support. FDR/UPSTREAM offers to ability to perform complete file server backups for IBM LAN Server (all versions) and Novell servers (v4.x and v5.x)
- Support for a wide variety of OS/2 versions from OS/2 v3, OS/2 v4.x (Warp), Warp Connect and Warp Server.
- Full 32-bit application.
- Full Novell auto-recall support including notification.
- TCP/IP and SNA. TCP/IP support includes the TCP/IP implementations from both IBM and Novell. SNA support includes all IBM OS/2 SNA products (CM/2, Personal Communications and Comm. Server).
- Presentation Manager interface. All of the FDR/UPSTREAM programs are Presentation Manager programs. Thus it is easy to use and familiar to most users.
- PC Scheduler. FDR/UPSTREAM includes a powerful scheduler that allows PC users or administrators to schedule any combination of backups or restores. The facility can even be used to schedule non-UPSTREAM programs.
- Powerful Host Control. Virtually every FDR/UPSTREAM OS/2 function can be controlled from the host including backups, restores, reporting, restarting failed backups, execution of local programs and host reporting. The SNA attach manager or an included TCP/IP attach manager will even start FDR/UPSTREAM OS/2 if it is not running.
- Multiple, simultaneous backups. OS/2 is a multitasking operating system, and thus you can run multiple copies of FDR/UPSTREAM which will allow better overall throughput when using a single PC to back up multiple servers. Sophisticated, transparent multi-tasking and multi-user facilities allow easy sharing of FDR/UPSTREAM facilities or the highest performance backups.
- Very high performance. Added to the high performance and reliability of the OS/2 operating system, FDR/UPSTREAM OS/2 is multithreaded, pre-opening files in advance of their being needed, and reading large blocks of data.
- Reporting of Negotiated CM/2 SNA Performance Values. When FDR/UPSTREAM starts or as requested from a pull down menu, it reports the negotiated RU sizes and pacing values.
- Modification of execution priority. The priority of the running FDR/UPSTREAM program can be modified and saved for later use.

If you are running OS/2 see the *FDR/UPSTREAM OS/2 Supplement* supplied in the documentation directory on the CD for installation and configuration instructions.

1.10 FDR/UPSTREAM for Novell

Novell servers can be backed up:

- From a Windows or OS/2 PC. In this case FDR/UPSTREAM will use the Novell client tools to back up most Novell features including NDS, binderies, trustees, file and directory information and more.

  If you are using this method you should first proceed to the chapter for the operating system you will be running FDR/UPSTREAM on, and then proceed to the Novell chapter (chapter 14).

- From the Novell Server. FDR/UPSTREAM includes a NLM version which allows direct backup from the Novell server to the host. When you are running on the server, you can either use the client facilities to back up Novell specific information (as if it was a client machine), or you can use Novell's Storage Management Services (SMS).

  Novell SMS is recommended when possible as it backs up all Novell features not covered by the client services including Mac and NFS name spaces. There are some limitations described in the Novell chapter.

  You should first install and get FDR/UPSTREAM operational on some PC workstation and then see the Novell chapter (chapter 5) for more information on installation, configuration and use of the NLM version.

  GroupWise 6 backups and restores are supported via SMS when running FDR/UPSTREAM on a Novell Server.

- From a Windows NT/2000/XP/2003 machine using SMS. This is generally not recommended at this time due to poor NetWare performance. If you wish to use this method, see the Windows NT/2000/XP/2003 chapter and then the Novell chapter.

2 How to Use FDR/UPSTREAM

FDR/UPSTREAM is a powerful and sophisticated backup/restore and software distribution product with tremendous flexibility. This section will help you understand some of the ways that you can use the product.

Some of the important issues in using FDR/UPSTREAM are:

- Methods for backing up file servers
- Methods for backing up user's workstations
- Scheduling backups/restores/software distribution
- FDR/UPSTREAM Parameter Files
- Backup Profiles
- Host storage issues

2.1. Backing up Servers

The first decision that you must make when backing up servers is whether FDR/UPSTREAM is to reside on the server or on a LAN attached workstation. In several cases FDR/UPSTREAM works in only one way. You may also choose to mix the two methods.

Issues specific to each server vendor are discussed later in this manual. This section is designed to help you understand the different methods available in FDR/UPSTREAM.

NOTE: Merge backups are always the recommended method for backing up servers.

NOTE: Running FDR/UPSTREAM on the server (keeping it close to the data) is usually the fastest method.

2.1.1. LAN Attached Workstations

Using FDR/UPSTREAM on a LAN attached workstation has several advantages:

- **Fault-tolerance:** If the server hardware become inoperable (disk crash, etc.), the system containing FDR/UPSTREAM will still be available and as soon as the server hardware and operating system has been replaced, FDR/UPSTREAM can immediately be available to perform the restore.
- **Server Safety:** Several types of servers (most particularly Novell NLMs) can be crashed by programs running on the server. Backups by LAN attached workstations avoid these problems.
- **Less Server Impact:** By running your backups on another machine, the server's CPU will not be running the backup software, making it more available.
- **Simpler:** Since a single FDR/UPSTREAM LAN attached workstation can back up a number of servers, installation, configuration, and management issues are simplified.
- **Local Backup Storage:** While you can use local backup storage of data if you are running on the server, you must be sure to store your data on another disk to assure recovery in case of disk loss. This is best performed when running FDR/UPSTREAM on a workstation other than the server.

All FDR/UPSTREAM server backups can be performed by LAN attached workstations.

The most common way that FDR/UPSTREAM is used on LAN attached workstations to back up servers is by placing the FDR/UPSTREAM machine in a central location (like your computer room) as close to the host device that it is communicating through for performance (few if any bridges or routers). The figure below shows a sample scenario of a single LAN attached workstation backing up three LAN attached file servers.

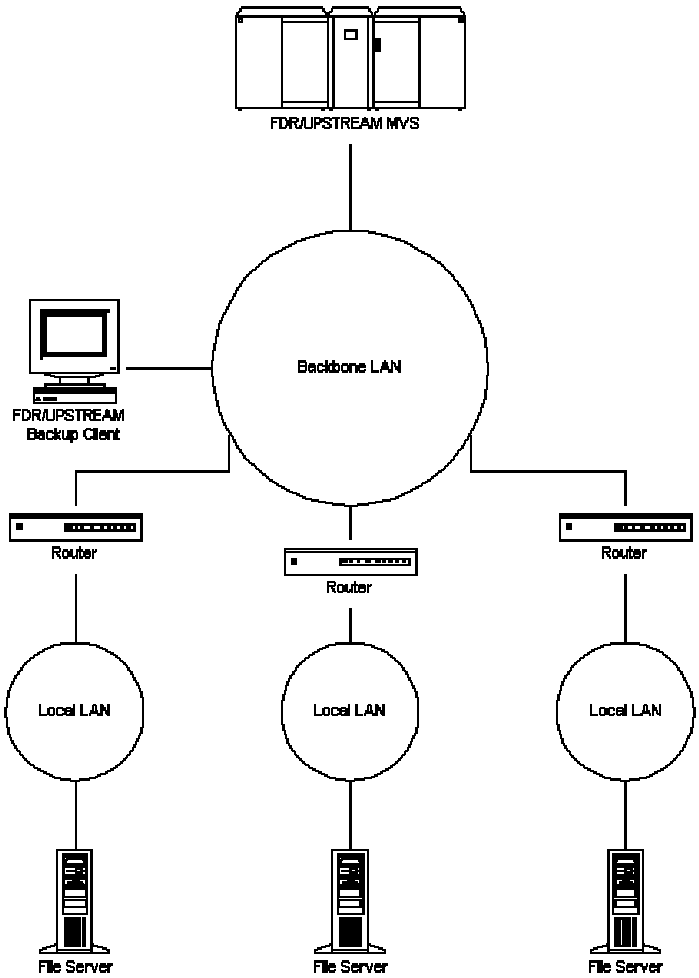


Figure 2-1
Sample Novell Server Backup Scenario

In this scenario, a single workstation running FDR/UPSTREAM will attach to each of the three file servers in sequence, performing merge backups of each. Note that the routers are effectively transparent.

There are any number of variants to this scenario. For example:

- Different LAN types are quite common; the FDR/UPSTREAM machine may have a Token-Ring card to attach to the host device Token-Ring and an Ethernet card to attach to the server LAN.
- The FDR/UPSTREAM LAN attached workstations may be close to the servers and further from the host (based on the bridge/router distances imposed). You may do this to optimize server disk speed (often the bottleneck) over host connectivity or to take advantage of compression over slow lines. This also helps reduce backbone LAN traffic.
- Using the FDR/UPSTREAM machine to back up workstations or servers using ULTra.

The number of servers that a LAN attached workstation can back up depends upon several issues. The key to this is the backup “window”: This is the amount of time that you are willing to allow a file server to be backed up. Since you want to perform backups when the fewest number of people are using the server, most backups are performed at night. Thus a typical backup window might be 10 hours: 10 PM to 8 AM. Issues affecting the number of servers that can be backed up within the window are:

- **Performance:** This is the total amount of time to perform a full or incremental backup. Simply, how long it takes to back up each server. Host communications, server access are some of the issues affecting performance. There are a number of performance improving techniques (discussed in the Performance chapter) which can help to improve your server backup performance.
- **How you schedule full vs. incremental merge backups:** Full backups (even full merge backups) take longer than incrementals. If you stagger the fulls so that you don't run all the full backups on the same night, you help to increase the number of servers you can back up within your window.

There are few actual limitations to the number of servers that can be backed up with an FDR/UPSTREAM LAN attached workstation. If you use UNC file names (recommended for LAN attached drives), even drive letters are not a concern.

However, the main practical limitation is the number of servers that can be backed up within your backup window. A good rule of thumb is 5 servers per FDR/UPSTREAM client, but we always recommend testing with your servers in your environment will give you the actual number.

If you have Windows NT or OS/2 File Servers you can also use ULTra to back up these servers. We recommend this in the case where your servers are remote (have a slow connection) to the FDR/UPSTREAM client. ULTra's high compression can actually be faster than Microsoft Networking in local environments; in remote environments the performance differences can be significant.

2.1.2. FDR/UPSTREAM on the Server

Using FDR/UPSTREAM on the server is the recommended method for backing up all file servers. It has several advantages:

- **Performance:** Since performance is so important for both backups and restores, having FDR/UPSTREAM on the server gives you the fastest possible disk read speeds as well as significantly reduced overhead in accessing data. This difference in performance can be up to an order of magnitude.
- **Reducing LAN Traffic:** Since the data does not have to be transmitted over the LAN from the server to the FDR/UPSTREAM machine, the LAN traffic is cut in half.

This method is conceptually quite simple; merely install FDR/UPSTREAM on all the servers you wish to back up; it's virtually identical to backing up a user's workstation (with the added overhead of server specific information). The figure below shows a sample using FDR/UPSTREAM to back up three file servers.

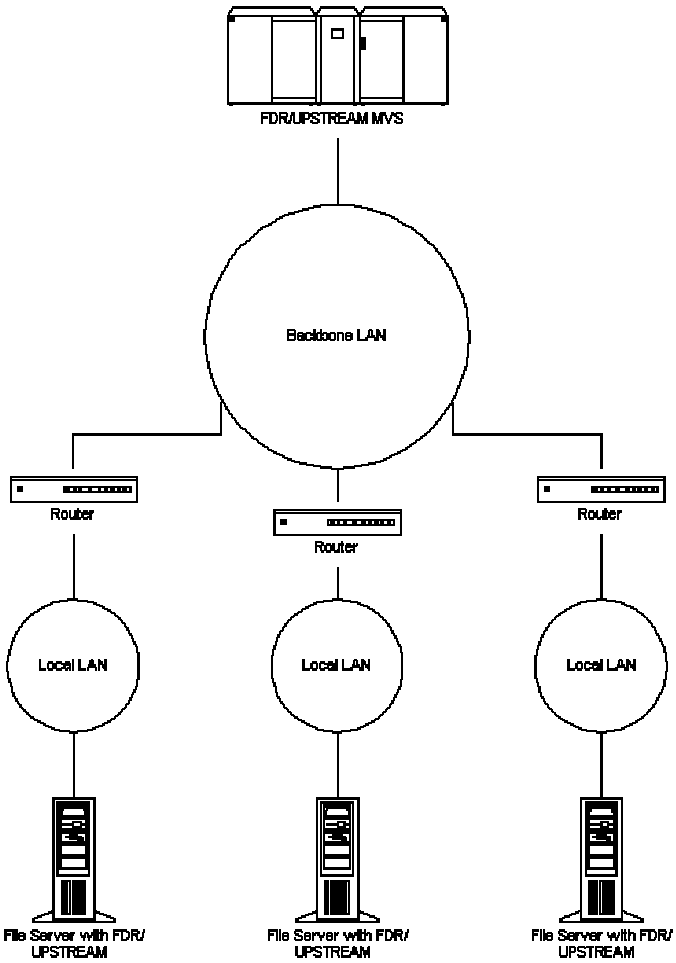


Figure 2-2
Sample Windows NT Server Backup Scenario

The most common variants used with this method are using ULTra to backup workstations and also using the FDR/UPSTREAM machines to backup other servers through the LAN (the previous method).

2.2. Backing up Workstations

FDR/UPSTREAM offers outstanding features for backing up user's workstations. Its wide array of connectivity options, its unique ULTra feature and more make it the method of choice for backing up user workstations and for distributing software.

The two main methods for backing up workstations are either installing FDR/UPSTREAM on each workstation, or using one or more FDR/UPSTREAM machines with ULTra.

2.2.1. FDR/UPSTREAM on Each Workstation

This is the simplest method conceptually, but can be the more complex to implement. Basically, you install the complete FDR/UPSTREAM product on each workstation. The advantages of this method are:

- **Users can perform their own restores:** Since they have the entire product a user can perform their own restores. Since virtually any feature can be restricted using the Personalization facility (including which files can be restored), administrators can still effectively manage the facility.
- **Users can control what they backup:** If a user determines that a directory needs to be backed up immediately, they can just do it, without having to go to an administrator.
- **Users can control when they perform backups:** The client scheduler becomes available to users allowing control of when backups are most desirable to them.
- **Higher performance:** Since data is only transmitted once, the performance is higher than if ULTra was used.
- **Operates in all FDR/UPSTREAM environments:** ULTra can not be used on TCP/IP LANs (unless NetBIOS is available), or on UNIX workstations.

2.2.2. FDR/UPSTREAM ULTra

FDR/UPSTREAM ULTra (UPSTREAM LAN Transport) is available for workstation backups. However, because the full power of UPSTREAM is necessary for Windows 2000/2003 and XP systems, we no longer recommend ULTra for workstation backup for new installations.

2.3. Scheduling

Performing ad-hoc backups and restores is the starting point to using FDR/UPSTREAM. But, backups are generally an unattended, scheduled process. They are something that once setup, just work; when you need to perform a restore, you expect to find the files you need.

Software distribution, the act of sending new software or data files to a number of workstations, is also an unattended process.

Scheduling of FDR/UPSTREAM consists of:

- **Planning.** Determining what your repeatable events are, and building a schedule. For backups, this generally means determining what time your backup window starts, how often you want to perform full vs. incremental backups, etc.
- **Implementation:** Implementing your schedule using FDR/UPSTREAM's powerful scheduling and control facilities.

2.3.1. Planning

The FDR/UPSTREAM Automated chapter in this manual helps you plan your backup or software distribution strategies. Some issues to help begin in implementing your plan are:

- When your backup window begins. What time of day for a given day of the week do you want to begin your backup or software distribution and making sure that your machine and files are available during the window.
- How often you wish to perform full vs. incremental backups. We always recommend using the full merge facility. We recommend performing daily incrementals and periodic full merge backups (weekly, bi-monthly, monthly, etc.).
- Access to host resources. Access to tape drives, disk storage space, etc. may affect when you can perform your backups. We recommend consulting with host administrators before finalizing scheduling with FDR/UPSTREAM.
- The performance of the backups. The time it takes to perform a full and incremental backup will affect your scheduling.
- Infrequent events. These may consist of Migration (see later in this chapter), or non-FDR/UPSTREAM functions.

Most users plan incrementals during the week (Monday-Thursday) and full merge backups over the weekend (starting Friday night).

2.3.2. Implementation

Once you have decided what you will be backing up, when it will be backed up, and where it will be backed up to, you must decide on the method you will use in requesting this backup. FDR/UPSTREAM offers three ways backups and restores can be started (**initiated**) automatically:

- **Client Scheduled:** FDR/UPSTREAM includes a powerful client scheduler (USSTART). This scheduler allows you to start virtually any function (even non-UPSTREAM functions) unattended in virtually any combination of daily, weekly, monthly and more times.

- **Host Scheduled:** FDR/UPSTREAM client functions can be requested through batch jobs which can be started using your existing host scheduling system.
- **Remote client Scheduled:** A client can request an FDR/UPSTREAM function of another FDR/UPSTREAM Client. Since FDR/UPSTREAM includes a scheduler, this function can be fully automated.

2.3.3. Client Scheduled (Initiated)

The FDR/UPSTREAM Automated chapter in this manual describes how to set up Workstation Schedules in the Configurator for initiating FDR/UPSTREAM directly or batch or script files which start FDR/UPSTREAM. Worksheets are provided to help you get this straight.

These schedules can be quite sophisticated, consisting of virtually any number of timed daily, weekly, monthly, quarterly or yearly events.

The USSTART program executes these schedules. This program is tailored to your environment. In Windows it's a standard Windows program, in OS/2 a PM program, and in UNIX a command line utility which can be placed in the background. In all cases USSTART is designed to be as unobtrusive as possible, start FDR/UPSTREAM and non-FDR/UPSTREAM functions, and fit nicely into your environment.

2.3.4. Host Initiated

Host initiated backups are run through the USTBATCH program; even backup/restore requests generated using the FDR/UPSTREAM MVS ISPF program run through this facility.

The figure below shows how the USTBATCH process operates. While complex in operation, setup and use are really quite simple - and made even simpler if you use the FDR/UPSTREAM MVS ISPF facility to generate JCL which you then integrate into your existing host scheduling system.

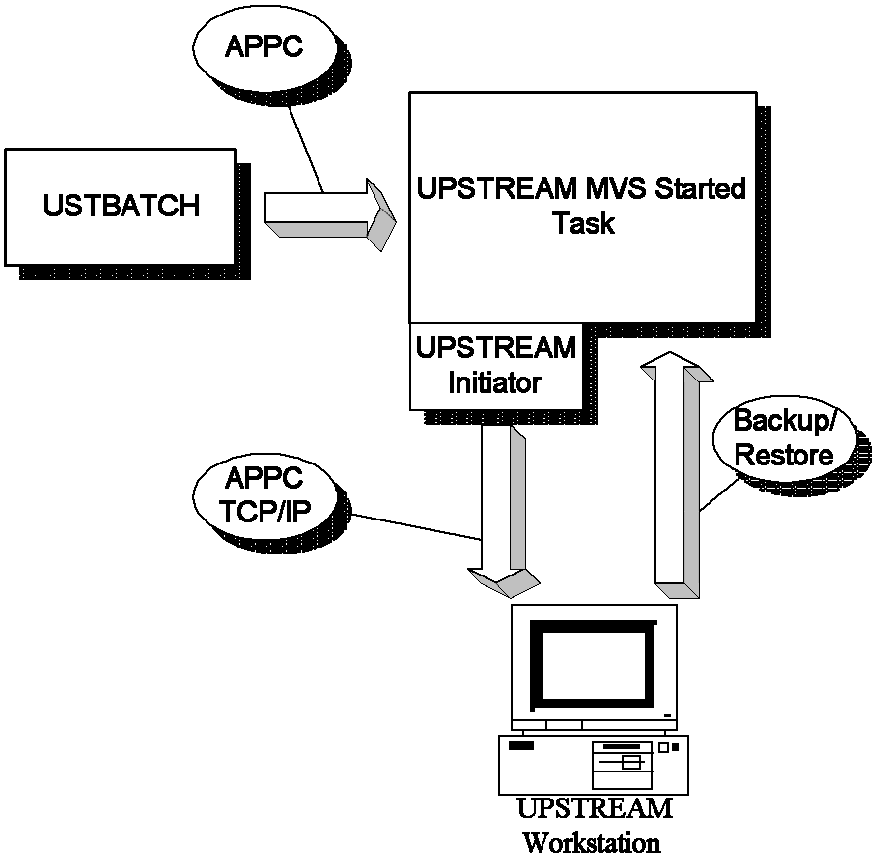


Figure 2-3
USTBATCH Process

2.3.5. Remote Client Scheduled

An FDR/UPSTREAM Client can request an FDR/UPSTREAM function of another FDR/UPSTREAM Client either through the mainframe or directly system-to-system (see the Advanced Configuration chapter in this manual). Since FDR/UPSTREAM includes a scheduler, this function can be fully automated.

Since this process can be quite complex, we recommend that you use either the host initiated or PC initiated method.

2.4. Parameter Files

When you perform many FDR/UPSTREAM functions including backups, restores, unattended functions and the like you are asked if you wish to save your values in an FDR/UPSTREAM parameter file.

Parameter files save all the parameters that you entered: backup profiles, versions, file names, and more. FDR/UPSTREAM's ability to save this information allows you to be able to repeat these functions without having to re-enter the information.

The biggest value of parameter files is in automated, unattended processing. If you wish to run daily incremental and weekly full merge backups, you will create a parameter file for the full backup and a separate parameter file for the incremental.

You can "run" a parameter file in several different ways:

- Select the **Open** option in the **File** menu to read in the values in a parameter file in memory. You can then enter the backup, restore or whatever function dialog was specified and modify the values. You can later either press the <Ok>, or <Save> buttons to leave the dialog and save your parameter changes or pull down the Save option in the File menu to save you parameters after you have left the dialog.
- From the command line when starting FDR/UPSTREAM. This is most commonly used when automating FDR/UPSTREAM for locally initiated functions using the FDR/UPSTREAM Scheduler (USSTART).
- From the host, using the **WSPARM** keyword in USTBATCH processing.

For simplicity sake, most users end up with two parameter files for each entity that they are backing up: a full merge backup and an incremental backup. For example, if you are backing up 3 Novell servers from your FDR/UPSTREAM PC, we would recommend the creation of 6 parameter files as follows:

Server	Parameter File	Description
Server1	SERVER1F.DAT	Full merge backup parameters for Server1.
	SERVER1I.DAT	Incremental backup parameters for Server1.
Server2	SERVER2F.DAT	Full merge backup parameters for Server2.
	SERVER2I.DAT	Incremental backup parameters for Server2.
Server3	SERVER3F.DAT	Full merge backup parameters for Server3.
	SERVER3I.DAT	Incremental backup parameters for Server3.

Server	Parameter File	Description
<none>	RMTPARM.DAT	Supplied parameter file used for handling host initiated backups with SNA in FDR/UPSTREAM Windows, OS/2 and UNIX.
<none>	UPSTREAM.DAT	Default FDR/UPSTREAM parameter file. Most often used for testing, and ad-hoc backups and restores.

Parameter Files on an FDR/UPSTREAM PC
Used to Backup up 3 Novell Servers

Note that the parameter file names include the server name (SERVERn) and have a F or I suffix to indicate that this is either a full or incremental backup parameter file. Most users truncate the server name if it is longer than 6 characters.

Also note **RMTPARM.DAT**. If you are running FDR/UPSTREAM with SNA, the SNA attach manager will start FDR/UPSTREAM for you. RMTPARM.DAT is included to allow FDR/UPSTREAM to wait for host initiates, service them, and terminate after the last one has been serviced.

Most users also have an UPSTREAM.DAT. This is the default parameter file and most users will use it only for ad-hoc backups and restores.

UPSTREAM.DAT will give you a warning if you set it to be unattended. UPSTREAM.DAT should never be used for unattended processing.

2.5. Backup Profiles

Understanding Backup Profiles is fundamental to using FDR/UPSTREAM. A Backup Profile is intended to be used as the key to represent a single, identifiable group of files. Thus you would use a backup profile to represent:

- All the volumes on a server.
- All the disks on a PC.

A backup profile should not be used indiscriminately for more than one PC or more than one server without careful consideration to the implications.

On the FDR/UPSTREAM Client, the backup profile is specified on one of any number of screens and is stored in the parameter file. In the examples in the previous section (Parameter Files), the backup profile name would be the same as the server name (SERVER1, SERVER2, SERVER3). In each parameter file you would list all the volumes on the server to be backed up (for example, F:*.*, G:*.*, etc.). On a local disk, your backup profile would include file specs for all your drives (for example, C:*.*, D:*.*, etc.).

On the host, backup profiles are used for several purposes:

- As a single identifier to allow workstations/servers to be able to access files on a given PC or server.
- Allowable storage types and backup types.
- File names or prefixes, retention periods, etc.
- Attributes for merge backups.
- ...and more...

Think of the backup profile as the key to the files on your workstation or server. Whenever you specify backups or restores for that PC or server, you should always use the same backup profile.

There are a variety of profile definitions in FDR/UPSTREAM. Each have a specific, but different, purpose:

- **Backup Profiles:** A single identifier which you use to group the files on a given workstation or server.
- **Novell Profiles:** Use to automate the login to a Novell server. These are specified in the SETNOV program and are fully described in the Novell chapter.
- **ULTra Profiles:** Use to group a number of workstations in a single backup or restore request. These are also specified in the SETNOV program and are fully described in the ULTra chapter.

Note that when using ULTra Profiles, each workstation still has a unique Backup Profile.

There are a wide variety of facilities within FDR/UPSTREAM for specifying and modifying Backup Profiles:

- Backup and Restore dialogs. Here you specify the backup profile that you will be using for the backup and restore.
- Profile Management: Here you can view original backup specifications for all backups stored on the host or for a specific profile (with wildcards). You can also delete backups (if you have adequate security).
- Profile Configuration: Here you can view, modify, add or delete profile information as defined on the host. This information includes the types of backups allowed, storage information and more.

The host must have defined to it attributes about the backup. Thus you must either define each backup profile specifically using the host configuration facilities or Profile Configuration, you can use a Profile Prefix, or you can use a **GLOBAL** profile.

The attributes in the profile name **GLOBAL** are used whenever FDR/UPSTREAM MVS does not have the profile name defined explicitly or using a Profile Prefix. Setting up a **GLOBAL** profile allows client administrators to set up a new FDR/UPSTREAM without changes to FDR/UPSTREAM MVS. Thus, this method is recommended whenever security and storage constraints allow it.

Profile Prefixes are partial Backup Profile names configured within FDR/UPSTREAM MVS. When a profile is received which is not configured, then Profile Prefixes are searched. For example, if you have a group of workstations which will share attributes, you can create a Profile Prefix (for example, WKS) which has these attributes. When you specify backups and restores, you use this name as the prefix for your Backup Profile names (for example, WKSTOM, WKSBOB, etc.).

2.6. Host Storage Management

Simplified, host storage consists of disk and tape. Since each installation's storage needs are unique, FDR/UPSTREAM MVS provides a wide variety of ways that you can store your client data on disk and tape on your MVS host. The client administrator will need to consult with the host storage administrator to decide the type of storage options to select when specifying backups.

Simplistically, the storage options are:

- A separate flat file on disk or tape for each backup.
- All backups stored on disk or tape GDGs
- Storage in the VSAM repository (Keyed and Archive backups). This method is available, but only recommended for storage of duplicate files.

We recommend for most users that full backups be stored directly to tape, and incrementals be stored on disk (all flat files, managed by tape and DASD management systems when available).

The client administrator only has to specify whether a specific backup is stored on a disk or tape flat file, or in the VSAM repository in the backup dialog or host or PC parameters. However, the mainframe and client storage administrators must combine to decide such important issues as:

- Should incrementals be stored on disk or tape? Some factors influencing this decision are the amount of disk space available on the host and the number of tape drives available during the backup window.
- Should disk backups be migrated to tape? You can use the USTMIGRT utility (which is recommended rather than HSM, ABR or a similar host archiving tool) to migrate disk backups to tape or you can use a storage management facility such as ABR or HSM. Some factors include the amount of disk space available and when it is available, and the time and the number of tape mounts necessary for full merge backups.
- How long you need to store your backups for. Auditing, legal requirements and user needs are decision factors. Once you have decided how long to store backups for, you roll off older backups using tape or disk retention periods (with your existing tape or DASD management systems), or GDGs

This is just a partial list. As a client administrator, we recommend that you fill in the following table of relevant decision factors in determining how to store your backups on the host. The subsequent table should be filled in by the host storage administrator and the last table is the result to be used for FDR/UPSTREAM production implementation.

Type	Decision Factor	Your Value
Servers		
	How many bytes on the average server?	
	How many bytes change daily on the average server?	
	How many servers?	
	How many bytes in your largest incremental?	
	How long do you need to keep backups?	
	Will there be a large number of restores (particularly from tape)?	
	Duplicate file savings expected (if any)?	
Workstations		
	How many bytes on the average workstation?	
	How many bytes change daily on the average workstation?	
	How many workstations?	
	How many bytes in your largest incremental?	
	How long do you need to keep backups?	
	Will there be a large number of restores (particularly from tape)?	
	Duplicate file savings expected (if any)?	

Client
Host Storage Decision Factors

	Decision Factor	Your Value
Disk		
	Amount of disk space available	
	Use USTMIGRT or host storage manager	
	GDGs or flat files?	
Tape		
	Number of tape drives available during the backup window	
	Number of tape drives available for restores	
	GDGs or flat files?	

Host Storage Administrator
Host Storage Decision Factors

Type	Decision Factor	Your Value
Servers		
	Incrementals on disk or tape?	
	Fulls on disk or tape?	
	Backup Profile names/prefixes/conventions	
	Full and incremental backups scheduled at the same time or staggered	
Workstations		
	Incrementals on disk or tape?	
	Fulls on disk or tape?	
	Backup Profile names/prefixes/conventions	
	Full and incremental backups scheduled at the same time or staggered	

PC Administrator
Host Storage Results

To help you figure out the methods that will work best for you, a number of sample scenarios follow which describe some sample environments.

2.6.1. Scenario #1: Large Servers/Limited Host Disk

In this example, the FDR/UPSTREAM Client administrator has 12 large servers (avg. 4 GB each) for a total of 48 GB. There are few files in the incrementals (avg. less than 1% for a total of 250 MB per day). Workstations are not to be backed up.

The host administrator can allocate up to 2GB for PC server backup on host disk. There are several tape drives available.

Due to the time required to perform a full merge backup and the number of tapes drives required, it is decided to not perform full backups on all the servers at the same time, but to stagger them throughout the week. This also helps to keep the amount of disk space used at a constant value.

It is decided to keep incrementals on disk in flat files, and to use the USTMIGRT facility daily to migrate them to tape after all the backups have completed. Full merge backups will be written to tape in flat files.

2.6.2. Scenario #2: Servers and Workstations

In this example, the FDR/UPSTREAM Client administrator has 5 large servers (avg. 4 GB each) for a total of 20 GB. There are few files in the incrementals (avg. less than 1% for a total of 250 MB per day). There are 40 workstations to be backed up (avg. 500 MB each) for a total of 20 GB.

The host administrator can allocate up to 10GB for PC server backup on host disk. There are several tape drives available.

For server backups, fulls will be performed, staggered, weekly direct to tape using flat files. Incrementals will be stored on disk, again using flat files. No host migration will be performed, but the COPYINCR option will be used to clean up host disk files.

For workstations backups, fulls will be performed, staggered, weekly direct to tape using flat files. Incrementals will be stored on disk, using flat files. No host migration will be performed, but the COPYINCR option will be used to clean up host disk files.

Note that COPYINCR copies the incremental backups onto the full and deletes the original incrementals. This option is only relevant when the incremental backups are stored on disk.

3 Windows

3.1. Overview

The installation process consists of four steps:

- Determining your system requirements
- Installing the FDR/UPSTREAM software
- Configuring the communications software
- Configuring FDR/UPSTREAM

We recommend that you install, configure, and make operational your TCP/IP or APPC before installing and configuring FDR/UPSTREAM.

If you are using SNA/APPC, see the *FDR/UPSTREAM Client SNA Supplement* supplied in the documentation directory on the CD for configuration instructions.

NOTE: Windows NT/2000/2003/XP users should see page 3-9 for a description of Windows NT/2000/2003/XP configuration issues required for successful FDR/UPSTREAM backups.

NOTE: If you are using FDR/UPSTREAM in Windows XP, you should obtain the hot fix described in Microsoft KnowledgeBase article Q317949 to fix a bug in TCP/IP which affects the FDR/UPSTREAM Director. This fix is also available from Innovation tech support.

3.1.1. Requirements

FDR/UPSTREAM Windows requires the following:

- 20 megabytes of free hard disk space. If you will be backing up large servers you may need up to 100 MB or more of free disk space.
- Microsoft Windows 9.x or NT v4.0 or higher
- Communications hardware compatible with your communications software.
- APPC software for an approved vendor, including Microsoft SNA Server or SNA Workstation or IBM Personal Communications.

or

- TCP/IP.

3.2. Installing FDR/UPSTREAM

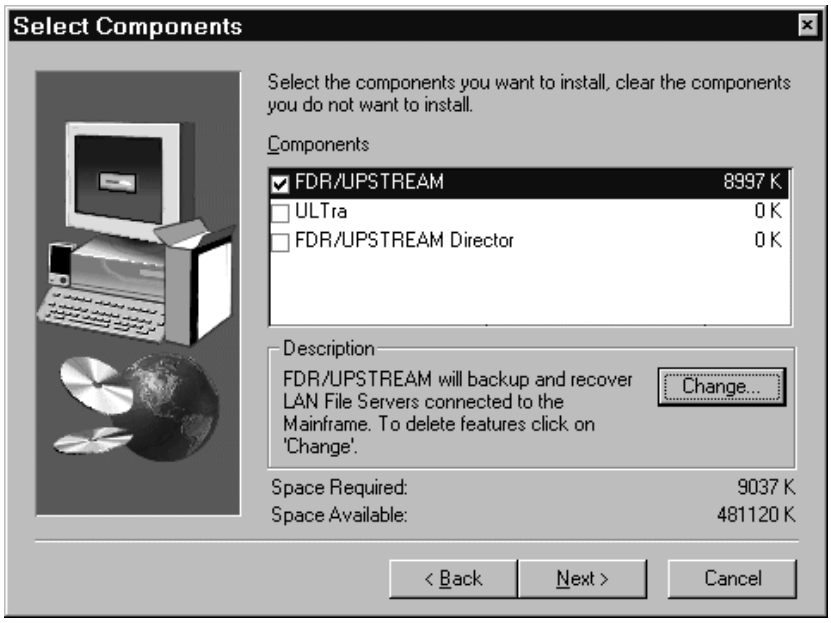
FDR/UPSTREAM includes an installation program (Setup.exe in the root directory of the FDR/UPSTREAM CD) to help you install it for the first time and to upgrade it to a newer version. The installation program performs a number of steps that are cumbersome to perform manually, so you will want to use the installation program to install or upgrade FDR/UPSTREAM.

To begin the installation, press the **Start** button and select **Run**. Enter <drive>:\SETUP. Many users will enter:

```
D:\SETUP
```

You will see a banner and then be asked for your Name and Company. FDR/UPSTREAM does not use this information, but it is required. Press the **Next>** button to continue.

You will then be asked to Choose Destination Location. If you do not wish to use the default directory of C:\UPSTREAM, press the Browse button to specify a different directory. Installing a new version of FDR/UPSTREAM over an existing version is safe as configuration, parameter and other important files are preserved. Press the **Next>** button when you are satisfied with the directory for FDR/UPSTREAM. This will display the Select Components dialog.

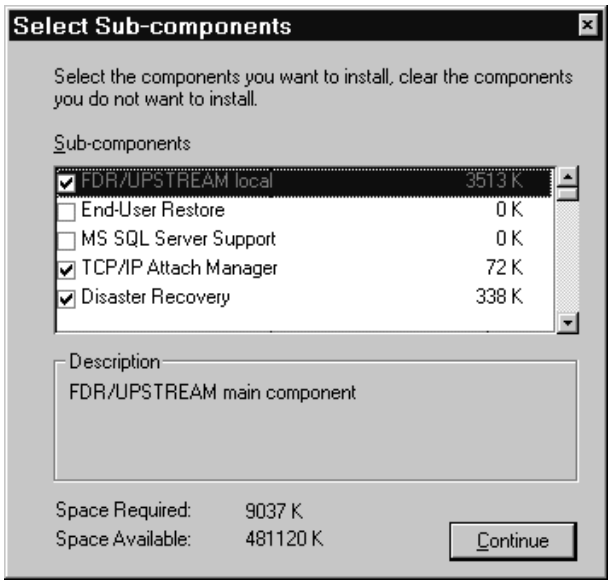


The FDR/UPSTREAM option is checked by default and cannot be unchecked.

ULTra (UPSTREAM LAN Transport) backs up and restores files on an client workstation under the control of an FDR/UPSTREAM for Windows or OS2 on another system. If you wish to install the client software, then check that option.

The **FDR/UPSTREAM Director** is a completely new full featured GUI user interface to FDR/UPSTREAM. Using it you can, from a workstation anywhere in your network, specify backups and restores, check the status of running operations, retrieve log files, perform profile configuration and more. The FDR/UPSTREAM Director requires a Java JRE (v1.2 or higher) which is included in the CD install or is available from a number of web sites (including the Innovation ftp site). It is not included in the single file FDR/UPSTREAM install and will need to be installed separately.

Only some of the full features of FDR/UPSTREAM are installed by default. To view or modify the list of features that will be installed (which most users will need to do), highlight **FDR/UPSTREAM** and press the **Change** button. This will display the Select Sub-components list:



The contents of the Sub-components list will change based on your operating system:

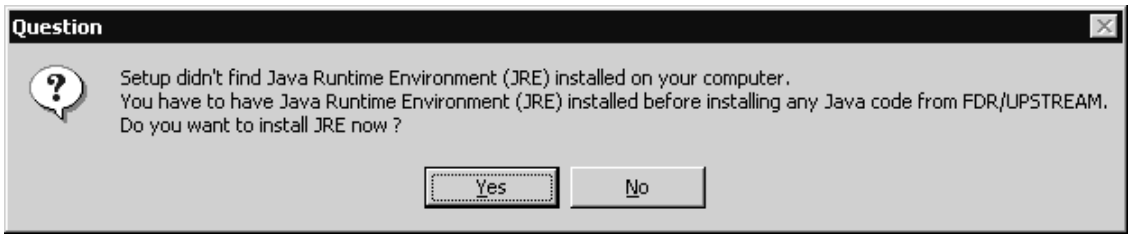
- FDR/UPSTREAM local: This is the base product and it cannot be deselected.
- End-User Restore: Installs the FDR/UPSTREAM End-User Restore program, an easy to use, Java based, Explorer like facility that eases restores for end-users and enables them for all users for remote restore requests. Installing End-User Restores requires the Java runtime library v1.2 or higher, enclosed with the FDR/UPSTREAM distribution (CD based); if you are installing from a single file distributed to you by FDR/UPSTREAM technical support, you will need to download the Java runtime separately. This is unchecked by default.
- MS SQL Server Support: (Windows NT only) Installs FDR/UPSTREAM Microsoft SQL Server support. This is unchecked by default and should only be checked if you have SQL Server installed on this machine.
- TCP/IP Attach Manager: (Windows NT only) Installs the USATTMGR.EXE program which allows activation of FDR/UPSTREAM by remote request.
- Disaster Recovery: (Windows NT only) Installs the physical disk disaster recovery programs including MAKULTRA, ULTRAD and PARTFIX.
- Novell and ULTra: Installs the tools necessary for Novell server backups and management of ULTra Profiles.
- MS Exchange Server: (Windows NT only) Installs FDR/UPSTREAM Microsoft Exchange Server whole database and individual object support.
- DataTools Support: (Windows NT only) Installs the USOBSI.EXE program and associated files which provides FDR/UPSTREAM support of BMC's DataTools SQL-BackTrack database backup product.
- Lotus Notes Support: (Windows NT only) Installs the LNINCR.EXE program which allows incremental backups of Lotus Notes databases as well as the Notes R5 PlugIn.

- Novell Auto-Recall: Installs both notifier and recaller software for Novell Auto-Recall of migrated files.
- SAP/Oracle external MMS: Installs the FDR/UPSTREAM SAP R/3 BACKINT backup/restore agent.
- DB2 UDB Support: Installs the FDR/UPSTREAM IBM DB2 Universal Database agent.
- Oracle Support: Installs the FDR/UPSTREAM Oracle Media Management and Oracle Backup Management Suite software.

When you have selected the options you wish to install, press the **Continue** button to return to the Select Components dialog and press the **Next>** button.

If you requested Novell Auto-Recall, you will be prompted to read the Novell chapter of this manual.

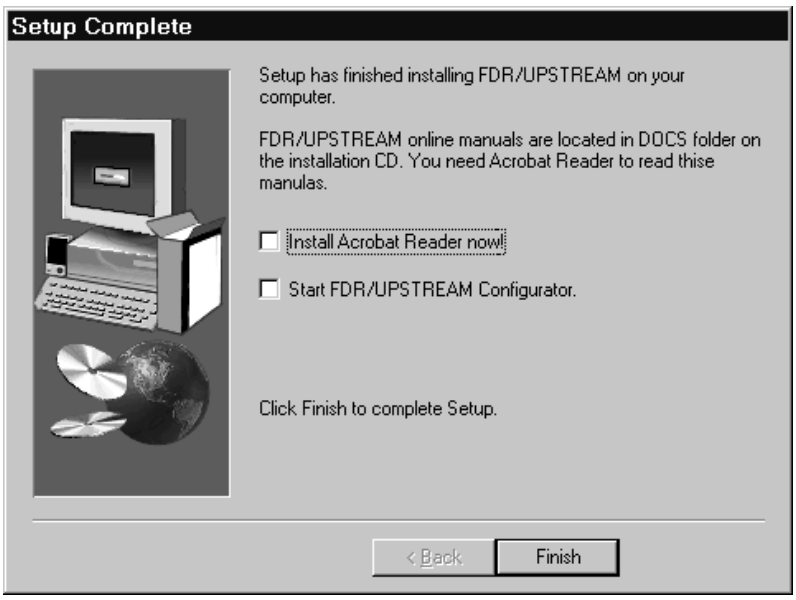
If you selected FDR/UPSTREAM Director or End-User Restores, the following message will be displayed:



FDR/UPSTREAM is able to detect a v1.3 or greater Java Run-time Environment (JRE); if it finds one it will use it. If you have a prior version of the JRE and wish to preserve it, press No. Most users will press **Yes** to be prompted to install the JRE 1.3 from the FDR/UPSTREAM CD. After several confirmations, the JRE will install in the background. Wait until it has completed before continuing.

Here you can select the Program Group that FDR/UPSTREAM will be installed into. The default is FDR_UPSTREAM. Press the **Next>** button to install the selected software.

When the software has been installed, press **Finish** to end the installation process. You do not need to reboot your computer.



If you check the **Install Adobe Acrobat Reader** checkbox, the Acrobat Installer is invoked. Most new users will want to check the **Start FDR/UPSTREAM Configurator** to begin configuring FDR/UPSTREAM.

When you are done, you will see the FDR/UPSTREAM program group created. Now proceed to page 3-6 to configure for FDR/UPSTREAM.

3.2.1. Uninstall

To uninstall FDR/UPSTREAM, enter the Control Panel and select **Add/Remove Programs**. In the **Install/Uninstall** tab highlight FDR/UPSTREAM and press the **Add/Remove** button. You will be asked if you wish to completely remove FDR/UPSTREAM and all of its components.

If you press the Yes button, you may be asked if you wish Transaction Program definitions removed from the registry. If you have created FDR/UPSTREAM services this also pertains to you. If you wish these entries removed as well press Yes.

You will then be asked if you wish to remove configuration files, parameter files, temporary files and directories. As it says, we recommend this only if you are removing FDR/UPSTREAM permanently. Otherwise only the executables are removed.

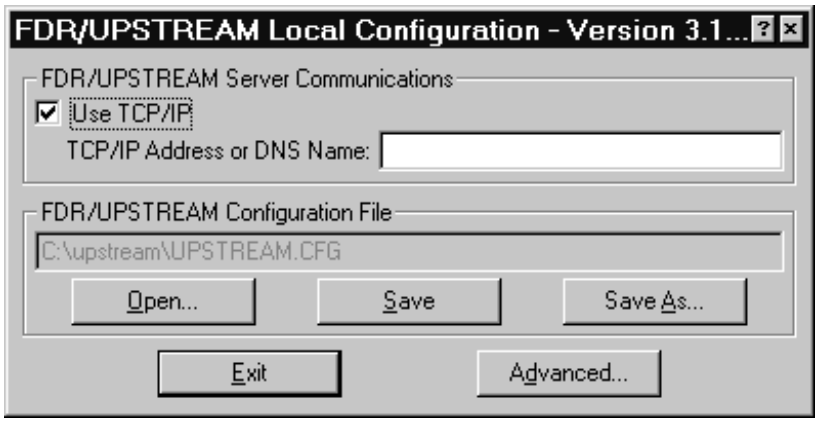
3.2.2. Windows Cluster Server

The installation and configuration of FDR/UPSTREAM on a Windows Cluster Server requires special consideration. Section 13.12. provides a step-by-step procedure for accomplishing this.

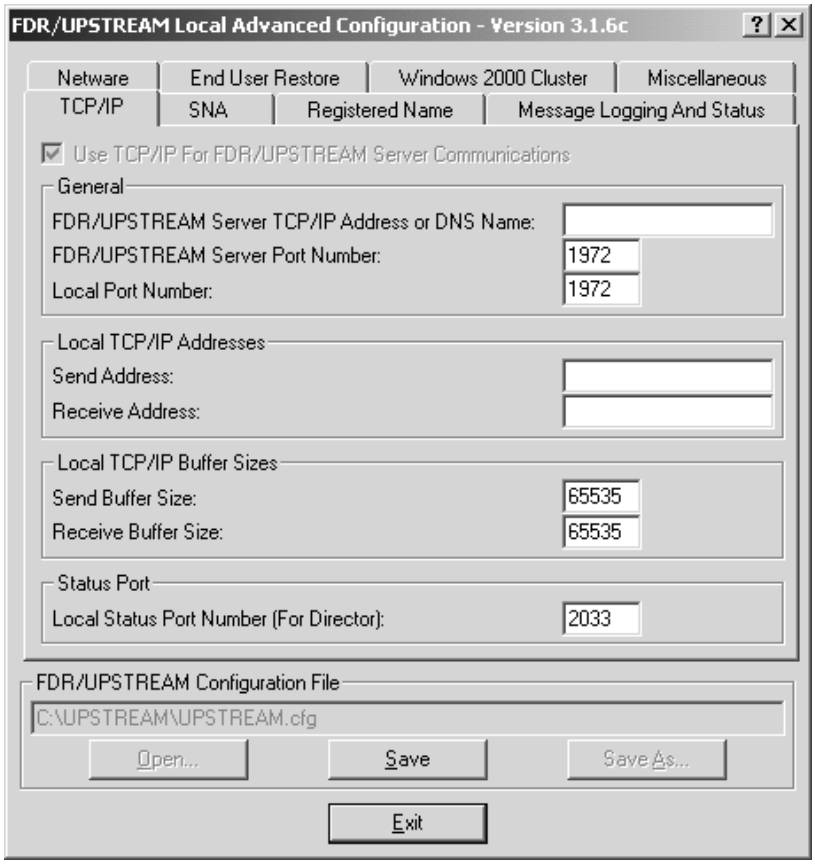
3.3. PC FDR/UPSTREAM Configuration

This section guides you in configuring FDR/UPSTREAM for your communications environment.

The FDR/UPSTREAM Configurator (USCFG.EXE) is started by selecting the Configurator item from the FDR_UPSTREAM (or whatever you named it during installation) folder of the start menu. The first time that you start the Configurator you will see the following dialog displayed:



The one exception to this is if you are configuring FDR/UPSTREAM on a Windows 2000 cluster system, in which case you will se the following dialog:

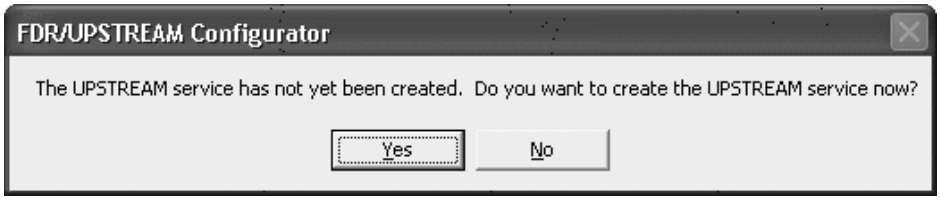


On both of these dialogs, assuming that you will be using TCP/IP as the communication protocol between FDR/UPSTREAM Local and the FDR/UPSTREAM Server, you must enter the TCP/IP address of the FDR/UPSTREAM Server in the FDR/UPSTREAM Server **TCP/IP Address or DNS Name** field. This is the only configuration setting that is required. You may now click the **Save** button to save your configuration in the default UPSTREAM.CFG file.

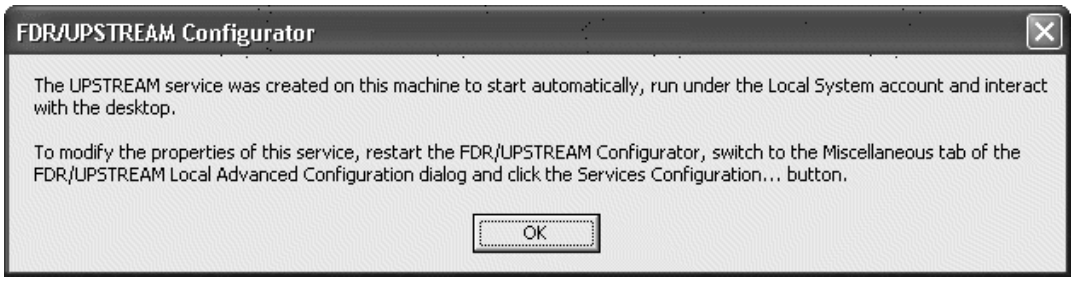
If the communication protocol to be used between FDR/UPSTREAM Local and FDR/UPSTREAM Server will be SNA, then you must either remove the check from the Use TCP/IP checkbox or click the Advanced button on the first dialog and click the SNA tab to display the SNA tab of the FDR/UPSTREAM Local Advanced Configuration dialog. Also, if there are any other configuration settings that need to be changed, use one of the tabs of the FDR/UPSTREAM Local Advanced Configuration dialog.

Anything beyond entering the TCP/IP address of the FDR/UPSTREAM Server is considered Advanced Configuration and is covered in Chapter 25.

When you press the **Exit** button to exit the configurator, and if this is a first time installation on a local Windows machine, UPSTREAM will automatically configure a registered name using the machine's name. Also, if this is a local Windows NT/2000/2003/XP machine, UPSTREAM will ask you if you wish to install it as a service.



Installing as a service is recommended if you wish to have UPSTREAM functions mainframe or Director controlled. The service will be created using the local system account which is adequate for most users when accessing local drives on your system. Most users will press the **Yes** button which will display:



Press **Ok** to exit the configurator. See section 3.4. for a description of the advantages of running UPSTREAM as a service and the methods for modifying UPSTREAM's service definitions.

3.4. FDR/UPSTREAM and Windows NT/2000/2003/XP

Backup and recovery of Windows NT machines requires the security and execution definitions described in this chapter. It also requires system familiarity and planning as described in the *Windows NT Resource Guide* and the *Windows NT/2000/2003/XP Considerations* chapter of this manual, even if this is not a server.

FDR/UPSTREAM can run as either a Windows NT program, or as a system service. A service is a special program which runs as an extension of the operating system. An application program is simply a standard Windows NT program. There are significant differences in configuring your Windows NT machine when using the two different methods.

Running FDR/UPSTREAM as an application is the recommended method for testing (and is the method described to this point). This is because FDR/UPSTREAM is an applications program and configuration and use is more natural. When you are ready to implement FDR/UPSTREAM in a production mode, you may choose to run it as a service.

Running FDR/UPSTREAM as a service has some of the following properties:

- **Optional user interface.** You can choose to either have a user interface (which appears when a user logs on) or have no user interface at all. In general, control of a service is performed using the NET command (from the command line) or through the control panel. Ascertaining the status of a service is through the Event Log, through the control panel or by using the NET START command from the command line. FDR/UPSTREAM can also be controlled from the host or another PC. Note that you can only have a user interface if running under system security (not as a specific user).
- **Requires no login.** Services are usually started when the system starts and remain running regardless of whether someone is logged on. This allows FDR/UPSTREAM to perform backups or restores irrespective of whether someone is logged in or not.
- **Have system privileges.** Services have the highest access privileges to files in the system. This means that you can guarantee access to all files in the system (if they are not open by another application and users have not specifically disallowed system privileged access).
- **Can become a specific user.** When a service is started it can be configured to attach as a given user. This allows you to back up any non-local drives automatically attached when a user is logged on, or backup files which require specific user privileges.

In most cases, you will choose to run FDR/UPSTREAM as a service when you are controlling your backups from the host, and have FDR/UPSTREAM operating successfully as an application.

If you have questions about whether to run as an application or as a service, contact FDR/UPSTREAM technical support. See page 3-14 for a description of setting up FDR/UPSTREAM as a service.

The following sections discuss security issues with FDR/UPSTREAM. Since security is extremely important in Windows NT we recommend that all users at least skim this section.

3.4.1. Security

The first step in the process of integrating FDR/UPSTREAM into your system for backups is to make sure you are running it under a Windows/NT user account that has a set of privileges (also referred to as rights) that FDR/UPSTREAM requires to perform its tasks.

The privileges that FDR/UPSTREAM requires and their meanings follow:

- **Back up files and directories.** This privilege allows FDR/UPSTREAM to backup the security information (without security ACLs), all extended attributes and all alternate data streams associated with the files it backs up. Without this privilege FDR/UPSTREAM can back up only regular file data.
- **Restore files and directories.** This privilege allows FDR/UPSTREAM to restore the security information (without security ACLs), all extended attributes and all alternate data streams associated with the files it restores. Without this privilege FDR/UPSTREAM can restore only regular file data.
- **Manage auditing and security log.** This privilege allows FDR/UPSTREAM to also backup and restore the security ACLs associated with the files it backs up and restores.
- **Change the system time.** FDR/UPSTREAM can be configured to synchronize the clock of a Windows NT Server or Workstation with the MVS host system clock. This privilege allows FDR/UPSTREAM to change the Windows NT system time.
- **Increase scheduling priority.** FDR/UPSTREAM is optimized to perform fast file data compression. This privilege allows FDR/UPSTREAM to perform its data compression using a highly optimized memory management method. Without this privilege FDR/UPSTREAM's data compression will still work, but it will be a little bit slower.
- **Shut down the system.** This privilege is not required by FDR/UPSTREAM directly, but FDR/UPSTREAM will request a system reboot after a restore that modifies all or part of the system registry. This privilege will be required by the user to perform the system reboot.
- **Log on locally.** All users who want to log on to a Windows NT system require this privilege.
- **Log on as a service.** If you want to run FDR/UPSTREAM as a service under a specific user account, the user account for the service must have this privilege. This right is automatically granted to any user account that is configured as the user account for a service that is created by USTPCFG.exe.

All of these privileges are granted to the user accounts that are members of the **Domain Admins** group. The Domain Admins group is also granted a number of other privileges that FDR/UPSTREAM does not require. If the FDR/UPSTREAM user performing the backups and restores is an administrator, then it is appropriate that the user's account be a member of the Domain Admins group. This is the recommended method.

If however, you would like to delegate the operation of FDR/UPSTREAM to another user (such as a help desk user) and you would like to restrict that user's privileges to the bare minimum, then you will want to create a special user account for that user to use to perform the backup and restore tasks. This special account can then be given only those privileges listed above or, if you choose, some subset of those privileges.

3.4.2. Creating a special FDR/UPSTREAM user account and group

Regardless of the machine on which FDR/UPSTREAM will be run, you first need to create a new user account and group in the security accounts database (SAM) for the domain. Perform these steps:

- 1. Start the User Manager for Domains application (usrmgr.exe).
- 2. Create a Global Group named UPSTREAMGroup (or something similar).
- 3. Create a User Account named UPSTREAMUser (or something similar).
- 4. Add the UPSTREAMUser account to the UPSTREAMGroup. Make sure the account is not a member of any other group.

- 5. Grant the desired rights (see above) to the UPSTREAMGroup.

This procedure will allow you to run FDR/UPSTREAM on the Primary Domain Controller (PDC) or any Backup Domain Controller (BDC) for the domain. To run FDR/UPSTREAM on a member server (non-Domain Controller) you will need to perform some additional steps. Assume that the name of the member server machine is MEMBER:

- 1. Logon to MEMBER as an administrator (this can be either an administrator account from the domain, if the workstation is a member of the domain, or a local administrator account defined in the local security accounts database).
- 2. Start the User Manager for Domains application (usrmgr.exe).
- 3. Change the domain to the name of the local system (MEMBER).
- 4. Add a Local Group named LocalUPSTREAMGroup (or something similar). **Make sure you are adding a local group to MEMBER and not to a domain.**
- 5. Add the global UPSTREAMGroup to the LocalUPSTREAMGroup.
- 6. Grant the desired rights (see above) to the LocalUPSTREAMGroup.

To run FDR/UPSTREAM on a workstation you will need to perform the following steps:

- 1. Logon to the workstation as an administrator (this can be either an administrator account from the domain, if the workstation is a member of the domain, or a local administrator account defined in the local security accounts database).
- 2. Start the User Manager application (musrmgr.exe).
- 3. Add a Local Group named LocalUPSTREAMGroup (or something similar).
- 4. Add the global UPSTREAMGroup to the LocalUPSTREAMGroup.
- 5. Grant the desired rights (see above) to the LocalUPSTREAMGroup.

For example, assume the name of your domain is DC with servers PDC and BDC, with member servers MEMBER1 and MEMBER2 and workstations STATION1 and STATION2. To be able to run FDR/UPSTREAM on all of these machines the following must be configured:

User Account or Group	Members
DC\UPSTREAMUser	N/A
DC\UPSTREAMGroup	DC\UPSTREAMUser
MEMBER1\LocalUPSTREAMGroup	DC\UPSTREAMGroup
MEMBER2\LocalUPSTREAMGroup	DC\UPSTREAMGroup
STATION1\LocalUPSTREAMGroup	DC\UPSTREAMGroup
STATION1\LocalUPSTREAMGroup	DC\UPSTREAMGroup

3.4.3. Providing FDR/UPSTREAM Access to Files

Typically, any user account that is a member of the Administrators group is provided full control over all of the files in the file system. It is possible for such a user account to be provided something short of full control, or possibly no access, to the files that need to be backed up or restored.

By running under a user account which has the **Backup files and directories** and **Restore files and directories** rights, FDR/UPSTREAM will have no problems reading the files for backup or writing the files during a restore but, FDR/UPSTREAM may encounter problems with some minor file system functions, such as performing directory searches or reading or writing file attributes. Although FDR/UPSTREAM will log these problems as errors, it will still be able to perform its backups and restores successfully.

To eliminate all file access errors, the user account under which FDR/UPSTREAM is run, must be granted full control of the files it backs up and restores. This is especially true for special user accounts and groups that are set up specifically for use by FDR/UPSTREAM. If you encounter Access Denied errors during a backup or a restore, it is probably due to the FDR/UPSTREAM user account not having full control of the files or directories for which the error is logged.

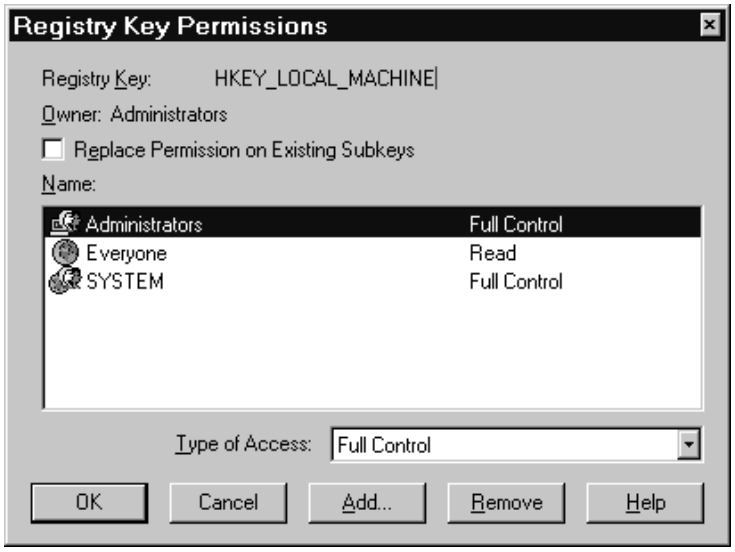
3.4.4. Providing FDR/UPSTREAM Access to the Registry Hives

In order for FDR/UPSTREAM to be able to backup or restore the individual parts of the registry (referred to as hives), FDR/UPSTREAM must be run under a user account that has Full Control to each registry hive. The various registry hives are:

- DEFAULT
- SAM
- SECURITY
- SOFTWARE
- SYSTEM

One or more user profile hives with the prefix **S-1-5-21-**.

To change the permissions of a registry hive, start the Registry Editor (REGEDT32.exe not REGEDIT.exe) and locate the desired hive key. The SAM, SECURITY, SOFTWARE and SYSTEM hive keys are on the **HKEY_LOCAL_MACHINE on Local Machine** panel while the .DEFAULT and user profile hive keys are on the **HKEY_USERS on Local Machine** panel. Highlight the key and then select **Permissions…** from the **Security** menu. This displays the following dialog:



Using this dialog you can add permissions for individual user accounts and groups. For a PDC or BDC system we suggest that you give the global UPSTREAMGroup (or the Administrators group) the **Full Control** access. For a member server or a workstation system we suggest that you give the LocalUPSTREAMGroup (or the local Administrators group) the **Full Control** access.

If FDR/UPSTREAM is run under a user account which does not have Full Control access to a registry hive, then FDR/UPSTREAM will log a PC4672E error message because it will not be able to backup this registry hive.

3.4.5. Using FDR/UPSTREAM to Back up Another Windows NT PC

You can use drive shares to map drives to other Windows NT PC (both within your domain and outside your domain). You can also use FDR/UPSTREAM UNC names as well.

UNC names are recommend as they are drive letter independent and work correctly when running as a service. The format for FDR/UPSTREAM UNC names is:

```
\\<Machine name>\<share name>\<directories and files>
```

Thus, to backup all the files on machine TEST on share CDRIVE use the specification:

```
\\TEST\CDRIVE\*.*
```

You can backup all read/writes drives on a machine using the special FDR/UPSTREAM UNC name of:

```
\\<Machine name>
```

UNC names are discussed further in the *Windows NT/2000/2003/XP Considerations* chapter.

There are a number of steps that you must perform to assure complete backups. To backup a PC in your domain, you must:

- Make sure that the user you logged in as has Full Control over the entire drive.
- Each hive in the registry must allow the user Full Control.

If you wish to backup a PC in another domain, you must do the following in the domain which FDR/UPSTREAM will be run in:

- You must grant the **Log on locally** right to the Domain Admins group of the domain to be backed up.
- The Domain Admins group of the domain to be backed up must be given **Full Control** over the FDR/UPSTREAM directory on the machine on which FDR/UPSTREAM will run.
- Grant the Domain Admins group of the domain to be backed up the following rights: **Back up files and directories**, **Change the system time**, and **Restore files and directories**.

You must do the following in the domain that you will be backing up:

- Make sure that the user you logged in as has **Full Control** over the entire drive.
- Each hive in the registry must allow the user **Full Control**.
- The user must be a member of the **Domain Admins** group in addition to being a member of the **Administrators** group.

Proceed to chapter 6 to perform your first backup.

3.4.6. Running as a Service

FDR/UPSTREAM itself does not run as a service. Innovation provides a separate program USTPSERV.EXE which runs as a service and runs FDR/UPSTREAM as a child program. Thus, when you have FDR/UPSTREAM properly configured as an application, there are few changes required to run it as a service.

If you wish to run FDR/UPSTREAM as an application at the same time it is running as a service, follow the steps outlined in the *Running More Than One Copy* chapter of this manual to set up a new LU, transaction program, etc. Note that if you do not have the service running, you can run it as an application, even to the extent of proper support for remote initiated functions.

NOTE: You should not use drive letters to reference LAN attached drives when running as a service (they are recommended for local drives). We recommend using FDR/UPSTREAM UNC names. See the *Windows NT/2000/2003/XP Considerations* chapter for details in using FDR/UPSTREAM UNC names.

The first step in configuring to run as a service is to configure (or modify) your transaction program definition. This is required even if you are running FDR/UPSTREAM using TCP/IP as the transaction program configurator facility makes registry changes required for services.

NOTE: If you are running IBM Personal Communications or IBM Communications Server it always starts your program as a service using the Local System Account. See the SNA Supplement more information.

3.4.7. Transaction Program Definition for a Service

Even if you are running TCP/IP you must configure a transaction program definition using the USTPCFG program, as it not only defines transaction programs for SNA Server, it also adds registry entries required when running as a service.

You can run this program in a variety of ways:

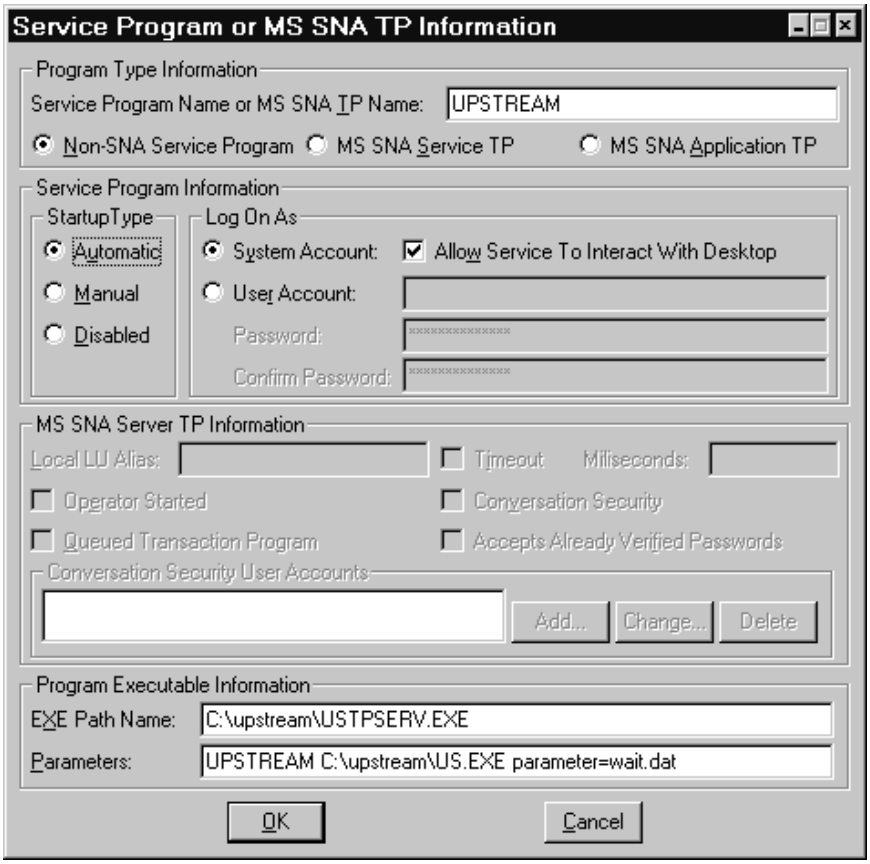
- Starting the **TP and Service Configurator** program from the FDR/UPSTREAM program group.
- In the UPSTREAM Configurator (USCFG), pressing the **Advanced** button, selecting the **Miscellaneous** tab and pressing the **Services Configuration...** button.
- Pressing the **<-Configure** button from the MS SNA Configuration dialog within the FDR/UPSTREAM Configurator (USCFG).
- From a command prompt by running the program C:\UPSTREAM\USTPCFG.EXE.

Note that you may see the message "Unable to open a key in the registry." This message can usually be ignored.

This will display the UPSTREAM Transaction Program Configurator main dialog. Press the **Add** button if you are creating your first transaction program definition or wish to have a separate transaction program definition for this copy of FDR/UPSTREAM; press the **Change** button if you wish to modify your existing definition.

Note that if you are using SNA and are not using the default transaction program name of UPSTREAM, you must change the INTPN definition in the FDR/UPSTREAM advanced configuration as described in the *Running More than One Copy* chapter of this manual.

This will bring you to the UPSTREAM Transaction Program Information dialog.



- **TP Name:** Enter the transaction program name which you wish to use. For your first TP definition most users will enter **UPSTREAM**. It is case sensitive, so enter in upper case.

The Program Type radio buttons are:

- **Non-SNA Service Program:** Press this radio button if you are running FDR/UPSTREAM using TCP/IP and wish to configure it as a service or configuring a non-UPSTREAM service program.

- **MS SNA Service TP:** Press this radio button if you are running FDR/UPSTREAM using Microsoft SNA Server or Microsoft SNA Workstation and wish to configure it as a service.

- **MS SNA Application TP:** This non-service option is discussed earlier in this chapter.

The Service Program Information parameters are enabled when you select a service radio button:

- **Startup Type:** Select one of the following ways of starting the service (and thus FDR/UPSTREAM):
  - **Automatic:** Press this radio button if you wish the service started automatically on system startup. This is the recommended value if this is a Non-SNA Service Program (usually TCP/IP).
  - **Manual:** Press this radio button if you wish the service started by user request or by SNA Server. This is the recommended value for SNA Server.
  - **Disabled:** Press this radio button if you wish to disable the service. Rarely recommended.
- **Log On As:** This is the user authority you wish the service (FDR/UPSTREAM) to have.

- **System Account:** The system account often (though not always) has the highest level access. Also, only when running under the System Account can FDR/UPSTREAM be visible (see the **Allow Service To Interact With Desktop** checkbox below). This is the default.
- **User Account:** Check this box if you wish the service to run under a specific user's authority. Note that the saved drive mappings for that user are available to FDR/UPSTREAM. Also, when selecting this option, FDR/UPSTREAM will be invisible (not on the desktop). You must enter a User Account name and its password (see below).

Logging on as a specific user is valuable in several ways:

- It allows the saved drive assignments for that user (as saved through NET USE or Network Neighborhood assignments) to be made available for FDR/UPSTREAM.
- It allows you to define an account which has all privileges without having to modify the System Account.

Note though that when running under a user account, FDR/UPSTREAM will not be displayed on the desktop - only when running under the System Account can FDR/UPSTREAM be visible.

When running under a user account there are the following restrictions:

- The account cannot be active/logged onto by a user at the time the service needs to use it. Thus we recommend defining accounts which will not be logged in by a user.
- Either the user account or the group it belongs to must be granted the **Log on as a service** right using the User Manager.

If you selected **System Account** above, you can check the following checkbox:

☐ **Allow Service to Interact With Desktop:** If you check this box, FDR/UPSTREAM will be visible so long as any user is logged on. We recommend checking this in testing and whenever possible in production. You may wish to uncheck this if you are concerned that users may inadvertently take FDR/UPSTREAM down.

If you selected **User Account** above, you must enter the following:

☐ **User Account:** Enter the user account name that you wish to have FDR/UPSTREAM use. This is a required field.

You can specify the domain you wish to login as by specifying it in the form of:

```
<Domain>\<User>
```

If your machine is a member server, you must specify the domain name. If you are a member of a workgroup and wish to backup files on a specific domain you also should specify the domain name. For example, if FDR/UPSTREAM is running on a member server of domain SALES and you wish to use the user UPSTREAM you would enter the User Account:

```
SALES\UPSTREAM
```

☐ **Password:** Enter the password that will be used by FDR/UPSTREAM to log on to this account. If the user has no password you must delete all characters in this field.

☐ **Confirm Password:** Reenter the user account's password. It must match the value above.

The fields in the MS SNA Server TP frame are discussed in the MS SNA Server sections earlier in this chapter.

The fields in the Program Executable Information frame are:

☐ **EXE Path Name:** Enter the fully qualified path name to the FDR/UPSTREAM service transaction program (UST-PSERV). Most users will enter:

C:\UPSTREAM\USTPSERV.EXE.
Note that this field was modified when you checked one of the service radio buttons above.

- ☐ **Parameters:** Enter the command line parameters which will be used when USTPSERV.EXE is started. This field was modified when you checked the Windows NT Service checkbox. For your first definition, you may choose to use:
UPSTREAM C:\UPSTREAM\US.EXE PARAMETER=WAIT.DAT

The format for USTPSERV is:

<Service Name> [/nowait] [/delay:n] <Program Name> [<Program Parameters>...]

Where:

- **<Service Name>**: Must be the same as the transaction program name. Usually **UPSTREAM**.
- **/nowait**: An optional parameter which causes the USTPSERV.EXE program to not wait for <Program Name> to terminate before terminating itself. The use of this parameter is not recommended.
- **/delay:n**: An optional parameter which cause the USTPSERV.EXE program to delay the execution of <Program Name> for *n* milliseconds. This parameter is useful for avoiding certain TCP/IP problems.
- **<Program Name>**: The fully qualified program name for FDR/UPSTREAM. Usually **C:\UPSTREAM\US.EXE**.
- **<Program Parameters>**: Enter the parameters which you will send to FDR/UPSTREAM. Most users will enter **PARAMETER=WAIT.DAT** for a Non-SNA Service Program or **PARAMETER=RMTPARM.DAT** for a MS SNA Service TP or MS SNA Application TP program.

Press the **<Ok>** button to save your changes. You will see a message concerning your service definition.

If you are adding the service definition for the first time, you will see the following message:

When USTPSERV.EXE has a message to log, it writes it to the Windows NT applications log. If you have unexplained behavior of USTPSERV (for example, not starting FDR/UPSTREAM as expected), you can use the **Event Viewer** in the Administrative Tools group to view the **Application** log to view any messages. Note that this is only for USTPSERV messages; FDR/UPSTREAM messages are stored in the UPSTREAM.LOG file.

3.4.8. Using a Service to Back up Network Drives

To use a Windows NT service to back up network drives (drives on another computer) you must:

- Define a user to Windows NT and give it authority to back up the network drive (see section 3.5.5.).
- Log in as that user and map the drive as permanent (using the File Manager, Network Neighborhood or NET USE commands). This is optional if you are using UNC names.
- Perform all transaction program definitions using USTPCFG, test and verify their operations.

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4 UNIX

4.1. Overview

The installation process consists of four steps:

- Determining your system requirements
- Installing the software
- Configuring the communications software
- Configuring FDR/UPSTREAM

We recommend that you install, configure, and make operational your APPC or TCP/IP before installing and configuring FDR/UPSTREAM. In particular getting 3270 fully operational will help you in getting FDR/UPSTREAM working quicker.

If you are using SNA/APPC, see the *FDR/UPSTREAM Client SNA Supplement* supplied in the documentation directory on the CD for configuration instructions.

4.1.1. System Requirements

- AIX 4.3 or above (on Power platforms) or
  SPARC Solaris 2.6 or above or
  Intel Solaris 2.6 or above or
  HPUX 11.0 or above or
  Compaq Tru64 v4 or above or
  Red Hat Linux 6.2 or above or
  OS/390 Unix System Services v2.6 or above or
  RedHat (32-bit), SuSELinux, Marist or TurboLinux for S/390
- Communications Server (or its equivalent) for AIX SNA connections. SNA is only supported for AIX.
- The built-in TCP/IP facility for TCP/IP connections.

4.2. Installation

FDR/UPSTREAM Unix is distributed on several diskettes or on a CD in a separate directory for each operating system type:

- /upstream/aix for AIX
- /upstream/solaris for Sun Solaris (SPARC)
- /upstream/solx86 for Sun Solaris (Intel)
- /upstream/hpux for HPUX
- /upstream/tru64 for Tru64
- /upstream/linux for Intel Linux
- /upstream/s390unix for OS/390 UNIX. See page 4-5 for instructions on installing OS/390 UNIX.
- /upstream/linux390 for S/390 Linux

The files are stored in compressed tar form. When transporting the FDR/UPSTREAM software you must use tar to assure that the directories and hard links that it installs are also correctly transported.

There are two files in each of the FDR/UPSTREAM UNIX directories:

- install: A UNIX script to install FDR/UPSTREAM. This file is not included for OS/390 UNIX.
- upstream.tz: All the FDR/UPSTREAM files in compressed tar form

NOTE: To install FDR/UPSTREAM, you must be logged in or su to root.

NOTE: You must shutdown usdaemon before upgrading FDR/UPSTREAM. See page 4-11 for the procedure.

If you are installing FDR/UPSTREAM for OS/390 UNIX, see page 4-5 for installation instructions.

If you are manually installing FDR/UPSTREAM (not directly from the CD), which includes most Linux S/390 users, see page 4-4.

Linux S/390 users should use the instructions for Linux systems in general. There are few differences between Intel based Linux and Linux S/390.

To install FDR/UPSTREAM Unix from CD:

☐ Mount the FDR/UPSTREAM CD. You may need to mount the CD in a different way than you mount other CDs to have the files displayed correctly. We recommend the following:

- **HPUX:**

```
mount -F cdfs -r -o cdcase <device> <mount point>
```

For example, if you are using the /dev/dsk/c1t2d0 device and the /cdrom mount point, enter:

```
mount -F cdfs -r -o cdcase /dev/dsk/c1t2d0 /cdrom
```

- **AIX:**

```
mount -r -v /dev/<cd_device_name>
```

The <cd_device_name> is shown in /etc/filesystems

- **SOLARIS or Intel Linux:** No mount command is needed. The auto mounter will automatically mount the CD whenever it is inserted. To remove it, use the eject command.
- **Tru64:**

```
mount -r -o noversion -t cdfs <device> <mount point>
```

For example if you are using the /dev/rz5c device and the /cdrom mount point, enter:

```
mount -r -o noversion -t cdfs /dev/rz5c /cdrom
```

☐ Change to the appropriate FDR/UPSTREAM directory for the operating system you are using and run the install script:

- **AIX**:

```
cd /<CD-ROM mount point>/upstream/aix
./install
```

- **HPUX**:

```
cd/<CD-ROM mount point>/upstream/hpux
./install
```

- **SPARC SOLARIS**: If you are running volume management, CDs are automatically mounted. Thus, with volume management, enter:

```
cd /cdrom/upstream/upstream/solaris
./install
```

If you are not running volume management enter:

```
cd /<CD-ROM mount point>/upstream/solaris
./install
```

- **Intel SOLARIS**: If you are running volume management, CDs are automatically mounted. Thus, with volume management, enter:

```
cd /cdrom/upstream/upstream/solx86
./install
```

If you are not running volume management enter:

```
cd /<CD-ROM mount point>/upstream/solx86
./install
```

- **Intel Linux:** If you are running volume management, CDs are automatically mounted. Thus, with volume management, enter:

```
cd /mnt/cdrom/upstream/upstream/linux
./install
```

If you are not running volume management enter:

```
cd /<CD-ROM mount point>/upstream/linux
./install
```

- **Tru64**:

```
cd /<CD-ROM mount point>/upstream/tru64
./install
```

The install script will display:

```
Enter FDR/UPSTREAM installation directory
Hit enter key to accept default directory
```

The default directories are:

- (AIX) /usr/lpp/fdrupstream
- (HPUX, Solaris, Linux and Tru64) /opt/fdrupstream

NOTE: We strongly recommend using our suggested directories as all samples provided can be used without modification.

```
FDR/UPSTREAM will be installed  in <directrory>
Enter y to continue, n to quit
```

If you enter 'y', then the software is installed.

NOTE: If you do not have an existing us.ser, us.ser.default is copied to us.ser. If you are installing the software manually, you will need to make this copy.

The FDR/UPSTREAM software and associated files will be copied into the default directory and the directories and hard links properly installed.

NOTE: If you plan to run FDR/UPSTREAM from other than the installation directory (i.e. the PATH), you will need to set the environment variable UPSTREAMPATH to point to the FDR/UPSTREAM directory. For AIX, we recommend that you add UPSTREAMPATH to /etc/environment. For HPUX, Solaris, Linux and Tru64 we recommend that you add UPSTREAMPATH to /etc/profile or the user's .profile, .login or .dtprofile.

Note that if you modify the serialization file us.ser, and subsequently wish to reinstall the software, you should rename the file before the reinstallation and copy it back to us.ser.

Note that if you will be running FDR/UPSTREAM from a different directory than the one where the files are stored, you should see the notes at the end of this addendum.

4.2.1. Non-CD Installation

If you wish to not install FDR/UPSTREAM from the CD (most Linux S/390 users will need to install it this way):

☐ FTP the FDR/UPSTREAM installation files to your UNIX machine. These can be copied anywhere you have write permissions.

There are two files necessary for FDR/UPSTREAM installation:

- install The installation script.
- upstream.tz The compressed tar file with all FDR/UPSTREAM files in it.

These are found on the CD in the directory appropriate to your operating system. See page 4-2 for a list of directories.

☐ Logon to your UNIX machine. Logon as root or *su* to root.

cd to the directory where you sent the two FDR/UPSTREAM installation files. Add the execute permission flag to the install script:

```
chmod 777 install
```

☐ Execute the install script. It will display:

```
Enter FDR/UPSTREAM installation directory
Hit enter key to accept default directory
```

The default directories are:

- (AIX) /usr/lpp/fdrupstream
- (HPUX, Solaris, Linux and Tru64) /opt/fdrupstream

NOTE: We strongly recommend using our suggested directories as all samples provided can be used without modification.

```
FDR/UPSTREAM will be installed  in <directrory>
Enter y to continue, n to quit
```

If you enter 'y', then the software is installed.

NOTE: If you do not have an existing us.ser, us.ser.default is copied to us.ser. If you are installing the software manually, you will need to make this copy.

The FDR/UPSTREAM software and associated files will be copied into the default directory and the directories and hard links properly installed.

NOTE: If you plan to run FDR/UPSTREAM from other than the installation directory (i.e. the PATH), you will need to set the environment variable UPSTREAMPATH to point to the FDR/UPSTREAM directory. For AIX, we recommend that you add UPSTREAMPATH to /etc/environment. For HPUX, Solaris, Linux and Tru64 we recommend that you add UPSTREAMPATH to /etc/profile or the user's .profile, .login or .dtprofile.

4.2.2. OS/390 UNIX Installation and Configuration

OS/390 UNIX (formally OpenEdition/MVS and Unix Systems Services) on MVS is similar to the other UNIX client versions of FDR/UPSTREAM, it supports the following OS/390 UNIX features:

- External Links
- Symbolic and Hard Links
- Auditing flags
- HFS Extended Attributes
- Unix owners and permissions
- Case sensitivity
- FIFOs
- Lotus Domino

This is a command line only version of FDR/UPSTREAM with the same characteristics as the other UNIX versions of FDR/UPSTREAM. OS/390 version 2.6 or greater is required.

Full installation instructions are provided in the FDR®/UPSTREAM® Unix Systems Services User's Guide. Described there is unloading the files from 3480 tape, running the daemon from a batch job and more. The instructions below are simply for getting started using the UPSTREAM CD rather than tape.

The OS/390 UNIX version is distributed as a compressed tar file. On the FDR/UPSTREAM CD it is in the **/upstream/s390unix** directory. You will need to use FTP or some other method to send this file to a file system in the OS/390 UNIX address space. You must name it **upstream.tar.Z** (case is important).

From a OS/390 UNIX terminal, su or login as root, change to the directory you wish to install FDR/UPSTREAM into (we recommend **/usr/lpp/fdrupstream**), make sure that upstream.tar.Z is copied to this directory and extract the file using the following command (the dash at the end is required):

```
zcat upstream.tar.Z | tar xvpf -
```

If you are not the superuser, you will see errors in setting the uid/gid. These can be ignored.

For most users there is no configuration necessary. It comes supplied with an **upstream.cfg** configuration file which assumes that the default IP address for the partner is 127.0.0.1 (localhost). If the FDR/UPSTREAM host is running on a different CPU, you should edit upstream.cfg and modify the TCPADDRESS parameter to point to the IP address of the system you wish to connect to. The default INPORT (listening TCP/IP port) is 2972 so as not to conflict with the default FDR/UPSTREAM host listening port.

We also recommend that you modify upstream.cfg to enable registration. Change the **USETARGETNAME** value from N to **Y**. Enter a **TARGETNAME** value; most users will use the TCP/IP name for their mainframe.

We have found that in some cases, TCP/IP performance can be improved dramatically by having FDR/UPSTREAM use the TCP/IP address of the one of your TCP/IP adapters rather than the local host address (127.0.0.1). Edit the default upstream.cfg to set TCPADDRESS to the address of the MVS system. Note that this only affects conversations initiated in the OS/390 Unix System Services space; for conversations initiated by USTBATCH, the IP address used is controlled in the batch job (TCPTARG or TARGNAME).

You can always edit upstream.cfg to modify or add any of the other configuration parameters (USETARGETNAME, TARGETNAME, STATUSPORT, etc.).

Proceed to page 4-10 for a description of some of the features of the FDR/UPSTREAM Unix product.

4.3. Configuring FDR/UPSTREAM

You must configure FDR/UPSTREAM to let the software know the method you will be using to communicate with the host (SNA or TCP/IP) and some of the specific communications parameters.

To specify these configuration parameters, run the FDR/UPSTREAM configurator, uscfg.

4.3.1. The FDR/UPSTREAM User Interface

The FDR/UPSTREAM user interface is functionally quite similar to Motif or Microsoft Windows, but is implemented in character mode, so that it can be used from dumb terminals or TELNET. There are dialogs with push-buttons, check boxes, edit fields and more as well as pull down menus.

The appearance of screens and the user interaction is quite different depending upon your terminal type. The most powerful terminal type with the best appearing screens for FDR/UPSTREAM are the terminals available from the system console or X-Terminals. For all UNIX systems we recommend using CDE, KDE or Gnome and the dtterm application. For AIX, in CDE you may wish to use aixterm instead of dtterm because aixterm provides ALT key support. However, FDR/UPSTREAM will operate with most terminals and terminal emulators.

As there is no mouse support available for generic terminals, certain control and alt or escape key variations have been defined.

- To press a push button, checkbox or radio button, press the [Space] bar.
- To move between fields in a dialog use the [TAB] key.
- To select between radio buttons, use the right and left arrow keys.
- To pull down menus or use accelerators on the HFT, LFT or AIXTERM, use [ALT]+highlighted letter. For example, to pull down the Action menu on the HFT, press [ALT]A.
- To pull down menus or use accelerators on other terminals (including TELNET terminals) press the ESC key immediately followed by the highlighted menu letter or accelerator letter. For example, to pull down the Action menu, press the ESC key immediately followed by the letter A.

Since the HFT or LFT is often the main system console, messages from other facilities (including Communications Server) may be written to the screen on top of FDR/UPSTREAM. You can refresh the screen display by pressing [CTRL]R.

4.3.2. Communications Configuration

After you have stared the FDR/UPSTREAM configurator (uscfg), you will see the Configuration dialog.

```
=                          UPSTREAM Configurator
  File  Action                                                    F1=Help

                           Configuration                                v^
  Connection Type
   (x) SNA...                          ( ) TCP/IP...

  SNA Options                         TCP/IP Options
   ( ) Use Side Info Profile           Host TCP/IP Address.[                ]
       Profile Name....[        ]      Host TCP/IP Port....[1972 ]
   (x) Use Partner LU Profile          Your PC Port........[1972 ]
       Partner LU Alias[        ]
       Mode Name.......[#INTER  ]
   TPN Profile...[UPSTREAMP     ]    UPSTREAM Java (End-User Restore)
                                       (x) Start UPSTREAM
   Messages Time Out...[0    ]         ( ) Connect to Running UPSTREAM
   [ ] Use a Registered Name             IP Address.....[127.0.0.1      ]
       Registered Name..[        ]
       Trans. Interval..[0    ]

              <    Ok    >                        <  Cancel  >
```

- **Connection Type:** Select either **TCP/IP** if your connection to the host uses TCP/IP or **SNA** if your connection to the host uses Communications Server. Select the option you wish by using the arrow keys to highlight your selection, and pressing the space bar to place an 'X' in the parens. The default is SNA.

  Note, if you select SNA, and press [TAB] you will be brought into the SNA options frame and you can not specify TCP/IP options, contrariwise, if you select TCP/IP you will be brought into the TCP/IP options frame and can not select SNA options.

4.3.3. Configuring for a TCP/IP Host Connection

The following are the TCP/IP specific parameters.

- **Host TCP/IP Address:** Enter the IP address of the host adapter that you will be connecting to. Enter the doted decimal notation, HOSTS or DNS name. For example: 130.50.75.1. This field is required.

- **Host TCP/IP Port:** Enter the IP port that FDR/UPSTREAM MVS was installed on. Enter a decimal number. This field is required; in most cases you can accept the default of **1972**.

- **Your PC Port:** Enter an IP port that FDR/UPSTREAM on other computers can use to contact your PC. Only one instance of an application on a given computer can use a specific port. This field is optional; in most cases you can accept the default of **1972**.

  When you have completed entering the TCP/IP specific information proceed to the next section to complete your configuration.

4.3.4. Completing the Configuration

There is one field common to both connectivity types in this dialog:

- **Messages Time Out:** FDR/UPSTREAM informational and error messages will remain displayed until a button is pressed or until they time out. The default of **0** indicates that the message will stay displayed until the button is pressed. A positive number indicates the number of seconds until the message times out if a button is not pressed. -1 indicates that messages should not be displayed. For initial testing, we recommend 0. In production we recommend a small number (such as 3 seconds).

- ☐ **Use a Registered Name for Host Initiation:** Check this box if you wish to register a name with FDR/UPSTREAM MVS that host and other workstation/server requests can use to find your workstation. A registered name is required if you wish to use the FDR/UPSTREAM Director or the automatic update facility. You must enter a Registered Name if you check this box. The default is checked.

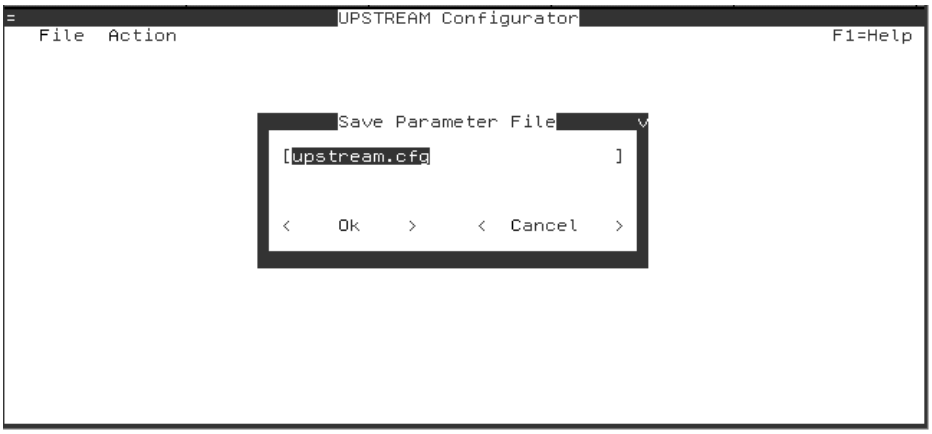
- ☐ **Registered Name:** Enter any name, unique within FDR/UPSTREAM MVS, that can be used to allow the host and other workstation/servers to find your workstation. You can enter up to 16 characters which can include embedded spaces. Note that if there are duplicate names no errors are reported and the most recently registered name is used.

- ☐ **Transmission Interval:** Enter a number which indicates how often (in minutes) you will reregister your registration name with FDR/UPSTREAM MVS. Most users will use the default of **1440**, which causes registration to happen once per day. The main reason to specify a non-zero value is if you are using TCP/IP with the DHCP facility enabled and your IP address may change.

- ☐ **Allow Dynamic TCP/IP PC Port Assignment:** Enabled only if you use Registered Names, FDR/UPSTREAM will search for an unused port, starting at the 'PC port' (above) before listening on it and then register the port with the host. Recommended unless you must listen on a specific port or don't use registered names for host initiation.

The options in the UPSTREAM Java (End-User Restore) frame a described fully in the *End-User Restore* chapter.

Press the **<Ok>** button (or press the [ENTER] key) to accept your parameters. You will be asked for the file name to save these parameters to.



In this dialog box, you can type the name of the file you want to save your configuration parameters to. The default is upstream.cfg, but you can use any file name and any directory. If the file and path is too long from the displayed edit field, it will scroll horizontally. Press the <Ok> button to save the parameters to the file you specify, or press <Cancel> to not save your changes.

FDR/UPSTREAM is now configured for operation with your communications environment. You can leave the configuration program by pulling down the File menu and selecting Exit (or by [ESC]X or the [ALT]X key on the HFT).

The following section will discuss specific issues under UNIX.

To begin using FDR/UPSTREAM proceed to chapter 6.

4.4. Command Line FDR/UPSTREAM (uscmd)

The command line version of FDR/UPSTREAM (uscmd) gives you several advantages over the full screen version:

- Can be placed in the background.
- FDR/UPSTREAM can be run using **cron**.

The command line version writes errors and reporting information (if enabled) to stdout. Since this information is also written to the log and report files, you can redirect its output to the nul file to avoid duplication.

The command line version must be started with enough parameters to perform a function unattended as there are no displays to request parameters and stdin is not supported. Thus, we always recommend that you start uscmd with a command line specified parameter file:

```
uscmd parameter=<parameter file>
```

For example, to process a backup request stored in an FDR/UPSTREAM parameter file testback.dat, you would enter:

```
uscmd parameter=testback.dat
```

NOTE: All parameter files used with uscmd must be unattended (ATTENDED=N) since uscmd has no user interface to allow attended operations.

The uscmd process can be killed in the normal way and will terminate whenever the requested function has completed.

4.5. Host Controlled FDR/UPSTREAM (usdaemon)

FDR/UPSTREAM provides a way to have all of it's functions available via remote system control. The usdaemon program is intended to be incorporated into the system startup/shutdown process so that FDR/UPSTREAM functions are continuously available while the system is active.

When running the daemon we recommend that you explicitly set the Work Path and the paths for the message file and log file in the Advanced options of the FDR/UPSTREAM configurator (uscfg). In OS/390 Unix System Services these are the WORKPATH, LOGFILE and MESSAGEFILE parameters in upstream.cfg.

4.5.1. AIX Installation

The following sample line (which can be found in the file inittab.sample.line in the FDR/UPSTREAM directory), can be added to /etc/inittab to start FDR/UPSTREAM at boot time. We suggest that you add this line at the end of inittab. In all cases is must be placed after the lines that start TCP/IP (the rctcpip line), and Communications Server (the rcsna line).

```
usdaemon:2:wait:/usr/lpp/fdrupstream/usdaemon
parameter=/usr/lpp/fdrupstream/rmtparm.dat
configfile=/usr/lpp/fdrupstream/upstream.cfg > /dev/console 2>&1
```

Note: Enter this as a single line.

You must also add UPSTREAMPATH to the /etc/environment file. Assuming you have installed FDR/UPSTREAM in the recommended directory named /usr/lpp/fdrupstream, you would add UPSTREAMPATH=/usr/lpp/fdrupstream to /etc/environment. You must reboot after making these changes.

To shutdown the daemon you can use the following commands:

```
ps -e | grep uscmd
kill <process number>
```

To restart the daemon, enter at the command line the command added to /etc/inittab (above), after the *usdaemon:2:wait:* prefix.

4.5.2. HPUX, Solaris, Tru64 and Linux Installation

To install usdaemon, you must first create a file: **fdrupstream.config** which sets variables which are used by the FDR/UPSTREAM startup/shutdown script.

In the <UPSTREAM directory>/startup directory, there is a sample file, fdrupstream.config.sample which can be used as your template. For a new installation, we recommend that you copy this file:

```
cd <UPSTREAM Directory>/startup
cp fdrupstream.config.sample fdrupstream.config
```

Edit fdrupstream.config and modify it to fit your environment. Fdrupstream.config.sample looks like:

```
#!/bin/sh
#
# FDR/UPSTREAM configuration
#
```

```
# FDRUPSTREAM:      Set to 1 to start FDR/UPSTREAM daemon
# UPSTREAMPATH:     The FDR/UPSTREAM directory
# UPSTREAMPARMFILE: The FDR/UPSTREAM parameter file
# UPSTREAMCFGFILE:  The FDR/UPSTREAM configuration file
#
FDRUPSTREAM=1
UPSTREAMPATH=/opt/fdrupstream
UPSTREAMPARMFILE=rmtparm.dat
UPSTREAMCFGFILE=upstream.cfg
```

The variables which must be set are:

- ☐ **FDRUPSTREAM:** Set to **1** to start the FDR/UPSTREAM daemon.
- ☐ **UPSTREAMPATH:** Set it to the directory that FDR/UPSTREAM is installed in. For HPUX and Solaris the default is **/opt/fdrupstream**
- ☐ **UPSTREAMPARMFILE:** The FDR/UPSTREAM parameter file which is executed when FDR/UPSTREAM is started. The sample **rmtparm.dat** is recommended.
- ☐ **UPSTREAMCFGFILE:** The FDR/UPSTREAM configuration file. Most users will specify **upstream.cfg**.

After you have created fdrupstream.config, run the install script from the <upstream>/startup directory. You must be logged in as root.

```
./install
```

The install script incorporates the FDR/UPSTREAM startup/shutdown facilities into the operating system startup/shutdown directories.

If, at any time, you wish to temporarily not start the FDR/UPSTREAM daemon, modify:

- (HPUX) /etc/rc.config.d/fdrupstream
- (Solaris, Tru64 and Linux) /etc/fdrupstream.config

Change the FDRUPSTREAM=1 variable to FDRUPSTREAM=0. On the next reboot the FDR/UPSTREAM daemon will not start.

To permanently remove the FDR/UPSTREAM daemon from your system, run the ./uninstall script.

To manually start the usdaemon:

- (HPUX and Tru64) /sbin/init.d/fdrupstream start
- (Solaris and Linux) /etc/init.d/fdrupstream start

To manually stop the usdaemon:

- (HPUX and Tru64) /sbin/init.d/fdrupstream stop
- (Solaris and Linux) /etc/init.d/fdrupstream stop

4.5.3. OS/390 UNIX Daemon Installation

Most users run the UPSTREAM daemon as a batch job. The sample is included on the 3480 installation tape and instructions are in the FDR®/UPSTREAM® Unix Systems Services User's Guide.

As an alternative to running as a batch job, the following sample line can be added to /etc/rc to start FDR/UPSTREAM at boot time. We suggest that you add this line at the next to last line of /etc/rc. It assumes that you have installed FDR/UPSTREAM in the /usr/lpp/fdrupstream directory.

```
/usr/lpp/fdrupstream/usdaemon
parameter=/usr/lpp/fdrupstream/rmtparm.dat
configfile=/usr/lpp/fdrupstream/upstream.cfg
```

Note: Enter this as a single line.

You must also add UPSTREAMPATH to the /etc/init.options file. Assuming you have installed FDR/UPSTREAM in the recommended directory named /usr/lpp/fdrupstream, you would add to /etc/init.options:

```
-e UPSTREAMPATH=/usr/lpp/fdrupstream
```

You must IPL after making these changes.

To shutdown the daemon you can use the following commands:

```
ps -e | grep uscmd
kill <process number>
```

To restart the daemon, enter at the command line the command added to /etc/rc (above)

4.6. Backups & Restores

The screens and backup/restore concepts used in FDR/UPSTREAM Unix differ somewhat to those in the PC products.

To enter the FDR/UPSTREAM Unix main program, run **us**.

4.6.1. Backups

Note that since UNIX does not have an archive bit, FDR/UPSTREAM determines when a file has changed between backups in a different way. Whenever a backup is performed, FDR/UPSTREAM writes a single line file (<Backup Profile>.inc) which contains the date/time of the backup. When you select Incremental, FDR/UPSTREAM uses the date/time in this file and compares it against the last modification date/time of the selected files. Thus you should be careful to not add or modify file specifications when performing an incremental backup, as this will defeat the mechanism.

As an alternative to the incremental date file above, UPSTREAM can maintain a database of files it has backed up which can be used to determine the files to be included in an incremental backup or phase 1 of a merge backup.

The UPSTREAM database contains the fully qualified file name for each file, along with a file's modification date, size and attributes. For UNIX the file's attributes contain the file's permissions. Thus when a file changes either in content or attributes it will be included in the next UPSTREAM backup.

This feature is not the default so as not to affect existing backups and because of both the disk and CPU overhead. This facility is also available in PC operating systems. Since there is an archive bit and since there is some overhead we recommend the continued use of the archive bit for most customers. However, for situations where you are backing up data where the archive bit is not available for update (BCVs, Volume Shadow Service, etc.), this method is highly recommended.

To enable this feature there is a new parameter: **INCRDB,** which if set to Y will cause UPSTREAM to begin using the database. INCRDB can only be set to Y for the first time for a first-time full or a full merge. To allow easy migration to this new method, if the option is set for a full merge and there is not an existing database, the current method (incremental file or archive bit) will be used to determine the files to back up and the database will be created.

You can enable this option in the UPSTREAM Director in both the Backup and Restore tabs. Press the **Options** button, and the **Miscellaneous** tab. Check the **Use Incremental Database Facility** checkbox to enable.

You must have the INCRDB option set to Y for all backups and restores using this profile so that the files are properly recorded in the database. When you restore files, the files are also written to the database so they are not included in the next backup.

The database is stored in the UPSTREAM work path with the file name of the backup profile with an "idb" extension. This file must be preserved between backups and can potentially grow quite large so sufficient space must be available in the work path.

FDR/UPSTREAM AIX offers a backup feature not available on any of the PC versions (available in the Backup <More> dialog): **Backup files open for Update**: Check this box if you wish FDR/UPSTREAM to

back up files which are open for write. Note that the integrity of the data is not assured. This box is not checked by default. For other UNIX systems this box is ignored; all files are backed up regardless of their open state.

4.6.2. Logical and Physical Volumes

Logical and physical character volumes as well as files and directories can also be backed up and restored. This is particularly helpful in backing up databases such as Oracle. In Solaris, HPUX and AIX v4.1 and later, these backups can even be larger than 2GB. Logical and Physical volumes are not supported in S/390 UNIX or Linux.

To specify a backup of a logical or physical character volume, simply specify the UNIX path of the character special device (for example, /dev/rlv01). You must not have subdirectories selected. You cannot specify wildcards and these devices will not appear in the Files Available list box to avoid inadvertently selecting them. You must be the root user to use this feature.

When logical or physical volumes are displayed on an inquiry, the device is listed as either <CHR-PV> for a character special physical volume or <CHR-LV> for a character special logical volume along with a short size. Restores of these volumes proceed as for restores of files.

Backup and Restore of logical or physical volumes can be very dangerous as the operating system or application may have cached significant amounts of critical data making it unusable when restored. We recommend that file system volumes be taken off-line before any backups or restores and that applications using raw volumes be shut down normally. When in doubt, contact FDR/UPSTREAM technical support for help in planning your backup/recovery scheme.

For physical disk or raw partition access for Tru64 version 5, you must use the /devices/rdisk directory instead of the /dev directory. For example, use /devices/rdisk/dsk0c for the entire disk; /devices/rdisk/dsk0a for the *a* partition. When restoring to the *c* partition (the entire disk), you must use the *disklabel* command to unlabel the disk. See the man page for the *dd* command for more information.

4.6.3. Owners and Groups

FDR/UPSTREAM uses the name of the owner user and group for files and directories by default rather than the ID number. This facilitates cross-system restores in situations where the /etc/passwd and /etc/group files on the two systems are not in-sync.

If these files are not in sync, restores will work correctly if the system which owns the disk is the system which is doing the restore. If you are restoring to a disk owned by another system (via NFS or using a vgexport for example) and the two systems do not have user and group ID numbers in sync, the owner and groups assigned may not be as you would expect. Thus we recommend keeping these ID synchronized or using NIS.

The rules for owner/group assignments are:

- The owner is only restored if the restore is performed by root. Otherwise the owner of the file is the person doing the restore.
- The group is only restored if the restore is performed by root or if the user doing the restore is the original owner of the file or directory.
- If the owner/group name was not found at backup time, UPSTREAM in previous versions used the current UPSTREAM user (root); now the UID/GID from the backup is used.

- Existing directory ownership is preserved only if the repeating parameter **CHANGEDIRATTRIBS** is set to Y.

Starting in FDR/UPSTREAM version 3.1.6 backups include the file or directory's UID and GID number as well as the UID and GID name. You can force the restore to use the number rather than the name with the restore parameters **USEUID** and **USEGID** (defaults to N). To use this new feature, you must perform first-time full backups if you have performed backups with prior versions.

4.6.4. NFS

Your backup spec can be NFS mounted. In the UNIX character mode interface, if you specify an NFS file spec for backups or migrations, there is a new display-only checkbox *NFS Spec* which will indicate if you specified an NFS file spec (checked) or a local file system (unchecked). File transfers will automatically accept NFS mounted files.

If you wish FDR/UPSTREAM to traverse NFS mounts while it is traversing subdirectories, set the file spec parameters **NFSBELOW Y**. For UNIX character mode, there is a new checkbox: **Include NFS** which is grayed unless you check *Include Subdirs*. The default is not checked preserving the previous behavior of only backing up local file systems. If your file spec is an NFS spec, then NFSBELOW is automatically set to Y.

Version inquiry details and client reports indicate whether a file spec was an NFS spec or had Include NFS enabled.

NOTE: The Tru64 and AIX v4.2 and earlier auto-mounter uses a symbolic link to a /tmp_mnt mount point for auto mounted directories. FDR/UPSTREAM will automatically resolve it to the /tmp_mnt directory entry for backups. However, for restores, the data needs to be manually redirected to it's original location or you will get file errors for all files.

4.6.5. Single File System

You can restrict your backups or restores to the file system specified in the backup spec using the file spec parameter **SINGLEFS Y.** This is regardless of where the file system is mounted in the directory structure.

For example, if you have a file system mounted at /home with subdirectories, but then also have separate file system for user ed mounted at /home/ed, if you back up /home with SINGLEFS Y, the /home/ed directory will be excluded.

Note that SINGLEFS is ignored when you specify SKIPBACKUPSCAN.

4.6.6. OS/390 UNIX

FDR/UPSTREAM for OS/390 UNIX is released with only the command line version (uscmd and usdaemon). This means that all backup and restore requests will have to be performed from the FDR/UPSTREAM host (using the ISPF panels), from the FDR/UPSTREAM Director, from a UNIX system which contains the full-screen version of FDR/UPSTREAM (us) using the "Request a Remote Function" facility or End-User Restores.

uscmd or usdaemon will usually be left running for an extended amount of time and CPU time consumed will accumulate. MVS may have a CPU timelimit for each OS/390 Unix System Services task. This may need to be increased. This is controlled via SYS1.PARMLIB(BPXPRMxx) with the parameter **MAXCPUTIME**. See the *OS/390 UNIX Systems Services* planning guide for more information.

Also, uscmd will need a certain amount of memory to run, which may increase for any given number of reasons based on your backup specifications. This may require an increase in **MAXASSIZE** also specified in SYS1.PARMLIB(BPXPRMxx). Again, see the *OS/390 UNIX Systems Services* planning guide for more information.

When running backups, you must be the superuser (uid of 0) to avoid RACF errors during the directory search.

The default INPORT (listening TCP/IP port) is **2972** so as not to conflict with the default FDR/UPSTREAM host listening port. All USTBATCH jobs must specify this port (not the default of 1972).

All levels of compression appear to degrade performance significantly. We recommend that your do not use compression in your backups.

We have found that in some cases, TCP/IP performance can be improved dramatically by having FDR/UPSTREAM use the TCP/IP address of the one of your TCP/IP adapters rather than the local host address (127.0.0.1). For USTBATCH CONV=WAIT jobs, the IP address used is the one specified in the TARGNAME or TCPTARG parameters. For OS/390 Unix System Services initiated conversations, edit the default **upstream.cfg** to set TCPADDRESS to the address of the MVS system. FDR/UPSTREAM performance tests should be used to help isolate performance issues. See the *Performance* chapter or contact Tech support for performance tuning help.

UPSTREAM can hold open user's home directories so that they'll be available for full system backup; specify **HOLDUSERDIRS** Y. This is particularly useful when performing /* backups for OS/390 Unix where user's file systems are managed in separate HFS file systems and are mounted by the system auto-mounter. This parameter is available on the UNIX Backup/More... dialogs and in the FDR/UPSTREAM Director.

There are known bugs in directory searching in zFS for OS/390 UNIX. UPSTREAM uses the opendir2/readdir2 API calls which improve performance dramatically in performing directory listings internally. However, the use of these calls may cause xFS file systems to be dismounted or cause other xFS problems. You can cause UPSTREAM to use the lower performance opendir/readdir functions by specifying the environment variable **USNOOPENDIR2=Y** in your UPSTREAM startup script, the usenv.dat file or your backup/restore job. See the UPSTREAM Parameters chapter for the description for setting environment variables. See IBM APAR OW57194 for potential PTFs.

4.6.7. UNIX Summary

The following are the main differences between FDR/UPSTREAM Unix and FDR/UPSTREAM PC:

- FDR/UPSTREAM is intended for application and user backup. FDR/UPSTREAM is NOT a replacement for your operating system backup except in systems where the UPSTREAM Rescuer is supported. We recommend that you continue to use whatever backup mechanism you are currently using to create bootable backups of the /(root), /usr, /var, /tmp, /opt and any other directories that are part of /home required for minimal system recovery.

  A complete /* restore of files from any of the system directories may make your system unbootable. We recommend that only experienced UNIX system administrators perform selected file restores on an as-needed basis (i.e. to recover a deleted /etc/hosts file).

However, FDR/UPSTREAM is intended to be used as your primary backup facility. Its limitations are predominantly in the area of system disaster recovery.

- Significant FDR/UPSTREAM internal files, used both by us and uscmd, including the help file (us.hlp), the resource file (us.res), the message file (unless fully qualified in the FDR/UPSTREAM configuration), the personalization file (us.ser) and the personalization authorization file (serial.dat) are searched for starting with the default directory (the directory you were in when you started FDR/UPSTREAM), the WORKPATH (in some cases) then in the directory pointed to in the environment variable UPSTREAMPATH.
- (AIX) We do not recommend using DTTERM when running FDR/UPSTREAM from X-Windows; we recommend the more full featured AIXTERM which allows use of ALT keys and is generally more friendly.
- Symbolic and hard links are properly handled for both backups and restores. See the *Advanced FDR/UPSTREAM* chapter for a description of hard link handling.
- Sparse files are not specifically supported on backup (except for the implicit sparse advantages achieved through compression). However, files will be written sparse on the restore using the boundary set with the repeating parameter WRITESPARSE unless you specifically set its value to be 0.
- Incremental backups are performed by checking the file's last modification date.
- There is no user specifiable non-file data. Owner IDs, access dates and more are stored automatically.
- ACLs are not supported.
- If there are errors in starting a remotely requested job (see the *Advanced FDR/UPSTREAM* chapter), these errors are stored in the file **usjob.out** in the WORKPATH directory.
- (AIX) Whenever there is a SNA error that causes a FDR/UPSTREAM APPC request to be interrupted, there will usually be a Communications Server message at the console and FDR/UPSTREAM will terminate.
- FDR/UPSTREAM will not back up directories that have been mounted over.
- UPSTREAM has a kill and control-C signal handler. If FDR/UPSTREAM is terminated with a standard kill or control-C it will finish the current operation and log message #1272E External kill. A kill -9 can not be intercepted and thus the message with not be logged.
- Only standard (OS supplied) UNIX file systems are supported. Backups of 3rd party file systems will generally be denied.

5 NetWare (NLM)

5.1 Overview

FDR/UPSTREAM for Novell can be used from a LAN attached workstation or directly on the server as an NLM (NetWare Loadable Module). This chapter addresses installation and configuration for running FDR/UPSTREAM on the Novell server as an NLM, which is the recommended method. See chapter 14 for details on Novell server backups and specifics for running FDR/UPSTREAM on a workstation for backing up Novell servers.

FDR/UPSTREAM NLM carries the Novell *Yes Tested and Approved logo* and was a Novell NetWare 5 and 5.1 and 6 Launch Partner. Note that to use the facilities that were Yes Tested and Approved you should use SMS for your backups and restores.

The NLM version supports almost all of the extensive functionality of FDR/UPSTREAM including:

- FDR/UPSTREAM/SOS local backups as well as file level local backups.
- NDS backups and restores.
- Host and local initiation.
- Merge backups and restores
- Physical disk backups and restores.
- GroupWise 6 (see the GroupWise chapter)
- ...and much more...

It is the full version of FDR/UPSTREAM with a number of limitations.

- It is a command line version only. All commands must be remote or host initiated or command line or NCF file initiated.
- ULTra is not supported.

FDR/UPSTREAM can run your backups and restores in two ways:

- The legacy method where FDR/UPSTREAM backs up and restores files, obtaining the non-file data through separate calls. This method has the advantage of reasonable performance and allows restores to systems on all PC platforms.
- Using Novell's SMS. It provides the highest level of performance and non-file data preservation. However, you can only restore to a Novell volume.

System requirements are:

- NetWare version 4.1 or higher

WARNING: NLMs are by their nature dangerous. If they crash, the server crashes. You should be familiar with NLMs and FDR/UPSTREAM before using the NLM version of the product.

We recommend that you install, configure, and make operational your TCP/IP software before installing and configuring FDR/UPSTREAM.

5.2 Installation

WARNING: You should obtain all relevant maintenance for your version of NetWare before proceeding with the installation.

The FDR/UPSTREAM NLM version is stored on the CD in the **\UPSTREAM\NOVELL** directory. You can install it either from a client workstation or from the server console.

To install it from a Windows or OS/2 workstation, change to the UPSTREAM directory and run the installation program (assuming that your CD drive is d:):

```
d:
cd\upstream\novell
ussetup
```

From the server console, run (assuming that your CD drive is d:):

```
load d:\upstream\novell\ussetup
```

The installation program displays:

```
This program installs FDR/UPSTREAM.  All it does is:
      - Create an UPSTREAM directory
      - Copy the files to that directory
      - Create an UPSTREAM startup script (to add to AUTOEXEC.NCF)
      - Copy newer version of libraries to the SYS:SYSTEM directory
If you have any problems, you can always perform these steps manually
Do you wish to run it (Y or N) ->
```

Enter Y to continue the installation.

If you are running from a client, you will be asked:

```
Specify the UPSTREAM directory. It must be on the SYS: volume.
[ENTER] for F:\UPSTREAM ->
```

Press [ENTER] alone to use F:\UPSTREAM; otherwise you must enter the full path for where you wish FDR/UPSTREAM installed (for example, “K:\UPSTREAM”). If the directory is not found, it will prompt for its creation. It will then copy all of the files.

When the copy has completed, a startup script, US.NCF will be created in the SYS:SYSTEM directory. This startup script will load all required NLMs as well as FDR/UPSTREAM. If the script already exists, the existing one will not be modified.

The installation program will then note:

```
FDR/UPSTREAM requires the latest version of a number of Novell libraries
The latest version at the time of FDR/UPSTREAM shipment is enclosed on the
CD and can be installed now for you.  Only newer versions will be copied
Do you wish to install these now (Y or N) ->
```

We recommend that you always enter ‘Y’ as FDR/UPSTREAM will only overwrite older NLMs. If you wish to copy these manually, or inspect the files, they are in subdirectories off of the \UPSTREAM\NOVELL directory, NetWare version specific. Thus, version 4.x updates are in the LIB_4X directory; there are no updates for NetWare v5 or 6.

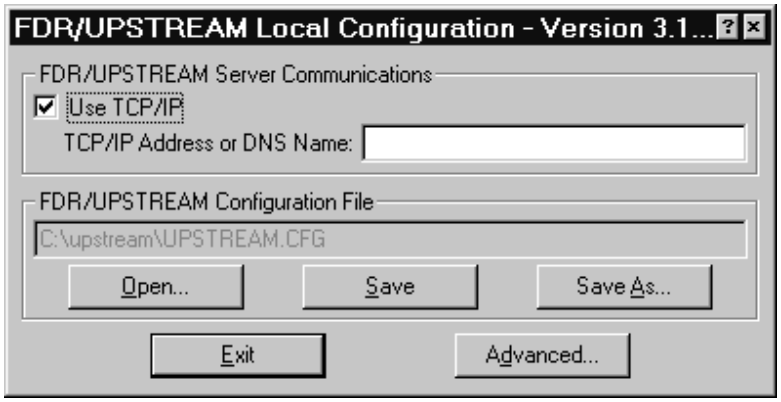
If you are running from a client, you will be asked for the version of NetWare on the server. If you are unsure, you should enter a number other than 4, 5 or 6, this step will be skipped and you can repeat it at a later time.

The contents of the \LIB4X directory are copied from the an older Novell SDK CD (SDK-15) - all recent support packs include these updates so most users will not need to apply them.

5.3 Configuration

FDR/UPSTREAM must be configured from a Windows workstation with the standard FDR/UPSTREAM configurator. The Windows configurator is copied as part of the installation.

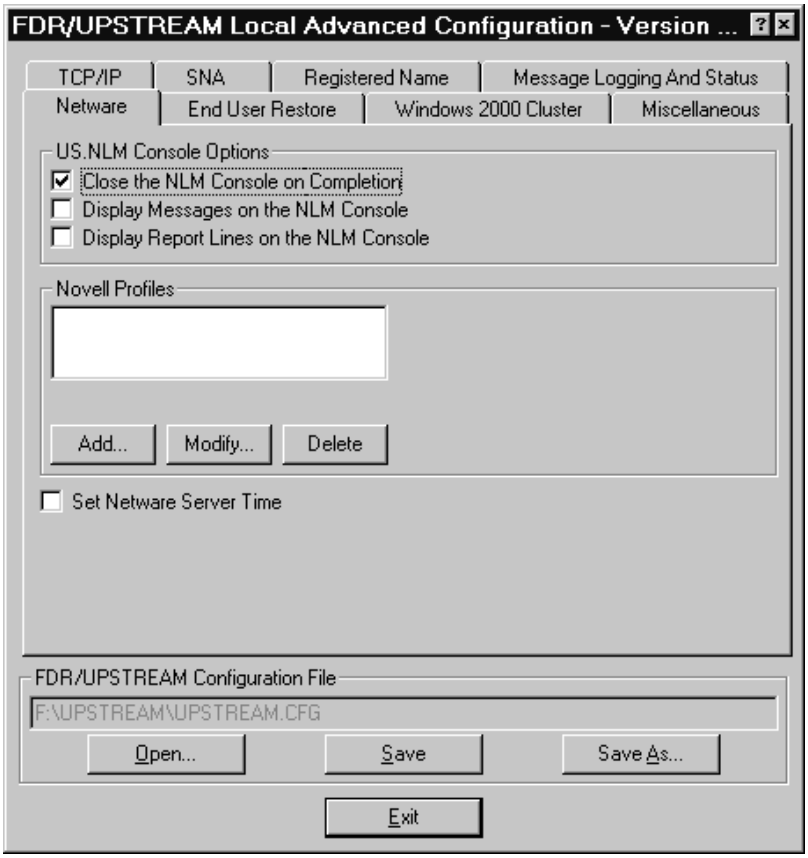
From the client workstation run the FDR/UPSTREAM configurator, **USCFG.EXE** from the UPSTREAM directory where you have installed the NLM version. Note that the Windows version of USCFG is copied to the UPSTREAM directory on the server during the install.



- **TCP/IP Address or DNS Name:** Enter the IP address, or HOSTS or DNS name of the MVS host.

There are a number of NLM specific options which can be accessed when you press the **Advanced** button to modify additional configuration settings.

Press the **Netware** tab to modify UPSTREAM NLM specific settings:



- **Close the NLM Console on Completion:** Check this box if you wish the FDR/UPSTREAM screen to automatically go away when FDR/UPSTREAM terminates. If you do not check this box, you will see a <Press any key to close screen> message and you must press a key to have FDR/UPSTREAM terminate. Note that if you do not, the system console will be locked. The default is **checked**.

- **Display Messages on the NLM Console:** If you check this box, FDR/UPSTREAM will log all of its messages to the system console as well as to its own screen (and log). The default is not checked.

- **Display Report Lines on the NLM Console:** If you check this box, FDR/UPSTREAM will write report lines to the system console as well as to its own screen (and report file). The default is not checked.

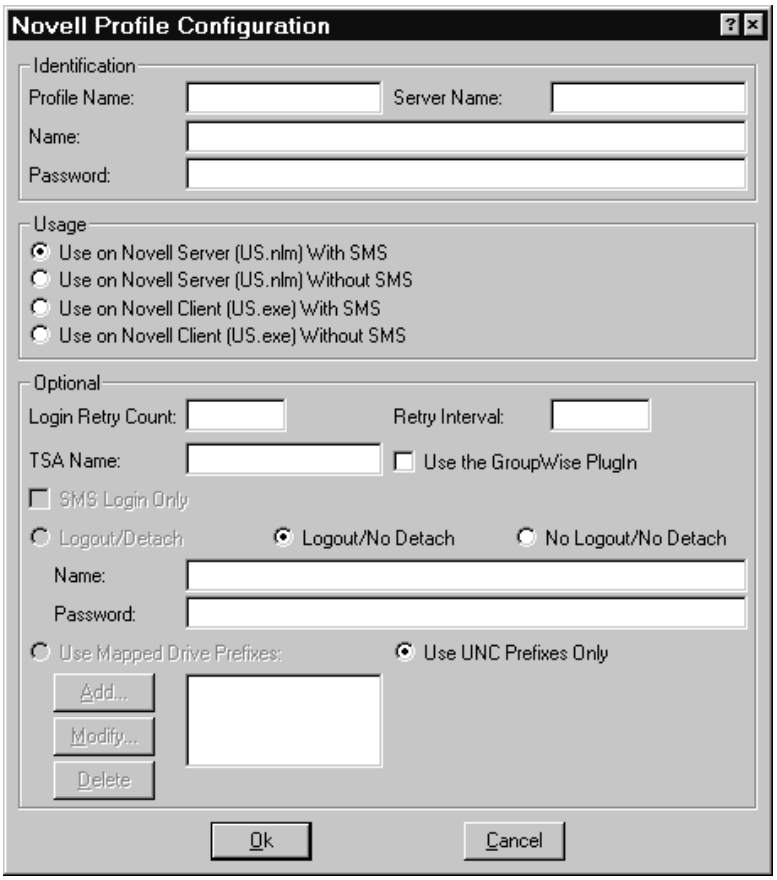
- **Set Netware Server time:** Check this box if you wish UPSTREAM to synchronize the server's clock with the mainframe. The default is not checked.

5.3.1 Novell Profiles

UPSTREAM Novell Profiles login to a NetWare server and define certain characteristics. All UPSTREAM functions must use Novell profiles, as even NLMs must login. Novell Profiles are configured in the UPSTREAM configurator, **Advanced** settings, **Netware** tab.

NOTE: For the NLM version, you must specify Novell Profiles for all backups and restores.

In the *Novell Profiles* frame, press the **Add** button to add a Novell Profile.



In the *Identification* frame:

- **Profile Name:** The Novell Profile name. Specify any random name which identifies the information you are defining here, but we generally recommend the server name. Required field. This field is grayed and inaccessible if you are modifying an existing Profile.

- **Server name:** Enter the NetWare name of the server that you are defining.

- **Name:** The user name used to log in to the server you wish to attach to. Required field. You must use the complete, dotted, fully qualified name. For example: .CN=ADMIN.O=INNOVATION. If the name is not fully qualified you will be warned that you have specified a NetWare 3 login name. To assure that all information is included in your backups and restores we recommend that you use the NDS admin or equivalent.

- **Password:** The password for the user name defined above. Optional field.

In the *Usage* frame, only the first two options are relevant when configuring the NLM version of UPSTREAM:

- ☐ **Use on Novell Server (US.nlm) with SMS:** Novell Storage Management Services (SMS) is designed by Novell as the standard method for backing up and restoring Novell volumes. All Novell features (name spaces, security attributes, NSS specific features etc.) are included in backups and restores. In most cases this can be the fastest method of backup.

  The main disadvantage of FDR/UPSTREAM's SMS support is that the files backed up can only be restored to a Novell server. You cannot directly restore the data to a local disk. Data is transmitted and stored in SIDF form, and Novell compressed data is not decompressed. We recommend using SMS whenever possible to gain the fastest possible performance and the most complete backups. See page 14-20 for a complete description of Novell's SMS.

- ☐ **Use on Novell Server (US.nlm) without SMS:** Press this radio button if you choose not to use SMS.

  In the *Optional* frame:

- ☐ **Login Retry Count:** If the login attempt fails; subsequent attempts may succeed. The default of 0 will have a failed login not be retried.

- ☐ **Login Retry Interval:** If you specified a Login Retry Count, and a login attempt fails, FDR/UPSTREAM will wait for the interval specified here (in seconds) between retries. The default is blank - causing an immediate retry.

- ☐ **TSA Name:** Allows you to specify the TSA name used to connect to SMS. For regular file backups or GroupWise backups the name is generated automatically and you should leave this field blank.

- ☐ **Use the GroupWise PlugIn:** See the GroupWise chapter for more details for GroupWise backups.

The remaining parameters are not generally changed for the NLM version. See the Novell Considerations chapter for a detailed description of the remaining parameters.

Press the **Ok** button to save your Novell Profile and return to the Netware tab.

You can press the Modify or Delete buttons to change or delete the Novell Profile highlighted in the Novell Profiles list box.

5.3.2 Completing your configuration

Other tabs in the configurator are relevant to the setup of the NLM version of UPSTREAM. Most users can leave these values at their defaults.

- In the *Miscellaneous* tab, the **Local Work Path** must be either left blank or a valid local UNC name specified. Most users will leave this field blank to use the directory UPSTREAM was started in.
- In the *TCP/IP* tab, the **Local Status Port Number (for Director)** specifies the starting inbound IP port numbers for the UPSTREAM Director. For the NLM version, two ports are used, starting with the number specified here. Since 2033 may be used by the Novell Java remote console utility, some users may need to modify this value, but most users will leave the default of 2033.

When you have the configuration complete, press the **Save** button to write the configuration file and press the **Exit** button to exit the configurator.

This completes the configuration from a workstation. The next step is to run the FDR/UPSTREAM NLM which is performed at the server console.

5.4 Running the FDR/UPSTREAM NLM

When FDR/UPSTREAM is installed using USSETUP it creates a script US.NCF. To use it to load FDR/UPSTREAM, simply enter from the server console:

```
US
```

You do not need to specify LOAD before it as it is an NCF.

We recommend that you load the FDR/UPSTREAM NLM upon server startup. Thus we suggest that you add this line to your AUTOEXEC.NCF.

If you did not install UPSTREAM on the SYS: volume, or manually copied the files the setup was not able to create the sample startup script US.NCF. To manually load FDR/UPSTREAM, there are a number of NLMs which must be loaded for FDR/UPSTREAM to operate. These will be automatically loaded when you invoke the US.NCF script. The required NLMs include:

- TCPIP
- CALNLM32
- CLXNLM32
- NETNLM32

New versions of these NLMs may have been installed with the FDR/UPSTREAM installation. If you are going to use SMS, there are additional required NLMs (either TSA410, TSA500 or TSA600 as well as TSANDS).

If you are going to be backing up NDS, you do not need to install the USNDS.NLM.

The **US.NLM** program is a command line only version of FDR/UPSTREAM, similar to **uscmd** for UNIX. It has the following attributes:

- All operations must be unattended. You must create parameter files which are then executed by **US.NLM**. A sample one is included **RMTPARM.DAT** which is used to listen for host initiates.
- **US.NLM** opens a screen of its own when it is started. All messages written to the FDR/UPSTREAM log or reports are also written to the screen. Report and log file messages can also be written to the system console (see above).

Most users will want to have their backup and restores controlled by the host or a remote PC. US.NCF will load FDR/UPSTREAM in this manner.

To manually load FDR/UPSTREAM on the server for the servicing of host requests, enter from the system console:

```
LOAD SYS:UPSTREAM/US PARAMETER=RMTPARM.DAT
```

To unload US.NLM, go to the system console and enter:

```
UNLOAD US
```

You can also unload FDR/UPSTREAM by pressing the [ESC] key from the FDR/UPSTREAM screen group. If you press [ESC] during a backup or restore you can suspend the backup/restore without terminating FDR/UPSTREAM.

If you have NetWare 5 or higher or NetWare 4.x with the Winsock extensions and the LONG name space loaded, UPSTREAM supports multiple simultaneous executing instances of UPSTREAM for local or remote requests. Workpath, restarts, multiple host and Director requests and a number of other issues are automatically handled. See the Running More Than One Copy chapter for a description of this feature.

When running in this mode and a new remote request is received, the main UPSTREAM process will start a new instance of itself. In the NetWare server list of Current Screens, you will then see multiple instances of the *FDR/UPSTREAM* program.

Note that the console UNLOAD US command will unload the "parent" UPSTREAM (the initial copy used to start "child" copies) and all child copies. To stop a given child copy, either kill it from the mainframe or the Director status screens or press the [ESC] key in the screen of the process you wish to stop.

Also note that if you terminate the "parent" UPSTREAM, then all active conversations on all children copies are automatically terminated.

The NLM version of FDR/UPSTREAM can only use UNC names. Do not specify drive letters or server formatted specifications. UNC names are specified in the form:

```
\\<Server>\<volume>\<file specification>
```

If you wish you can use the old UNC form as well:

```
!:\<Server>\<volume>\<file specification>
```

For example, to backup all the files in the DIR directory on the SERVER server's SYS: volume, specify:

```
\\SERVER\SYS\DIR\*.*
```

For SMS backups, you can backup all of the resources (volumes) with a single file spec:

```
\\.
```

NOTE: For the NLM version, you must use UNC names for all file specifications and you must use Novell Profiles.

5.4.1 Using the FDR/UPSTREAM NLM

There are a number of ways to request the FDR/UPSTREAM NLM perform functions:

- From the host. This is the method that most users will use. It takes advantage of host scheduling, the ISPF panels and more.
- From a client using the FDR/UPSTREAM Director. See the *FDR/UPSTREAM Director* chapter for more information.
- From a client using End-User Restores. See the *End-User Restores* chapter for more information.
- From the console (or RCONSOLE). This method allows ad-hoc execution of FDR/UPSTREAM functions. You must manually build parameter files (or use FDR/UPSTREAM for Windows or the UPSTREAM Director to build the parameter files) and then use command line parameters to run FDR/UPSTREAM functions.
- From the scheduler. See below for a description of using the NLM scheduler.
- Using the program included in the FDR/UPSTREAM/SOS distribution, NWSERVER.EXE. This is an OS/2 or Windows NT program which allows a NLM or NCF to be executed from a workstation as well as a number of other functions. See the FDRSOS manual for more information.
- From a workstation, using the "Request Remote Function" Management menu option. You must use SNA on the workstation to connect via the host, or you can connect directly to FDR/UPSTREAM on the server using TCP/IP (by **not** checking the Through MVS checkbox).

5.4.2 USSTART Scheduler

Included with the NLM version of FDR/UPSTREAM is a command line version of the USSTART scheduler. This program allows you to time schedule execution of NLMs (including FDR/UPSTREAM).

See the *Automated Backups and Restores* section of the FDR/UPSTREAM manual for a description of configuring and using USSTART.

Use the USCFG configurator to configure scheduled events. The Windows version of the USCFG program is copied to the UPSTREAM directory on the server. After using USCFG, you must modify the configuration file manually using a text editor, making sure that **all file names are in UNC form**. The parameters you must manually modify are:

- CONFIGFILE - The name of this file.
- WORKPATH - Must be modified for UPSTREAM
- FREQPARM - A repeated parameter which represents the FDR/UPSTREAM parameter file to run. This parameter file must be marked ATTENDED N and must be specified without a pathname or in UNC form.
- STARTBATCH - A repeated parameter which represents the NLM to execute. It should always be fully qualified and in UNC form.

Note that USSTART creates a log, USSTART.LOG which can be monitored to determine status.

5.4.3 Jobs

Jobs can only be used for executing NLMs, not NCF files or console commands. Jobs must be specified to run NLMs using the UNC naming convention.

Since there are many reasons to want to execute NCF files and console commands a small NLM, USSYS.NLM is included with FDR/UPSTREAM which allows these to be executed as jobs. To execute an NCF file or console command, specify from the host a command line of:

```
\\<server>\<volume>\<path to USSYS>\ussys.nlm <Novell formatted path to the NCF file>
```

For example, if this is the SERVER server and you are executing TEST.NCF specify a command line of:

```
\\SERVER\SYS\UPSTREAM\USSYS.NLM SYS:UPSTREAM/TEST.NCF
```

5.4.4 Additional Notes

Some additional notes about the NLM version:

- There is an entry **<Volume Information>** automatically created at the root (if you have specified ROOTENTRY=Y, which is the default). This contains volume restrictions (if the Novell Directory Restrictions option is selected). For SMS this is the SYS: primary resource definition. If this “file” is restored, the volume information is actually restored.
- Physical Disk backups/restores require media manager IDs (see ListDisk below) and all volumes on that disk must be dismounted.

5.4.5 ListDisk

ListDisk is a separate utility NLM which allows you to determine which disks may be FDRSOS Local Backup Disks and the media manager IDs for physical disk backups/restores. This is no longer necessary as local backup disk information is now available in the FDR/UPSTREAM Director. However, if you wish to determine local backups disks from the console, this program is still available.

There are actually two versions of this program:

- LISTDISK.NLM. The full version. You must load VOLLIB.NLM (if available) before loading this program. This program resolves media manager IDs to NetWare volume names, and can be useful if you wish to perform physical disk backups/restores.
- LSTDSK2.NLM. A somewhat limited version, which does not require VOLLIB.NLM Since VOLLIB is not available in some NetWare environments (particularly v5), a separate program is provided. This program is sufficient for identifying FDRSOS disks.

Most users will run the program from the console:

```
LOAD SYS:UPSTREAM/LISTDISK
```

It will then ask you:

```
This program lists all the disks and their UPSTREAM names on a Novell server
Enter the name of a file to write this information to.
Press ENTER alone to get the info only written to the screen ->
```

If you enter a file name, the information is written to a file and to the screen. The file name must be in NetWare form. If you just press ENTER, the information is written to the screen.

Since this program is primarily intended for determination of FDRSOS disks, you will be asked to press ENTER after each FDRSOS disk encountered.

The following is a sample listing from LSTDSK2:

```
ListDisk - Lists all Novell disks.  Run at Thu Aug  6 09:53:19 1998
Disk ID #18 (this is also its NetWare Object ID)
   MM_Reserve_Object error #6 (probably mounted): Can’t test for FDRSOS
Disk ID #21 (this is also its NetWare Object ID)
   Object 21 is not a FDRSOS disk
Disk ID #22 (this is also its NetWare Object ID)
   Object 22 is an FDRSOS disk (partition 1).  Set LOCALBACKUPDIR to: 1,22
Disk ID #23 (this is also its NetWare Object ID)
   Object 23 is not a FDRSOS disk
```

- #18 is most likely a mounted NetWare volume. If you wish to back this disk physically and need to relate the FDR/UPSTREAM media manager number to the volume name(s), run LISTDISK. In this case it happens to be the SYS: volume.
- #21 is an unallocated disk.
- #22 is an FDR/UPSTREAM FDRSOS disk. Set the LOCALBACKUPDIR parameter to 1,22 to use this disk.
- #23 is an unallocated disk.

5.4.6 Other Programs

There are a number of other programs which may help you use the NLM version of FDR/UPSTREAM:

- NWSERVER.EXE: This is a FDRSOS supplemental program which allows you to from an OS/2 or Windows NT workstation, load NLMs and NCFs, unload NLMs and mount and dismount volumes. See the FDRSOS documentation for details on its use.
- USLOGCLR.NLM: Cleans up FDR/UPSTREAM logs and reports. See the *Errors* chapter for its use.
- TRCTCP.EXE: A cooperative program, to be run on Windows NT workstations, for tracing the FDR/UPSTREAM NLM. It should only be used under the guidance of FDR/UPSTREAM technical support.

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6 YOUR FIRST BACKUP

6.1. Overview

This chapter discusses running the FDR/UPSTREAM local interface to perform a simple backup. You must have already configured your host connection and run the FDR/UPSTREAM Configurator before you can perform a backup or restore.

If you have configured FDR/UPSTREAM to use a Registered Name and it is running as a system service (NLM, Windows service, UNIX daemon) you may want to use the FDR/UPSTREAM Director as it provides a GUI interface for most platforms, particularly NLM and UNIX. See chapter 8 for more information.

You should view this sample backup as just a test. If you are using the Merge Backup facility, you should identify the drives or directories you wish to back up and use a single backup profile name consistently with the same drives or directories.

NOTE: This section assumes that you are using a GUI or full-screen version of FDR/UPSTREAM. If you are not see page 6-12 for a description of the command line version of FDR/UPSTREAM.

NOTE: Once you enter FDR/UPSTREAM with communications activated, you are eligible to receive and service remote backup or restore requests.

NOTE: There will probably be several fields on your screen which are gray and unavailable. When FDR/UPSTREAM starts it detects if your system is capable of doing the function set in the field. If not, then the field is grayed. If there are server fields you need, verify that the server software is correctly installed and activated.

6.2. Running FDR/UPSTREAM

The FDR/UPSTREAM PC main program is named **US**.

(Windows, OS/2 only) Start FDR/UPSTREAM by selecting the **FDR/UPSTREAM**or **UPSTREAM Local** icon from the FDR/UPSTREAM Program Group.

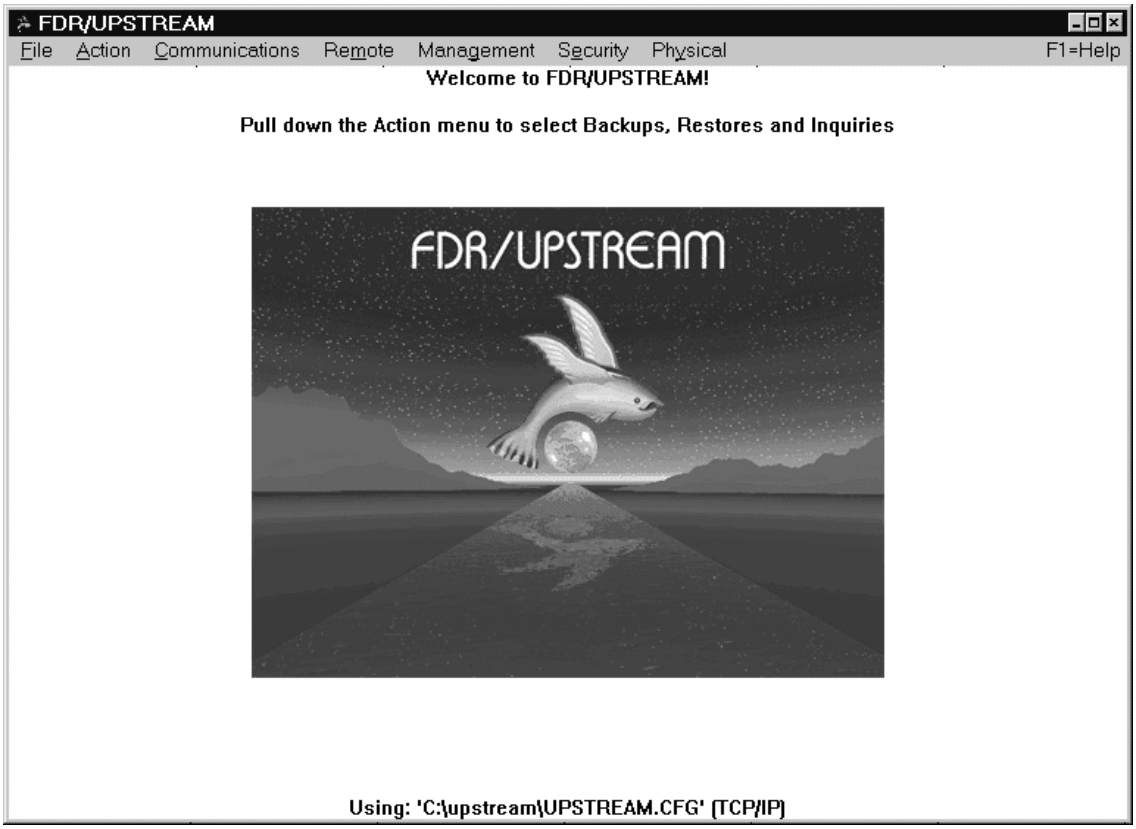
(UNIX only) To start the FDR/UPSTREAM character mode program, change to the directory you loaded FDR/UPSTREAM into and run the **us** program.
Note that if you installed FDR/UPSTREAM into another directory, or you have multiple users using it, you should see the notes at the end of the Unix configuration chapter regarding the current default directory and which files a given non-root user can backup or restore..

If you requested workstation registration in the FDR/UPSTREAM Configurator, you will see a small window which displays the progress of registration to FDR/UPSTREAM MVS. If there are errors, see the Errors chapter for more information on problem determination and resolution.

The first screen you will see is the main FDR/UPSTREAM screen. As suggested by the text on the screen you access FDR/UPSTREAM functions with pull down menus. As for the configurator, you can pull down a menu by using the mouse, pressing the [ALT] key followed by the first letter of one of the menu options (like [ALT]A for Action), or by using an accelerator key (like [ALT]B for backup).

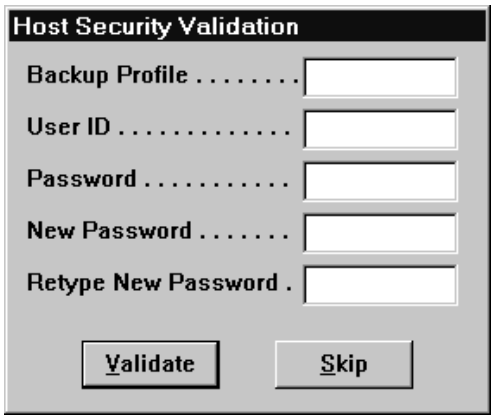
(UNIX only) Most Unix terminal emulators when run with FDR/UPSTREAM should substitute [ESC] for [ALT]. Thus to pull down the Action menu, press the **[ESC]** key immediately followed by the letter **A**.

The bottom of the screen indicates the selected configuration file name (usually UPSTREAM.CFG) and the type of host connection (SNA or TCP/IP).



The action to be performed is a backup. Pull down the **Action** menu with the mouse or by pressing [ALT]A and press ENTER on **Backup**.

Whenever you first enter FDR/UPSTREAM and request just about any functions, you will be asked to enter your host security parameters.



The entry fields are:

- **Backup Profile:** All of the backups for a backup profile are stored and are accessible together, and each backup profile has certain attributes which are maintained on the mainframe. The mainframe administrator should assign backup profiles. If you are using the merge backup facility (as recommended) you will assign a single backup profile to each workstation or server. This field has a maximum of 8 characters and is required. Note that you can add to the duplicate file database by performing Keyed/Duplicates backups using the backup profile USTDUPFL.

> **WARNING: Backup Profiles should not be shared between servers or workstations. Each server or workstation should have its own Backup Profile when using merge backups.**

- **User ID:** The user ID is your mainframe security ID as assigned by the mainframe security administrator. Usually a password is required if a user ID is required.

- **Password:** The password is your private identifier associated with your user ID for access to the mainframe. This is assigned by the mainframe security administrator. When you enter values in this field, the cursor will move but what you type is not displayed. When you save parameters to disk the password is encrypted. You need to reenter your password at least once when you enter FDR/UPSTREAM in attended mode.

- **New Password:** If you are running FDR/UPSTREAM MVS v3.1.0 or later, you can change your host password by entering the new password here.

- **Retype New Password:** If you entered a new password, reenter it here for verification.

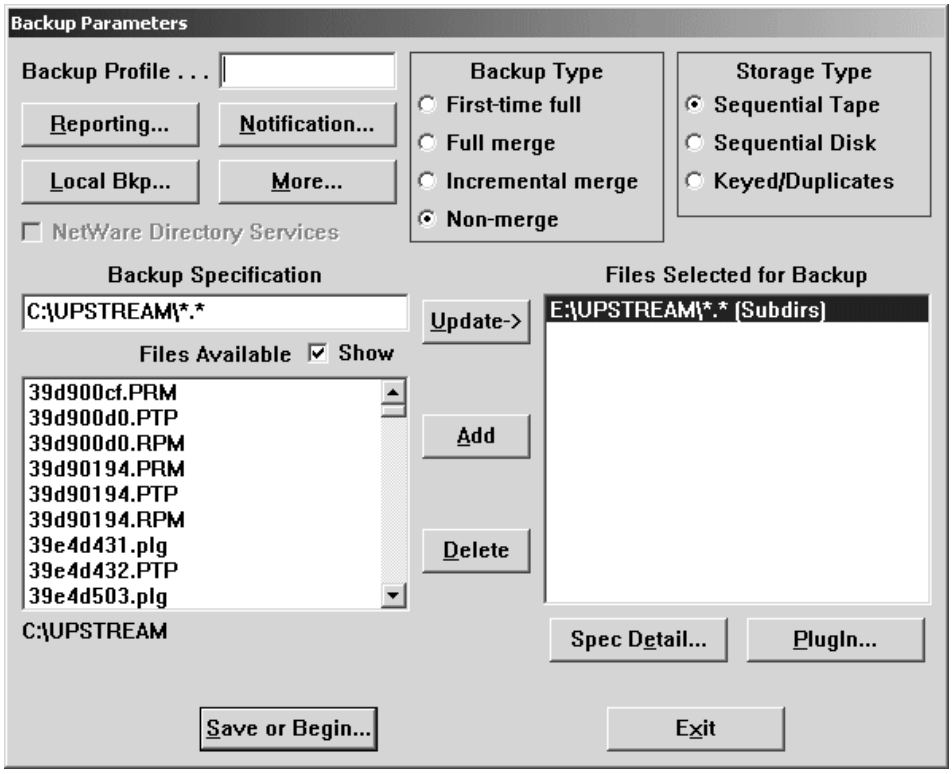
- **Validate:** Press this button to validate your backup profile/user ID/password combination with host security. If you do not validate at this time, validation will be performed at the first host request. Validation can be skipped if you do not have host security enabled or you do not have host communications activated. Note that when you press Validate, communications will be attempted and you may get communications errors (see later in this chapter). Pressing [ENTER] has the same affect as pressing this button.

- **Skip:** Press this button if you wish to skip validation at this time. Pressing [ESC] has the same affect as pressing this button. Note that if you skip validation, your entered parameters are still saved.

  Note that you can bring this dialog back up to change any of these values from the main FDR/UPSTREAM window by pulling down the **Security** menu and selecting **Host Security Login**.

  We recommend that you press **<Skip>** until you have completely entered your backup request.

  You will see the backup parameters dialog.



The meanings of these fields are available by pressing the help key, [F1]. The fields are described below. After the field descriptions is a sample for a definition for a test backup.

The meaning of the text field is:

- **Backup Profile:** This field will have the value entered in the security validation dialog. You can change its value here.

The push buttons beneath the backup profile allow you to specify a number of parameters which are useful in your backup strategy. These include:

- **Reporting:** Specify workstation reporting options including files backed up and skipped. See *The FDR/UPSTREAM Program* chapter for more information.
- **Notification:** Generates email or SNMP notification messages. See the *FDR/UPSTREAM Program* chapter for more information.
- **Local Bkp:** Specify parameters which improve performance on restores as well as FDRSOS Local Backups which improve the performance of backups and reduce network traffic. See *The FDR/UPSTREAM Program* and the *FDRSOS/Physical Disk* chapters for more information.
- **More:** Specify a variety of useful options including Compression, Restart, Novell Automated Login, and more... See *The FDR/UPSTREAM Program* chapter for more information.

The Backup Type radio buttons define the type of backup that you wish to perform. The first three options are for merge type backups. The last option is used when you are performing tests or do not wish to use the merge facility. Pressing the merge backup options has effects on other fields in other dialogs.

- ☐ **First-time full:** Press this radio button if you intend to use the merge backup facility and you are performing a baseline full backup. Pressing this button causes the Archived and Keyed storage type buttons to be disabled as well as changes in all the file specs:
  - Incremental is turned off.
  - Reset Archive Bit is turned on.

NOTE: First-time full backups are not recommended if you are using the duplicate file suppression facility.

- ☐ **Full merge:** Press this radio button to create a full backup using the merge facility. Pressing this button causes the same changes in all the file specs as when you press the First-time full as well as disabling the Incremental and Reset Archive Bit options in the file spec dialogs.

- ☐ **Incremental merge:** Press this radio button if you have performed a First-time full in the past and wish to create an incremental backup. Pressing this button causes the Archived and Keyed storage type buttons to be disabled as well as changes in all the file specs:
  - Incremental is turned on and the field is disabled.
  - Reset Archive Bit is turned on and the field is disabled.
- ☐ **Non-merge:** Press this radio button when you do not wish to use the merge facility, are performing tests, or if you are managing Backup Profiles used for Grooming. For backward compatibility, this is the default.

The storage type radio buttons define the host storage type which is how and where your backup information is stored. The option you select must be coordinated with the host administrator who defines the backup profile in the FDR/UPSTREAM MVS configurator and defines which types of backups are allowed. These options affect the file *data*, not the information about each file. Even if your backups are stored on tape, inquires can be done without a tape mount. The Backup Type may disable some of the options.

- ☐ **Sequential Tape:** If you press this radio button, then you will be creating a "direct-to-tape" backup. These backups are written immediately to tape rather than stored (even temporarily) to disk. This storage type may be slow on startup, but is then generally fast on backup (with occasional stoppages while tapes are being changed). Restores may be slow while tapes are being mounted. Remember that coordination with host operational staff is important and that you are limited to the number of concurrent backups or restores you can run by the number of tape drives in the system. This is the default option.

- ☐ **Sequential Disk:** If you press this radio button, then you will be creating a "sequential disk" backup. These backups are stored in a sequential disk (flat) file rather than in the VSAM clusters. This allows the file data to be managed by ABR, SMS or any other host migration system. This storage type allows fast backups but requires temporary disk space to hold the file, coordination with the migration facility, and may be slow on restore due to tape mount delays.

- ☐ **Keyed/Duplicates:** If you press this radio button, then you will be creating a "disk" backup or adding to the duplicate file database (you can use the predefined backup profile USTDUPFL to add to the duplicate file database). These backups are stored until rolled off on a host disk file. This storage type allows fast backups and fast restores but requires MVS disk storage for all data. This option is disabled if you are using merge backups.

The check box above the backup spec:

- ☐ ***(non-UNIX only)*** **NetWare Directory. Services.:** Check this box if you wish to backup NetWare Directory Services as one of your backup specifications. Checking this box changes the Backup Spec field to (NDS). This box is

grayed unless you have an active NetWare drive mapping to a server running the USNDS NLM. See the Novell chapter for more information. The default is not checked.

The Backup Spec allows you to enter the files to be backed up:

- **Backup Spec:** Enter the fully qualified file name, with wildcards, of the file, subdirectory or drive that you wish to back up. When you leave this field the Files Available list box is changed to reflect all the files in the directory which you just selected (if you have pressed the <Show> check box and not specified a StreetTalk name or a UNIX character special device).

  To use this specification, press the <Update> button, which causes the change to be reflected in the Files Selected for Backup list box. Pressing the <Ok> , <Add>, <Spec Detail> or <More...> button will also cause this entry to be saved. This value will change as you highlight different entries in the Files Selected for Backup list.

  NOTE: You must press the <Update>, <Ok>, <Add>, <Spec Detail> or <More...> button to have the Backup Spec saved for use.

  NOTE: To backup more than one file, you MUST specify wildcards.

  (Windows NT, OS/2 and NLM only) You can specify the files to back up using FDR/UPSTREAM UNC (universal naming convention) names. Somewhat similar to the standard UNC naming convention, the format is:

  ```
  \\<Machine>\<share>\directory spec>
  ```

  Or you can use the FDR/UPSTREAM UNC form:

  ```
  !:\<Machine>\<share>\<directory spec>
  ```

  Thus to back up all the files in the \TEST directory on the SERVER1 server on the CDRIVE share you would specify:

  ```
  \\SERVER1\CDRIVE\TEST\*.*
  ```

  See the *IBM*, *Novell* and *Windows NT/2000/2003/XP Considerations* chapters for more information. Note that we recommend UNC names for LAN attached drives where possible. Note for Windows NT and OS/2 drives it is faster to back up local disks by their drive letters rather than UNC names.

  For Windows systems or Novell servers with SMS you can also backup the entire system (all read-write drives) as well as the Windows 2000 system state (if applicable) with the file spec:

  ```
  \\SERVER1
  ```

  Or, to indicate the current machine:

  ```
  \\.
  ```

- ***(non-UNIX only)*** **Show:** Check this box to have the File Available list updated with the files specified in the Backup Spec (either locally, on a server, or via ULTra). The default is checked.

- **Files Available:** This list box displays a directory listing of the drive and directory specified in the Backup Spec (local files, network drive files, or ULTra attached workstation files). You can use the mouse or keyboard to select en-

tries which causes the Backup Spec to change to reflect the selection, or double click on a file, directory or drive to make that the new entry. To use this specification, press the <Update> button, which causes the change to be reflected in the Files Selected for Backup list.

The buttons between the list boxes allow you to modify the values in the Files Selected for Backup list box.

- **Update:** Press this button to change the currently highlighted entry in the Files Selected for Backup list to reflect the entry in the Backup Spec field. This also occurs when you press the <Ok>, <Spec Detail>, or <More...> buttons.

- **Add:** Press this button to create a new entry to be included in the backup using the Backup Spec. The new entry is added to the end of the Files Selected for Backup list box and it becomes the highlighted entry.

- **Delete:** Press this button to delete the highlighted file spec in the Files Selected for Backup list box. The entry before this one becomes the active spec.

- **Files Selected for Backup:** The entries in this list box are the file specifications that will be used in the backup. When you highlight an entry, the Backup Spec entries will change to reflect the value. Double-clicking the mouse on an entry has the same affect as pressing the <Spec Detail> button.

- **Spec Detail:** Press this button to modify parameters specific to the file specification highlighted in the Files Selected for Backup list box. These parameters include whether subdirectories are included, incremental flags, file server specific information and more. See *The FDR/UPSTREAM Program* chapter for more information.

- **PlugIn:** Press this button to enable processing of the file specification, specific to a database type. Plugins are available for Windows 2000 Active Directory, Lotus Notes R5 and a number of other databases. See the specific database chapter for descriptions of each plugin. This button is only enabled if there are plugins available for your operating system.

The meaning of the push buttons at the bottom of the dialog are:

- **Ok:** Press this button to be prompted to exit this dialog, save your changed parameters and optionally begin the backup. Pressing ENTER has the same effect as pressing this button.

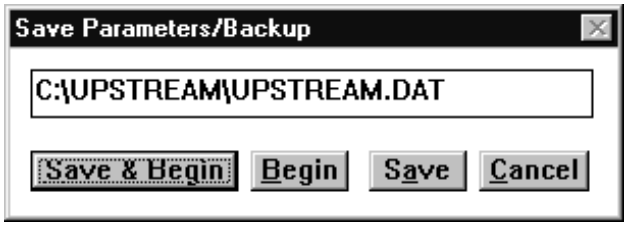
- **More...:** Press this button to update lesser used parameters such as Record size, Novell Profile, Compression, ULTra options, Reporting and the like. See *The FDR/UPSTREAM Program* chapter for more information.

- **Cancel:** Press this button when you wish to leave this dialog without saving parameters. Pressing this button is the same as pressing the ESC key.

For this example, use the following parameters:

- Backup Profile as assigned by your system administrator.
- Non-merge Backup Type
- Seq. Disk Storage Type
- C:\UPSTREAM*.* Backup Spec.
- All the remaining parameters left at their defaults.

Press the <Save or Begin> button to save these parameters. You will see the Save parameters dialog



In the edit field, enter a name for the file to be used to save the stored parameters in. These parameters are merely text values which can be later viewed in FDR/UPSTREAM, edited with a text editor, overridden from the environment or command line. The recommendation is that all parameter files have the suffix .DAT; the default is UPSTREAM.DAT.

If you press:

- **Save and Begin:** Your parameters will be saved to a file (which you can name in the edit field) and the backup will begin. Pressing the ENTER key has the same affect. You must have started communications.
- **Begin:** The backup will begin, but your parameters will not be saved to disk. You must have started communications.
- **Save:** Your parameters will be saved to a file (which you can name in the edit field). The backup will not be run.
- **Cancel:** Your parameters will not be saved and the backup not run.

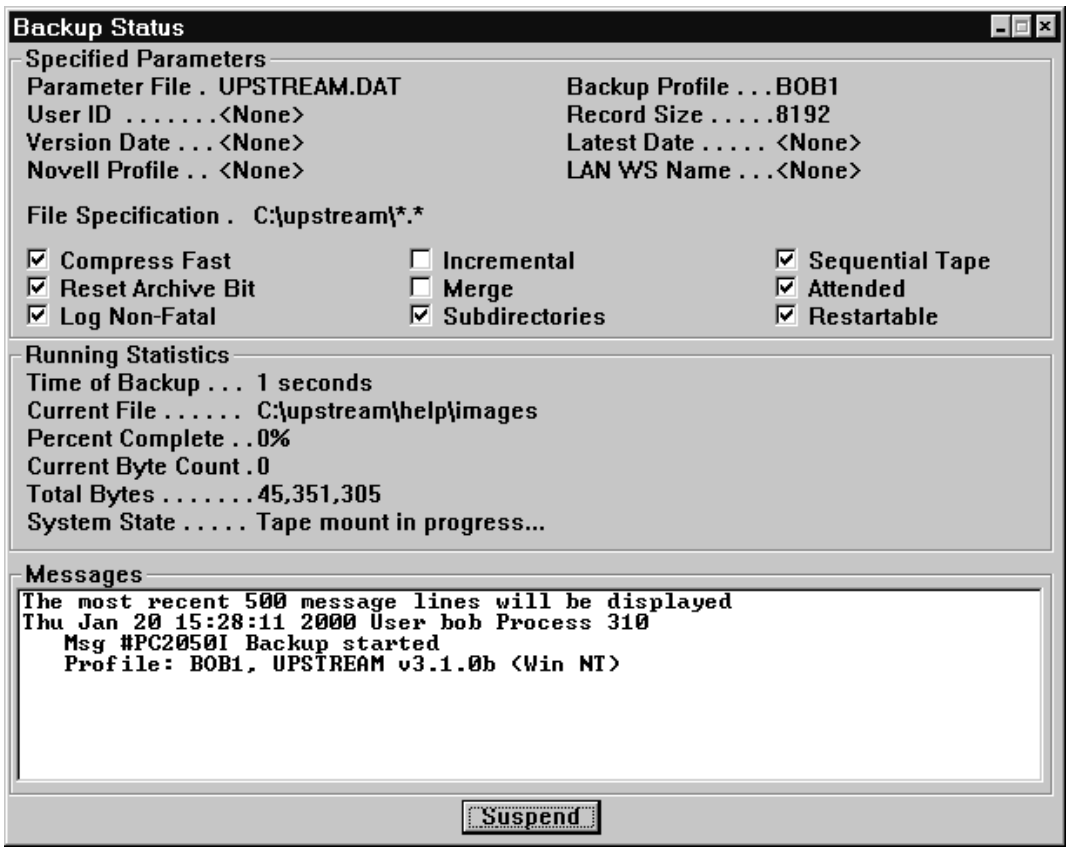
You have now created the default parameter file. If you wish, you can exit the program by pressing [ALT]X, [F3], or by pulling down the File menu and selecting Exit.

6.3. Running a Backup

To run a backup start the FDR/UPSTREAM program as you did above.

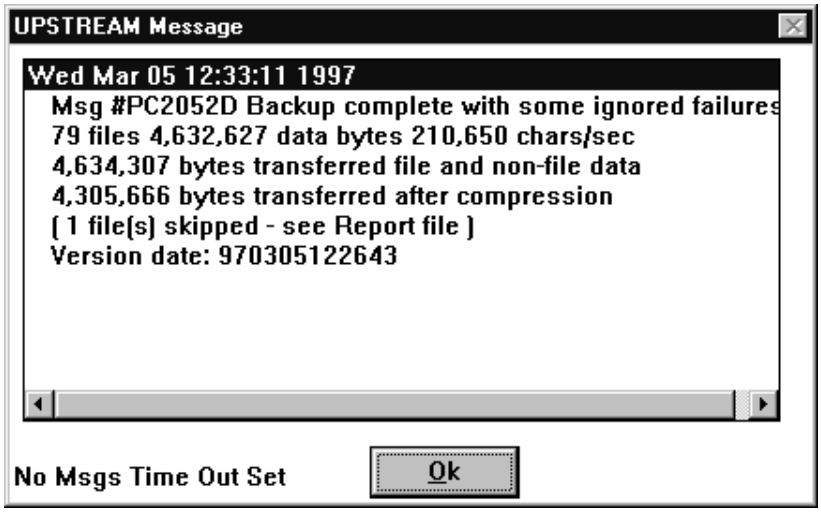
Bring up the backup dialog by pressing [ALT]B or by pulling down the **Action** menu and selecting **Backup**. Press the TAB key until you highlight the **<Save or Begin>** button and press it, or click the <Save or Begin> button with the mouse.

You will be asked if you wish to save your parameters (see figure above). If you choose to begin the backup you will see the backup status screen which displays information about the backup that you entered and also shows continually updated running statistics.



As the backup progresses, you can press the <Suspend> button to stop it. If you specified a restartable backup type, the backup can be restarted later. Errors which occur during the backup are written to the Messages list.

When the backup is complete, the status screen is removed and transfer statistics are displayed in a message window and written to the FDR/UPSTREAM log file (**upstream.log**).



If you received an error during the backup, the FDR/UPSTREAM file viewer will be displayed; it will automatically open the **upstream.log** file and bring you to the end of the file. See the *Errors* and FDR/UPSTREAM Errors chapters to help you in problem resolution. All messages and errors are written to this log file. Note that in the operating system specific chapters (UNIX, Windows, Novell, etc.), there are often suggestions for problem resolution described.

If the backup was not successful, and you specified Restartable in the Specify Backup screen, the information about the backup is retained (in the Backup Description File created at the beginning of the backup). The next time you enter FDR/UPSTREAM, the backup will be retried. If you specify Attended in the Specify screen, then you will be prompted first and have the opportunity to not retry the backup. All files not successfully backed up will be retried.

You have now completed your first backup. The following chapter will walk you through your first restore and inquiry.

6.4. Command Line FDR/UPSTREAM

As well as the GUI or full-screen version of FDR/UPSTREAM, a command line version of FDR/UPSTREAM is also provided for the UNIX, Novell (NLM), and Windows NT operating systems. The command line version is a full featured version of FDR/UPSTREAM with virtually all functions supported including backups, restores, file transfers, job execution, etc.

Reasons for it's use often depend upon the operating system type:

- UNIX: The command line version does not require a terminal to be connected and can thus be useful for automation.
- NLM: Running the command line version on the Novell server is much faster than running FDR/UPSTREAM from GUI capable workstations.

With the command line version, FDR/UPSTREAM functions can be requested:

- From the host. Use the USTBATCH facility to request virtually all FDR/UPSTREAM features. See the FDR/UPSTREAM MVS manual for the use of USTBATCH.
- Using the FDR/UPSTREAM Director. See chapter 8 for more information.
- Using End-User Restores. See chapter 9 *End-User Restores* for more information.
- From another PC. This facility is further described on page 25-8 in the *Requesting a Remote FDR/UPSTREAM Function* section in the *Advanced FDR/UPSTREAM* chapter.
- From the command line. In this case you build parameter files with the full-screen or GUI version of FDR/UPSTREAM or the FDR/UPSTREAM Director and request execution of it on the command line. This is usually used in timed automation and is described in the *Automated Backups and Restores* chapter.

If the request is from the host or another FDR/UPSTREAM Client, FDR/UPSTREAM or a communications sub-system must be listening for the request. For SNA environments, the SNA attach manager will often start FDR/UPSTREAM (except for UNIX), for Windows NT, FDR/UPSTREAM needs to be running (usually as a service); also for Windows NT there is a TCP/IP Attach Manager provided with FDR/UPSTREAM (see chapter 24 *Running More Than One Copy* for more information).

To get FDR/UPSTREAM to listen automatically depends upon the operating system:

- UNIX: Configure the daemon as described in the *UNIX* chapter.
- NLM: Add the appropriate LOAD command as described in the *NetWare* chapter.
- Windows NT: Most users will want to run the command line version as a service. See the *Windows* chapter for a description of running FDR/UPSTREAM as a service.
- OS/2: FDR/UPSTREAM needs to run from STARTUP.CMD or in the Startup group.

We recommend that your first backup, whenever possible be locally initiated via the GUI or full-screen interface because connectivity and security issues are easier to diagnose if there is only a single step to the process (PC-to-host rather than host-to-PC-to-host).

If this is not possible (for example, with the NLM version), you may want to create a parameter file with the GUI version of FDR/UPSTREAM and pass the parameter file as a command line parameter (using the PARAMETER=<parameter file> statement) to the command line version of FDR/UPSTREAM. Note that the command line version requires that the ATTENDED parameter be set to N. You can often do this with command line overrides.

Thus, if you have created a parameter file BACK.DAT, you can execute it using uscmd as follows (for the NLM version you must use **us** instead of uscmd and precede it with LOAD):

```
uscmd PARAMETER=BACK.DAT ATTENDED=n
```

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7 YOUR FIRST RESTORE

7.1. Overview

This chapter discusses performing a simple version and file inquiry and restore. A restore assumes that you have first performed a backup, so you should already have installed FDR/UPSTREAM, configured your host connection performed a backup (see the previous chapter).

FDR/UPSTREAM allows you to view, without actually performing a restore, all prior backups (backup versions) stored on the mainframe, as well as all the files in each version, in a format that you are familiar with. This makes it easy for you to restore just the files you need.

7.2. List and Restore

To begin a restore you should load your host connectivity software and FDR/UPSTREAM (see the previous chapter). From the FDR/UPSTREAM main screen, either press [ALT]L or pull down the **Action** menu ([ALT]A or use the mouse) and select **List and Restore**. This may cause one or two communications functions to occur (an inquire versions and an inquire files). Either of these may fail. If they do, you will not be able to enter the list and restore facility. See the *Errors* and FDR/UPSTREAM Errors chapters to help you in problem resolution. If you want to set up restore parameters, see *The FDR/UPSTREAM Program* chapter for instructions in using the old restore facilities.

After the communications are complete, you will see the Inquire/Restore dialog.

Inquire/Restore for Profile BOB1 From 01/20/00 15:39:24 Back to Full

Search Spec ..... **

Restore To .....

```
-Version Date- -Status/Size-   -Version Date-
01-20-00 15:39  Drive──────► - C:
03-05-98 14:04  Directory──► + ├──upstream
01-20-00 15:37             0   └──<Volume Information>
```

Select for Restore | Select All Dirs. | Expand Dir. | Expand All Dirs.

Restore... | Backups... | Exit | More... | PlugIn...

- **File list:** This list box shows the results of your requested inquiries and selections. Each item in the list box is a file or directory shown in a tree-like format. The Version Date column indicates the file's last modification date, the Status/Size column indicates one of the following:
  - If it is a file, it's size.
  - Whether it is a directory
  - Whether is has been migrated.
  - Whether it is a symbolic link or a physical or logical volume.
  - It's selection status (selected or excluded).

  If the item has been selected, it will indicate `Selected` ➔. Note that items can only be deselected at the level they were originally selected at. If an item at a lower level has been selected, it will indicate `Selected` ↓ to help you locate selected items. If an item has been selected implicitly (with wildcards) it will indicate ↑ `Selected`. Items can be excluded only if they are already selected.

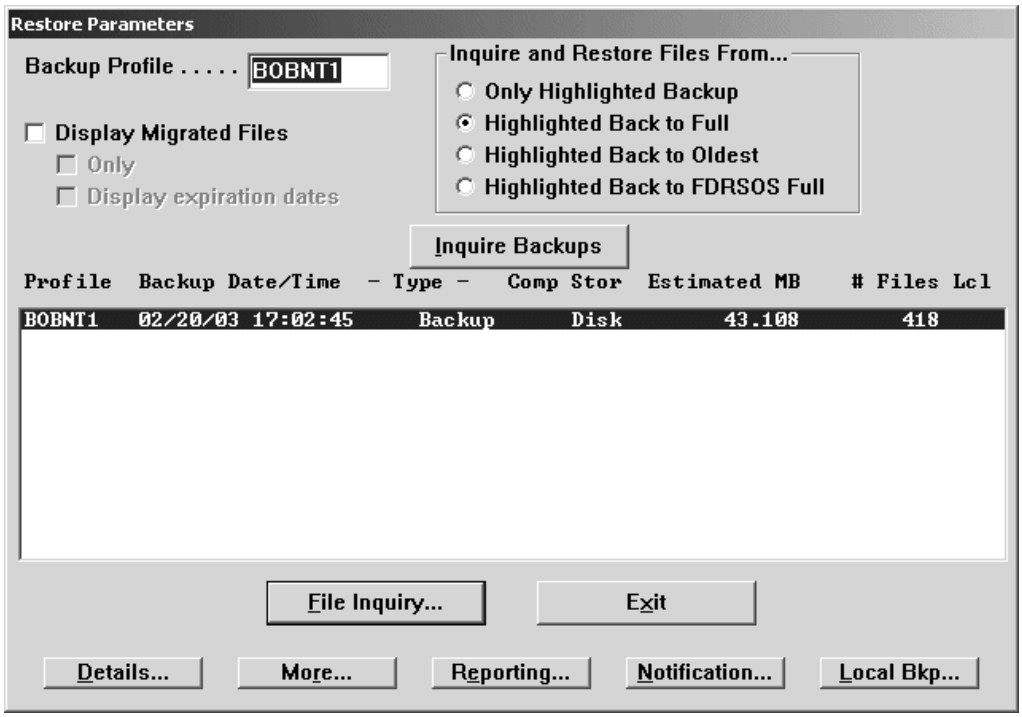
  Note that the buttons change their text and meanings depending upon the state of the item highlighted in the list box. For example, if the item highlighted is an unselected, unexpanded directory, the 4 buttons will say (in sequence):
  - <Select for Restore> (to select the directory),
  - <Select All Dirs> (to select all files in all subdirectories below the highlighted one).
  - <Expand Dir> (to expand and see the contents of the directory).
  - <Expand All Dirs> (to expand and see the contents of all subdirectories below the highlighted one).
- **Select:** If the entry in the list box is unselected, this button will say **<Select for Restore>** and will select the highlighted file or (if this is a drive or directory) the items at the highlighted level. Note that when you select an item, it is included in the restore. You must select at least one item for the <Restore> button to be enabled. If the entry in the list box is selected implicitly (through the selection of a drive/directory at a level above), the button will say **<Exclude>** and allow you to exclude the file or files at the given level. If the item is explicitly selected the button will say **<Deselect>**. If the item is explicitly excluded, it will say **<Exclude Off>**.
- **Select All:** Allows you to select or exclude from the entry highlighted in the list box, down through all subdirectories. Like the regular select button, the value will change depending upon what is highlighted in the list box.
- **Expand:** Press this button to expand (perform and display a file inquiry) the entry highlighted in the list box. If you have a drive or directory highlighted the current drive/directory level will be inquired from the host and displayed on the screen. If you have a file highlighted, then any older versions of the file will be displayed (if any). If the entry has already been expanded (denoted by a minus sign in front of the entry), the button will read **<Collapse>** and you hide displayed files.
- **Expand All:** Allows you to expand/collapse from the entry highlighted in the list box, down through all subdirectories.
- **Restore...:** Press this button to display the screen allowing you to save your parameters and begin a restore. You must select something for restore for this button to be enabled.
- **Backups...:** Press this button to see the backup version information dialog which allows you to select which backup is your starting backup, see details about backups and more...
- **Exit:** Press this button to exit this dialog without saving your changes.
- **More...:** Press this button to specify non-file data and other information about the files to be included in the restore. Note that when you save values in the More... dialog, the values apply to all the restore specifications.

- **PlugIn**: This button is only available if you specified a plugin for the backup. See the database section for your database for more details.

For this example, highlight the UPSTREAM directory and press the **<Expand Dir.>** button. We will restore just the **us.hlp** file, so highlight us.hlp and press the **<Select for Restore>** button. You will see the Status/Size column change to `Selected` ➔.

7.3. List Backups

If you press the **<Backups...>** button you will see the restore parameters dialog.



This dialog allows you to select information relevant to the backup(s) you are restoring from.

- **Backup Profile:** Available so that you can change the backup profile you will use for your restores. When you change this value, the Backups List clears. You can use a wildcard ('*') in the name to help you select from a group of backups. This field is automatically filled in with the value entered in Host Security Validation and is required.

- **Display Migrated Files:** Check this box if you wish to have migrated files included in the file list. If you check this box, you can optionally also check the **Only** box which, when checked, will display only migrated files and not display normal files in the file list. You can also check the **Display expiration dates** which displays expiration dates for migrated files in the file list. The default for all three check boxes is not checked.

The **Inquire and Restore Files From...** radio buttons allow you to select whether file inquiries and restores will use a single version or multiple versions (which may display multiple files). Note that these options are only used when working with Merge backups.

- **Only Highlighted Backup:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) File Inquiries will show only the files stored in that one backup.

- **Highlighted Back to Full:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) and all versions back to and including the full. If there are multiple copies of a file, all will be displayed. A restore will include the latest copy of each file (regardless of which backup it is on), or any specifically selected files. This is the default option.

- **Highlighted Back to Oldest:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) and all versions back to the oldest version stored on the host for this profile. If there are multiple copies of a file, all will be displayed. A restore will include the latest version of each file (regardless of which backup it is on) from the selected backup back to the full, or any specifically selected files (which may be before the full backup).

- **Highlighted Back to FDRSOS Full**: If you have FDRSOS® and if selected, the workstation/server software will extract the modification date/time of the FDRSOS Timestamp file and the host software will transmit files in backups which were performed since that date. If selected, the workstation/server software will extract the modification date/time of the FDRSOS Timestamp file and the host software will transmit files in backups which were performed since that date. See the FDRSOS chapter for more information.

The button and the list box are:

- **Inquire Backups:** Press this button if you wish a listing of the backups stored on the host for the specified backup profile. Pressing this button communicates with the host. Note that FDR/UPSTREAM does an automatic Inquire Backups when entering the list and restore facility.

- **Backups List:** This list box contains the results of the Inquire Backups. It is a mono-spaced list box, each row showing an individual backup. The columns are: Backup Profile, date and time the backup was started, the type of backup (merge full, merge incremental, or just backup), whether it was completed (an 'I' in the Comp column), the storage type (disk or tape), the original estimated backup size in megabytes and the number of files. Often the list box is automatically filled in on entry. The highlighted backup is important for determining the information displayed and restored (see above).

The big push buttons are:

- **File Inquiry...:** Press this button to return to the list and restore dialog.

- **Exit:** Press this button to return to the main FDR/UPSTREAM window.

The small push buttons are:

- **Details...:** This button allows you to examine the specific information for the backup version highlighted in the Backups list box above. You must press the <Inquire Backups> button to extract versions before viewing their detail.

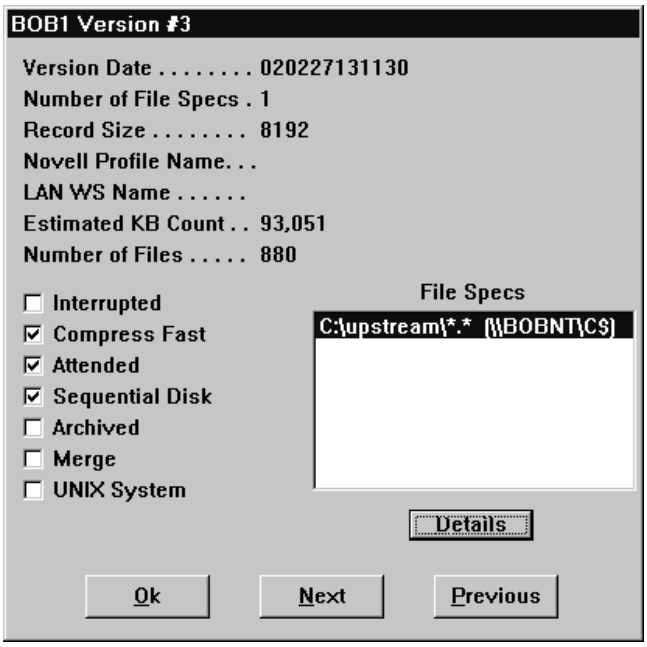
- **More...:** Press this button to select additional restore parameters such as a Novell Profile, Reporting options, etc.

- **Reporting...:** Press this button to specify workstation/server reporting options.

- **Notification:** Generates email or SNMP notification messages. See the *FDR/UPSTREAM Program* chapter for more information.

- **Local Bkp...:** Press this button to specify local backup options including FDRSOS Local Backup options.

  To see detailed information about a given backup, press the **<Details...>** button.



  This dialog displays the overall parameters specified when you performed the backup. The controls are:

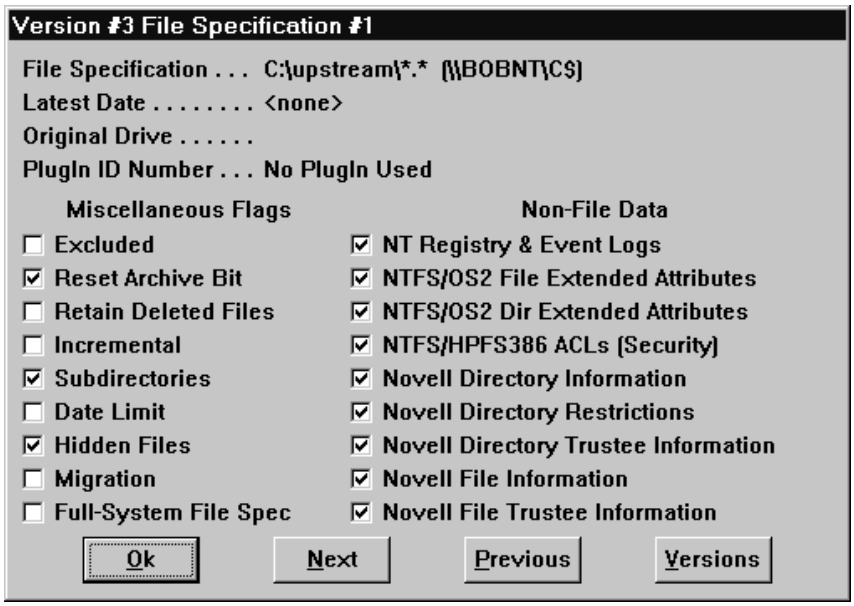
- **Details:** Highlight a file spec in the File Specs list box (or double-click the file spec) and press this button to see details of the original file specification.

- **Ok:** Press this button to highlight return to the List Backups dialog, highlighting the current backup.

- **Next:** Press this button to see the next backup in the list.

- **Previous:** Press this button to see the previous backup in the list.

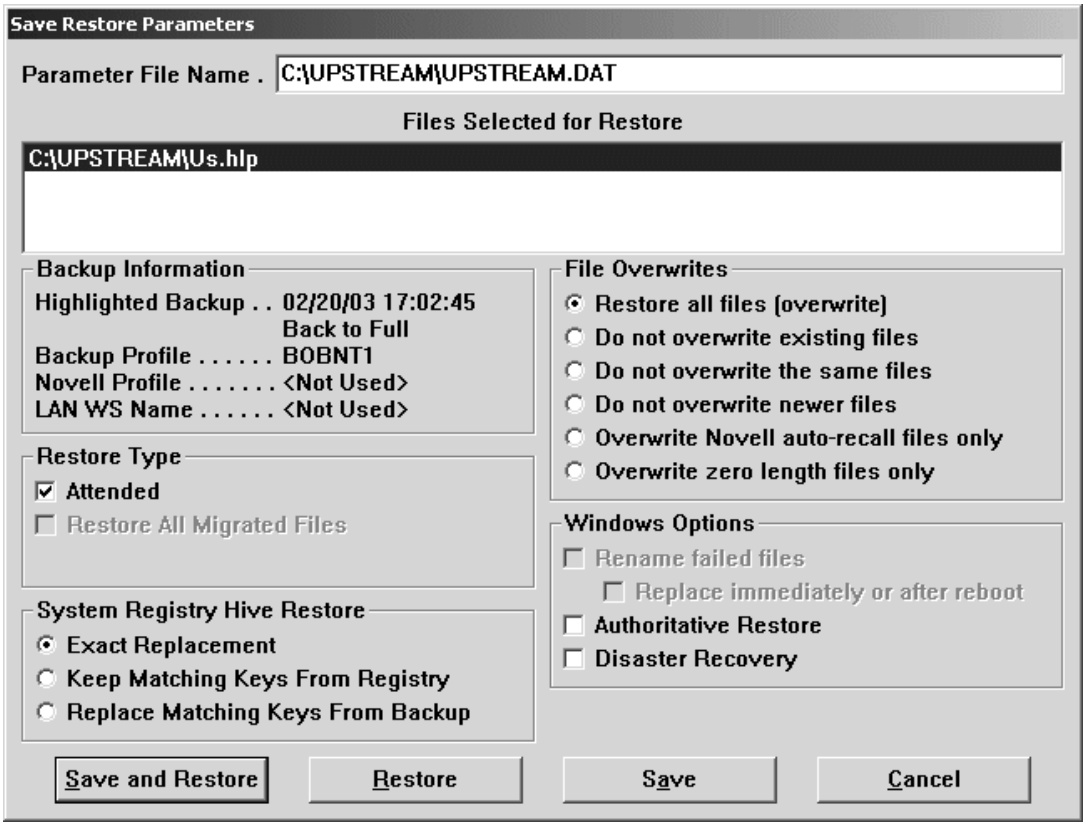
  If you highlight a File Spec and press the <Details> button you will see the File Specification dialog.



Press the **<Ok>** button to return to the Backup Version dialog. Press the **<Ok>** button to return to the Restore Parameters dialog. Press the **<File Inquiry...>** button to return to the Inquire/Restore dialog.

7.4. Finalize Restore

When you select file(s) to restore and press the **<Restore...>** button, you will see the Save Restore Parameters dialog.



Most of the displayed items on this dialog are to help you to decide if this is the restore that you actually want to perform. There are several modifiable fields including:

- **Parameter File Name:** If you wish to save your restore request, this is the name of the FDR/UPSTREAM parameter file that will be used.

  The *Files Selected for Restore* listbox displays all of your selections their destinations (if any are different from the original locations), and whether you are restoring subdirectories. This is intended to help you decide if this is truly what you wish to restore. The *Backup Information* frame is also information about your restore to help you decide if you specified it correctly.

- **Attended:** Check this box to have your saved parameter file be attended (recommended). Since restores are generally an attended process (a user specifies the files to be restored), we recommend that you always check this box.

  The **Restore All Migrated Files** and **Only** checkboxes are for display purposes only. The *System Registry Hive Restore* frame is described in chapter 13. The radio buttons in the **File Overwrites** frame are:

- **Restore all files (overwrite):** Press this radio button if you wish any existing files to be replaced by files from the backup selected. Thus all received files are written. This is the default.

- **Do not overwrite existing files:** Press this radio button if you wish to preserve the files currently stored on the disk and only write those files which do not already exist.

- **Do not overwrite the same files:** Press this radio button if you wish to have FDR/UPSTREAM write all files received except those which have exactly the same modification date and time. This improves performance slightly as extraneous file I/O is avoided.

- **Do not overwrite newer files:** Press this radio button if you wish to have FDR/UPSTREAM write only those files which are older than the files currently on disk (preserve newer files).

- **Do not overwrite Novell auto-recall files:** Press this radio button if you wish to have FDR/UPSTREAM overwrite all files except those which are tagged for Novell auto-recall. See the *Novell Considerations* chapter for more information.

- **Overwrite 0 length files only:** This option is intended to deal with viruses/worms which may leave your files on disk but set the length to zero. The PC will request all files from the host, but will only overwrite those whose length on disk is zero.

The failed files buttons are only displayed for Windows NT and only if you have personalized for "Rename restore failed files":

- **Rename failed files:** (Windows NT only) If this checkbox is checked and FDR/UPSTREAM attempts to restore to a file which is locked, it will rename the file to a temporary file name and log the name. The default is not checked.

- **Replace immediately or after reboot:** (Windows NT only) This checkbox is grayed unless you have checked Renamed failed files above. If this checkbox is checked, the file will be renamed back to the originally specified file name immediately (if it can) or otherwise after the next reboot. This is useful for disaster recovery of a Windows NT machine (particularly in installing service packs). The default is not checked.

- **Authoritative Restore:** See the Windows Considerations chapter for detailed information.

- **Disaster Recovery:** See the Windows Considerations chapter for detailed information.

The push buttons are:

- **Save and Restore:** Saves your restore request information (parameters) to the specified parameter file and begins the restore.

- **Restore:** Begins the restore, the specified parameters being only saved in memory.

- **Save:** Saves your restore request to a parameter file for later retrieval (locally or by the host).

- **Cancel:** Returns you to the List and Restore Dialog.

For this example, press the **<Restore>** button to begin your restore. You will see a status display similar to the one you saw for the backup, with a single button, **<Cancel>** allowing you to cancel the restore. When the restore has completed, a completion message with statistics is logged and displayed.

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8 UPSTREAM Director

8.1 Welcome to the FDR/UPSTREAM Director

...Your portal to the FDR/UPSTREAM line of Backup Recovery products...

8.1.1 Introduction

Key features of FDR/UPSTREAM Director:

- Creates a new third tier which inter-operates with the existing FDR/UPSTREAM Services and FDR/UPSTREAM Repository components providing system-wide distributed control and operations monitoring.
- Written as a Java application, it provides a user friendly “Windows” like graphical user interface that can run on any platform that provides a Java Virtual Machine and TCP/IP support - covering almost every substantial operating system in use today.

The FDR/UPSTREAM Director is capable of:

- Specifying backups and restores. Virtually all options available for backups and restores can be specified graphically in the Director.
- Checking the status of all Client FDR/UPSTREAM systems. This includes determining if they’re active, checking logs, performance tests and more.
- Manage your host stored backups. This includes viewing details on backups and deleting complete backups.
- Define, modify and delete host stored backup profiles.
- UPSTREAM/SOS Local Backup administration. Using the Director for FDR/UPSTREAM/SOS Local Backup administration is described in the FDR/UPSTREAM/SOS chapter (chapter 19).
- Running as an applet in the web browser.

The FDR/UPSTREAM Director requires a Java Runtime Engine (JRE) be installed on your machine and that it be compliant with version 1.3.0 of the Java specifications. The Sun version of the JRE for Windows is included on the FDR/UPSTREAM CD and you will be prompted for its installation if necessary when you install the FDR/UPSTREAM Director.

If you wish to run the FDR/UPSTREAM Director on a system other than Windows, contact FDR/UPSTREAM technical support for assistance on installation and operation.

8.2 Running the Director in a Web Browser

You can run the UPSTREAM Director in a web browser (such a Microsoft's Internet Explorer or Netscape Navigator) when served from a file server, or your existing web server.

If you intend to run the Director as an application or your have already installed the software so that it's available in your browser, continue onto page 8-8

Installation of the Director to run in a web browser is a manual operation with a supporting batch file to help setup the system. The main benefits of running in a web browser is to avoid a CD install and setup and to provide ubiquitous web access to the Director and therefore your UPSTREAM backup system.

8.2.1 Background Information

The Director application has been re-written to run as an applet in a browser. An applet is a program that is invoked by statements or "tags" in an HTML web page. The Director applet is actually executed by a Java Virtual Machine or "JVM" which is installed as a common browser plug-in. Your browser already has some widely used plug-ins such as ones to read Acrobat PDF files, run Flash animation, QuickTime and many more.

The JVM plug-in that may already be present in your browser however is probably not the one we require to run the Director. We require a certain level of the SUN MicroSystems JVM plug-in. This plug-in is downloaded and installed when the web page is rendered if it is not presently installed. The user has the option of not installing the plug-in, in which case the Director will not run. This is a one time installation at the user's browser.

WARNING: If the user is already running some production applets in their browser that require a certain level which is not our's, he should NOT allow the installation to proceed.

For security concerns, Innovation Data Processing has supplied a certificate or "digital signature" to protect unauthorized execution or mis-use of code. This was procured by Verisign Corporation and is embedded in the code. Upon running the code, the browser will notify the user that they are about to run code from Innovation Data Processing and asks for permission to do so. The certificate is basically assuring the user that the code is indeed from IDP and that upon granting it permission trusts it to run on his PC.

The applet version of the Director still makes all the TCP/IP socket connections that it normally would do when running as a standard application, i.e., it is using more than just port 80 to establish connections to the repository and client UPSTREAM(s). What this means is, that if your installation has a firewall and you are accessing the system from outside that firewall, you must configure or allow these connections or perhaps use some VPN software to ease this configuration for access.

8.2.2 Supported Systems/System Requirements

This code has been successfully tested and used on Microsoft's Windows NT 4.0, 2000 and XP using Microsoft's Internet Explorer Version 6.x and Netscape Corp.'s Netscape Version 7.x. Running on any other browser or version may not be successful. We will be expanding and testing with more platforms and browsers. We have run on Unix platforms but have not fully tested or certify it will run 100% correctly. We encourage the adventurous user to try these if necessary and would support and welcome documentation of failures or success in the endeavor.

The JVM plug-in we require for the browser comes from SUN MicroSystems and isVersion 1.4.1 - remember, the web page supplied will check for this on a Windows system and attempt to install it (REPLACING any existing JVM) if not present.

The code takes approx. 15megs of disk space for program files.

The user's browser should allow "cookies" to be set for best operation.

8.2.3 Our Software: What?, Where? and How?

The Director applet code consists of a small subset of files that are put into the UPSTREAM install directory upon installation of the Director with the product CD. Depending on how you want your user(s) to get the web HTML page which starts the Director, you will be choosing a directory to copy this subset of files to. We supply a tiny Windows batch file called "webcopy.cmd" (in the UPSTREAM install directory) to perform this for you.

Basically there are TWO ways that the HTML pages that start the Director are "served" to someone's web browser:

- Standard Web Server such as Microsoft Internet Information Server.
- From a shared drive/directory accessible from the user's PC.

Briefly, when using the first case, the user will be typing in the familiar URL format in their browser such as: "http://www.mycompany.com/scripts/Director.html" where "www.mycompnay.com" is your company's address of the web server and "scripts" is a symbolic location (or actual) of the directory containing the Director files.

In the second case they will use the format: "file://N:/cdrive/webdirector/Director.html", where "N" is a shared drive accessible to the user's PC and "cdrive/webdirector/" is the directory you have chosen to contain the Director files. UNC names may also be used to refer to the shared drive/directory.

In either case YOU must choose/create a directory for the batch file to copy the Director files to.

In both examples "Director.html" is the starting web page. We have one more page, "usdir.html" which is invoked internally by this one. The first one, "Director.html", is an introduction with information about running the Director. It IS intended for you to tailor and update in order to perhaps provide company information or additional information to the end user about running the Director in your environment.

The second one, "usdir.html", actually runs the Director and should NOT be altered.

As per the information on the first web page, after the user responds to the certificate's question about allowing the Director to run, the first thing the Director will do is check it's one and only browser "cookie". The Director when running as an applet, still needs a location for temporary files and to store user ".ini" type information or preferences. We use a single cookie to store that directory name in. When this is done the first (and only time), the user will be prompted for a location (directory) for the temporary files and preferences; that name is stored in the cookie. What this means is, the user's browser should allow cookies to be set. If it does not, the user will be prompted for a location each time the Director is run.

When running the Director as an applet, there is no upstream.cfg or upstream.dat files to read from at start up (the way it does when running as a regular application). Therefore, the Userid and Host information at the login dialog is not pre-filled the first time. Once supplied and used for a successful signon, they are of course "remembered"; no files are required.

As a reminder, the format of the Host information in the field of the logon dialog is: "IP-Address:port#" For example: "192.168.150.2:1972" or using a symbolic DNS name: "MYPRODSYS:1972"

8.2.4 Step By Step Install

- ☐ Using the UPSTREAM product install CD, install the Director component. This will also install the required JVM - the Sun Java Runtime Environment Version 1.4.1 (or JRE as it is referred to in the CD install).

- ☐ Choose your method of serving the HTML pages to the user(s) browser - Web Server OR shared drive/directory.

  - **If using a Web Server:** ask the admittatur to create or choose a designated directory.

    Proper rights and configuration to set up a directory to serve pages from is different for each vendor's Web Server. Make sure the administrator gives you write access to the absolute path name of the directory - if only temporarily just to run the copy batch script.

    Also, you MUST ask/get from the web server administrator the http URL name for this path and write this down for instructions (it will NOT necessarily be the absolute path name of the directory you will be copying the files to - do not confuse the two).

    You need the http URL name for instructions to give to your users for accessing the Director.html startup page. As shown above, an example would be:
    "http://www.mycompany.com/scripts/Director.html"

  - **If you are using the file method:** Create or choose a directory on a shared drive which users usually have a persistent share to. As shown above, an example URL for this case would be:
    "file://N:/cdrive/webdirector/Director.html"

    In this example you have chosen the directory "webdirector" on the "N:" share drive. UNC names may also be used to refer to the shared drive/directory.

- ☐ Run the copy batch file **webcopy.cmd**. This takes one argument: the chosen directory. Open up a command prompt window on a windows PC that has the Director installed on it AND has write access to the chosen directory. Type in:

```
C:\upstream> webcopy mydirectory
```

  Where: "mydirectory" is the absolute path name of your chosen directory. For a file method test, you might enter:

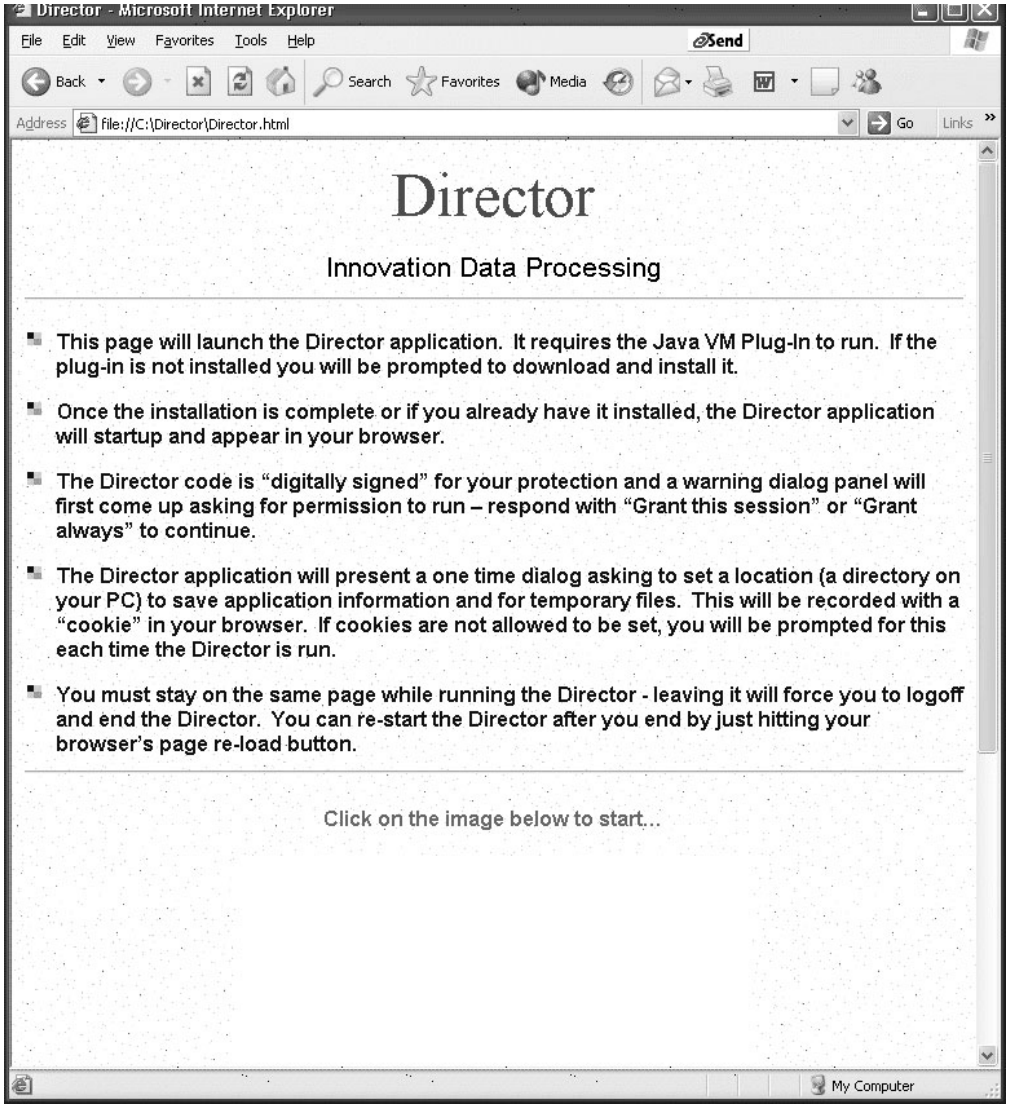
```
C:\upstream> mkdir \Director
C:\upstream> webcopy c:\Director
```

- ☐ Open up an appropriate web browser and verify installation by calling up the Director.html web page and run the Director.
  If you are running with the file method following our example above you would enter in the Address field:

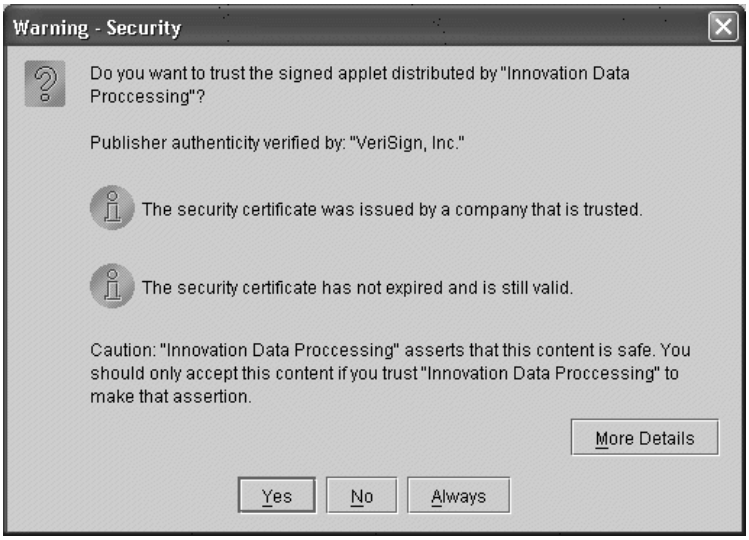
```
file://c:\Director\Director.html
```

8.2.5 Using the Director

When you start the Director in a browser, you will see the initial director.html screen. As described above, you may want to customize this file.

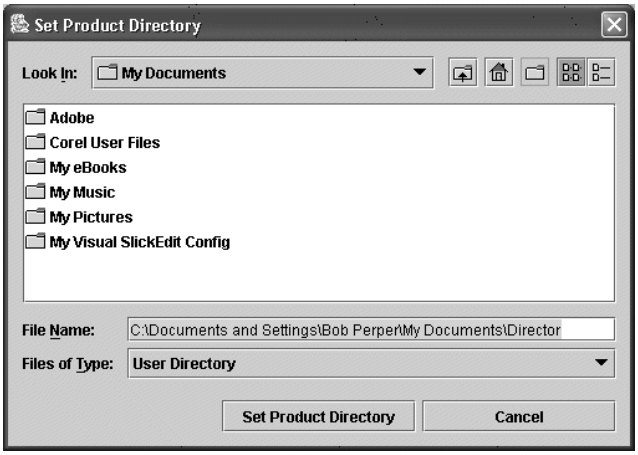


Click on the image of the IDP logo at the bottom of the window to begin.

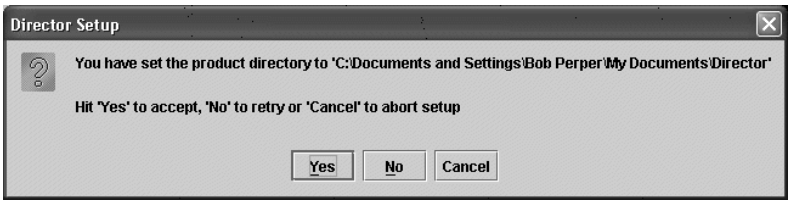


Press the **Yes** button to allow the Director to load. You will be asked to do a one time setup:

Press the **Continue...** button . You will be asked to set a directory for the Director to store its files. Most users will accept the default (determined by the browser) and press the **Set Product Directory** button.



You will be asked to confirm your settings. Most users will press **Yes** to accept the settings and continue.



The Director will then start as normal. Dialogs will run as external frames but standard Director windows will run within the frame of the browser.

If you use your browser's Back button to exit the Director, the Director will display the following message box as it exits:

8.3 UPSTREAM Director Basics

8.3.1 The Director's role

To effectively use the FDR/UPSTREAM backup/recovery product it is important to understand the nature of the FDR/UPSTREAM Director.

The Director is a new addition to the current FDR/UPSTREAM backup system which includes the FDR/UPSTREAM Services component (us.exe, uscmd.exe) and the FDR/UPSTREAM Repository (runs on an MVS mainframe). In their traditional roles, the Services component runs on a system where backup is desired and the Repository component running on an mainframe MVS system stores and manages the backup data that is produced by the Services component. Although their relationship may be viewed as simply client-server, because of the many complex features and capabilities inherent in the FDR/UPSTREAM backup system, this would be an incomplete description. For example, the Services component plays a dual role as both a user interface and provides the sophisticated backup and restore operations. While the Repository component communicates and works with the Services components to store, retrieve and manage backup data, it also can initiate and control these operations at the Services component.

With the new FDR/UPSTREAM Director software application we are introducing a new third "tier" to this system. It is designed to have the ability to communicate and control and use the current functionality of the Services and Repository components. This role of using the current capabilities now produces new extended functionality: centralized single view and control over what is essentially a distributed system.

With that said, it is a good idea to state briefly what the Director does and does not do:

- Communicates directly (TCP/IP only) with the Repository component to provide profile security checking, inquire backup profile information for viewing and deletion, profile definition viewing, updating, addition ,deletion and re-loading, host monitoring/status and control and to manage the server registration list.
- Communicates directly (TCP/IP only) and concurrently with any number of with the Services components to initiate backup and restore actions both physical and logical, monitor and control backup and restore progress, view current operation/status, get the complete log, get physical disk and system information.
- Produces and manipulates the parameter or ".DAT" files which represent an action such as backup or restore for the Services or Repository to use. (Will also do the same for the configuration or ".CFG" files in the future).
- It does not actually perform any backup or restore operations but only directs them.
- Is not required to complete an action such as backup or restore. Once the operation is started you can log off and come back later to sign on again and view the progress of an action.

NOTE: To use the FDR/UPSTREAM Director, FDR/UPSTREAM Services (us or uscmd) must be configured to use a Registered name.

NOTE: FDR/UPSTREAM Services (us or uscmd) should be at v3.1.4 or higher for proper operation.

8.3.2 Keeping up to date

You can upgrade to the latest version of the FDR/UPSTREAM Director from the Innovation ftp site using the Director itself. If you have any unsaved parameter specifications, you must either save them or exit and reenter the Director.

In the Director, pull down the **Help** menu and select **Software update**. The submenu will allow you to select either **Director** or **Help content**. Selecting either of these options will display the update window:

If you press the **Check for update** button, the software or help files will be updated and you will be asked to re-start the Director.

8.4 Getting Started

You can select to install the FDR/UPSTREAM Director while installing the FDR/UPSTREAM Windows software (see chapter 3). If you wish to run the FDR/UPSTREAM Director on a UNIX system or Novell console, contact FDR/UPSTREAM technical support for assistance.

Note that running FDR/UPSTREAM on your Windows machine will allow FDR/UPSTREAM Director features on all of your systems in your enterprise.

To run the FDR/UPSTREAM Director, simply select the FDR/UPSTREAM Director option from the FDR/UPSTREAM program group of the Windows Start menu. You can also start it from a command prompt by running the batch file USDIR.BAT.

When you start the FDR/UPSTREAM Director, it will display the FDR/UPSTREAM logo, (with shimmering water - you can suppress the shimmering by clicking the mouse on it, or permanently by specifying **SPLASH=N** in the shortcut of the command line that starts it). When it completes initializing it displays the login screen.

- **Profile:** Enter a backup profile. If you have SECLEVEL 2 security enabled on the FDR/UPSTREAM host, you must enter a backup profile which you have been authorized for. Otherwise enter a backup profile you'd like to start with. This is a required field to get the Ok button ungreyed.

- **User Id:** Enter your MVS User ID. If you have any FDR/UPSTREAM host security enabled (SECLEVEL greater than 0), you must enter a valid MVS User ID. If you have FDR/UPSTREAM host security disabled (SECLEVEL 0), this field is ignored and is optional.

- **Password:** Enter your MVS Password which matches your User Id above.

- **Host:** Enter or select the UPSTREAM/MVS system you wish to connect to. The form is: *IP address or DNS name*:*Port*. For example: 192.168.75.253:1972. The default is the value from your upstream.cfg file.

- **Change password:** If you have FDR/UPSTREAM host security enabled, you can change your MVS password, by checking this box. If you check this box, the dialog will change and you will be prompted for the fields above as well as for your new password, which you must enter twice.

Press the **Ok** button to continue into the FDR/UPSTREAM Director. If you press Cancel the program will terminate.

8.5 First Look

The FDR/UPSTREAM Director, written in the cross platform language of Java, has the appearance and familiar behavior of a typical windows application. It is a titled window with the upper right hand corner containing the standard window control icons: minimize, restore and maximize. It has a menu list of drop down operations across the top and a tool bar that can be hidden:

The main area of activity is one large set of action operation tabbed panels, one for each activity: Restore, Backup, Profile (viewing, definition/management), Physical Restore, Physical Backup, SOS Management, Host Reports and Run Job. Selecting a tab by clicking on it brings you to a panel containing one or more windows for performing the activity. These are internal windows or so called “MDI” windows which can also be minimized restored or maximized but never closed - they are fixed to the selected panel/operation and are always needed and available.

Some operations or functions produce a window which may appear in any tabbed panel when you start them, but can move and be used at any other tabbed action panel at anytime. These internal windows can be set to stay where they are or move with you from operation to operation or panel to panel. They can be minimized, restored, maximized or closed at any time.

In general, all the functionality from any panel window operation can be used at anytime and at the same time in tandem. For example, while monitoring the progression of a backup you can switch away and list a backup profile and delete it. Even where the action produces a hour glass waiting for the request to be satisfied by the Services or Repository component, you can still switch away to another panel/operation to perform.

8.5.1 The What, Where and How

Like any good story reported, we too have to give the FDR/UPSTREAM system all the necessary information - especially if we want an action performed properly for us. This means simply setting “What” is the action to be performed, setting “Where” it is to perform that action, and “How” to do that action. Some of these are trivial like the “What” and some of this is more involved like the “How”. The approach of the FDR/UPSTREAM Director focuses on helping you with the many and varied settings. The major ones are always displayed in the main bottom status panel of the Director window:

8.5.2 Saving the What, Where and How - The Parameter File

Whenever you are at one of the tabbed panels for performing an action you are actually working on a parameter or ".DAT" file which can be named and saved away. Later it can be re-opened to restore all the settings of the action in order to perhaps update any of the settings or execute the action again itself.

Each action or tabbed panel operation maintains its own independent parameter file so that you can create, view, update, save or delete any parameter file all at the same time. The current parameter file for the tabbed panel operation you are at is indicated (by "Parameter file: xxx") in the main bottom status panel of the Director window:

On the main menu item "File", select "Open parameter files" and you will get the Parameter List Window. In the title the current directory is displayed. By default this is the product install directory. You can move to any other directory by hitting the "Select Directory..." where a dialog will appear to do that. This Parameter List Window summarizes the parameter or ".DAT" files that have been created. Select a parameter file to load by double clicking an entry or hitting the "Load" button.

WARNING: Previous customers with existing parameter files when opened will receive a warning message about integrity - this simply means that the parameter file was not created by the new FDR/UPSTREAM Director or has been updated by something other than the FDR/UPSTREAM Director. The Director leaves a "fingerprint" in order to detect this and is for information purposes only - all existing "working" parameter files should work with the FDR/UPSTREAM Director regardless of this message. Simply re-saving a changed parameter file will eliminate the warning.

8.5.3 The "What"

All the major operations of the FDR/UPSTREAM system are grouped together into each of the available tabbed panels for selection. Whenever you are at one of the tab panel operations such as Restore, the action is always indicated (by "Action: xxx) in the main panel bottom status panel of the Director window:

The tabbed panel operation also has its own separate parameter file in which the settings are also appropriately set for the action. You have now satisfied the "What" piece of information for FDR/UPSTREAM Director.

8.5.4 The "Where"

Since the FDR/UPSTREAM Director only plays the "director's" role for the Services and Repository components, when we want to perform an action like backup, we must say where this is to take place. We need to set the destination or location of a Services component which the Director will direct the request to in order to perform the action there. Presumably you choose a system which is "closest" to the data you are backing up.

The Services is the "us.exe" or "uscmd" component that is running on a supported system. The Services component can "register" itself to the Repository component when it starts up or you can add or register a server Services component with the FDR/UPSTREAM Director.

This list of registered server Services components is where you select from in order to tell the Director the "target" of an action. The Director communicates with the Repository component to get this list. Most Director windows include a pull-down **Target** list which allows you to select from the list of known targets.

To get the detailed target list you can press the Target icon or from the main menu choose "View", and select "Registration/Target list" and a window with the title "Target System List" will appear. There is a column with the heading "Status". Select an entry and hit the "Status" button in order to see if the Services component is active and running at that location. All systems entries that are active when you exit the Director are remembered so that only their status(s) are automatically re-checked (status performed) when you bring up this panel again.

All action operations of the tabbed panels require that a target Services component be set. Only active Services components can be set as the targets. Once you have a Services entry that becomes active, select it and hit the "Set Target" button. The target will be set for the operation panel you are at, and is indicated (by "Target: xxx) in the main bottom status panel of the Director window:

Remember, the target selection is set only for the operation/tabbed panel you are at. You have now satisfied the "Where" piece of information for FDR/UPSTREAM Director.

8.5.5 The "How"

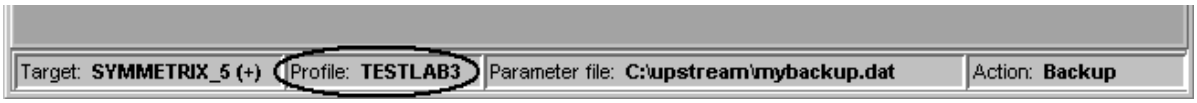
By far the most involved thing will be telling FDR/UPSTREAM how to perform an action such as Backup. This will in fact consist of a number of ingredients which you must have in order for FDR/UPSTREAM to perform any action. So what are these required ingredients...?

First of all as noted, the "container" for all the information (our What, Where and How) is the parameter or ".DAT" file. But one of the settings in it actually points to or names another container of information. That group of information is a "Backup Profile".

These backup profiles are stored and managed by the Repository component; they can be added, updated or deleted by the FDR/UPSTREAM Director. Besides providing a basis for security within the FDR/UPSTREAM system, these backup profiles essentially contain information more relevant to the Repository component for an action operation such as, how to store and manage data that is backed up.

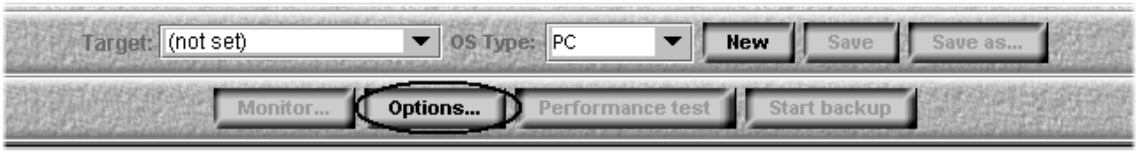
All the action operation tabbed panels have a list window that contains a drop down listbox labeled "Profile" for you to list and select from:

Once a profile is selected from the list, it is always indicated (by "Profile" xxx) in the main panel bottom status panel of the Director window:



Now that we know about this required ingredient and how to set it, we will give an explanation of the make up of the rest of the details of how to perform an operation. These "How" details make up the bulk of the parameter or ".DAT" file contents and are described as follows. Every action operation has an "overall" set of Option settings specific to the action. Along with that there is always one or more individual selections included to participate in an action - each of which having its own set of option settings. An individual selection is usually a file specification of some kind, e.g. a directory to be backed up or maybe a file to be restored. The set of option settings for an individual selection (the file specification) are unique to it and are not shared. The "overall" set of Option settings are common for the one or more individual selections (file specifications) and apropos to the action. An example of an overall Option might be to "produce a report", while an option for a selection (file specification) might be to "backup all the sub-directories".

Every action operation tabbed panel has a window with a panel that contains a button to get to the Options for the action. It is always with the sequence of buttons labeled: "Target", "Monitor...", "Options..." and "Start (action)...", e.g.:



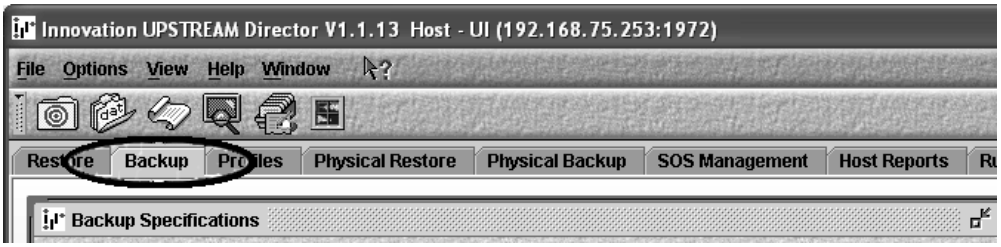
Of course, all the Options by action can be brought up with the drop down menu item "Options" on the top of the Director's main panel.

The individual selections for an action make up most of the activity in the windows of all the tabbed panel action operations. In fact, selecting and setting the options for each selection takes up most of the work you will do to setup an action operation. But this is the last and final ingredient of the "How" you will need to provide. You must have at least one selection set for the parameter file to be named and saved or to start the action operation itself.

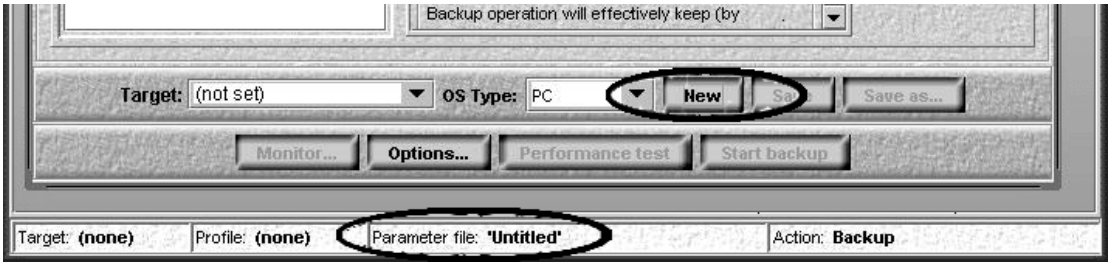
8.6 Step by Step Backup

8.6.1 Step1

Select the “Backup” action operation tabbed panel. It contains a single window titled “Backup Specifications”:

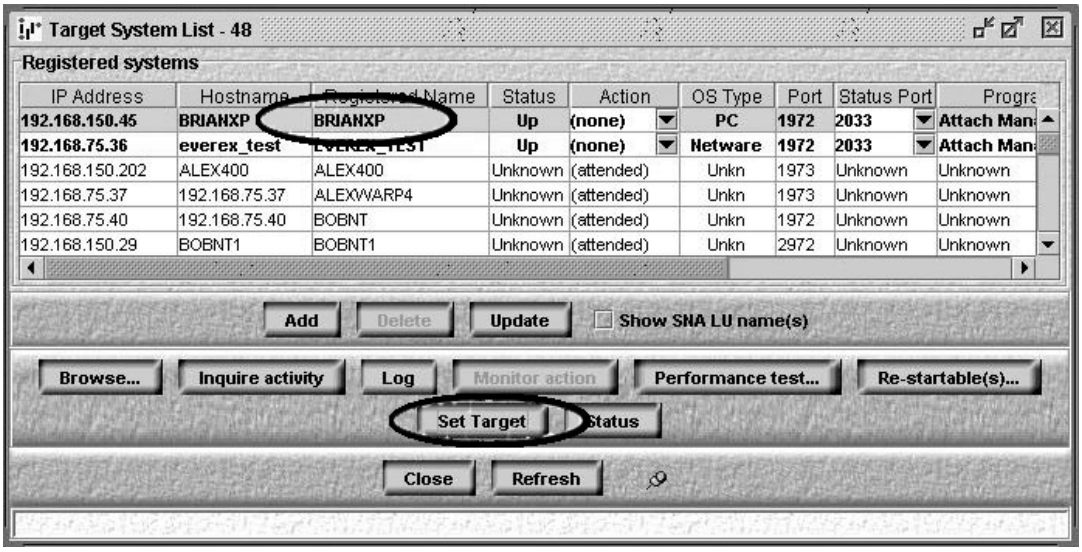


The action will be set as “Action: Backup” in the main panel bottom status panel of the Director window: The “Parameter file:” to the left of it should say “Untitled”. If it does not, hit the “New” button to start with a fresh parameter file and settings:

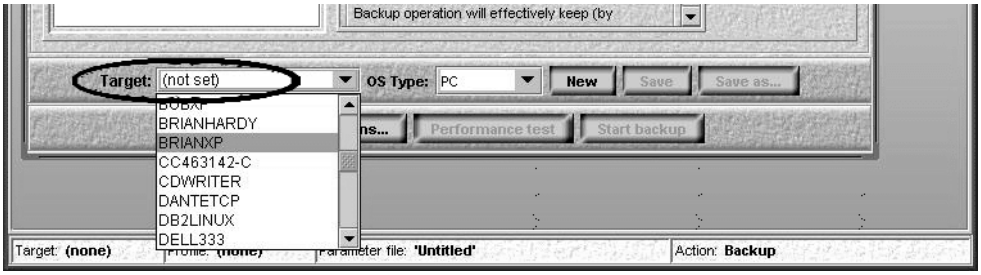


8.6.2 Step 2

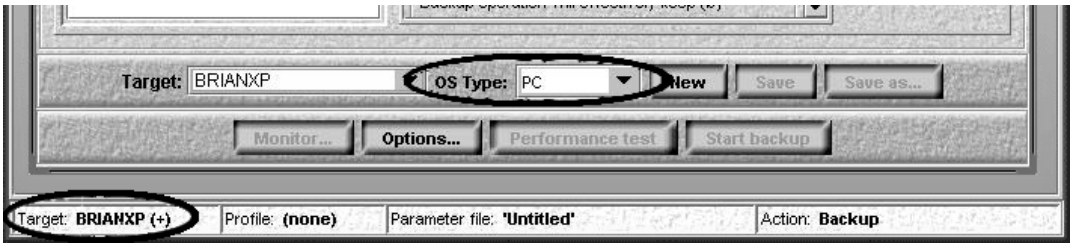
Hit the "Target." Icon (image of a folder with a bull's eye in it) next to bring up the Target system list OR locate the **Target:** drop down list in the window of the action operation you are at. Scroll through the list and selected an entry - in the target list window, it might be all bold with the column heading "Status" indicating "Up" or "Down". If none are active, you can still selected the target Services component, in this case the Director will try to activate (connect) to the target when the backup operation is initiated.



Once you select a system, hit the "Set Target" button (the Target System List closes) OR use the drop down list of target systems right in the Backup window:



The system selected should be set as "Target: xxx" in the main panel bottom status panel of the Director window. Also notice the OS Type is set in the Backup Specifications panel from the target system list. This sets the appropriate defaults for some of the settings in the parameter file automatically:



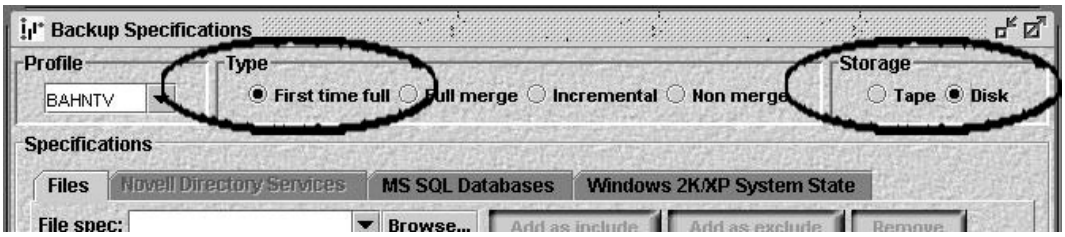
8.6.3 Step 3

Next we need to select a backup profile. Choose one from the Profile drop down combo box list in the top left part of the panel. You can also just type the name of a profile in the text field of the combo box.

After selecting the profile name or typing it in and hitting enter or leaving the field, the profile name will be set in the main panel bottom status panel of the Director window:

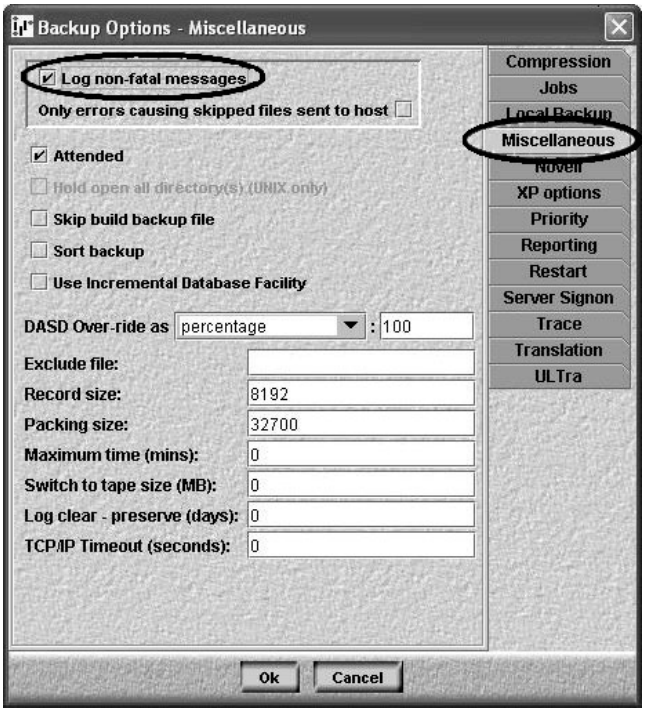
8.6.4 Step 4

Now we would normally go check out the overall Options for the backup operation but two of the settings are so important that they are on the Backup Specifications panel for us to see and set all the time. The first is UP-STREAM back types and the second is storage types. Set the backup type to "First time full" and storage to "Disk" to avoid a tape mount on the Repository component (MVS mainframe):



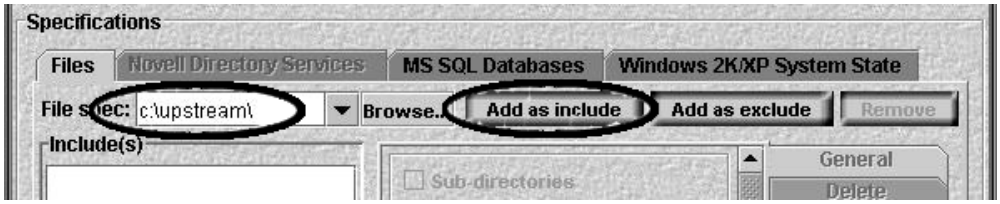
8.6.5 Step 5

Bring up the Options dialog panel by hitting the Options button. All the categories of option settings are grouped together at each named tab. Select the tab named "Miscellaneous" and the panel changes showing those option settings and check the "Log non-fatal messages" checkbox option:



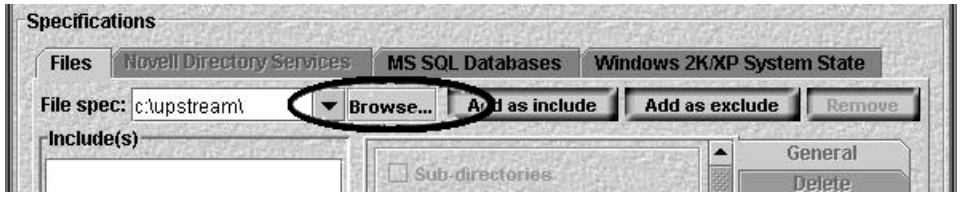
8.6.6 Step 6

Almost everything done before this has been in preparation for this step, and that is naming exactly what it is we want to have backed up. In this step by step example we will backup the UPSTREAM install directory which is probably on "c:\upstream" on a system where the Services component is installed. All we have to do is give the file specification for that directory:

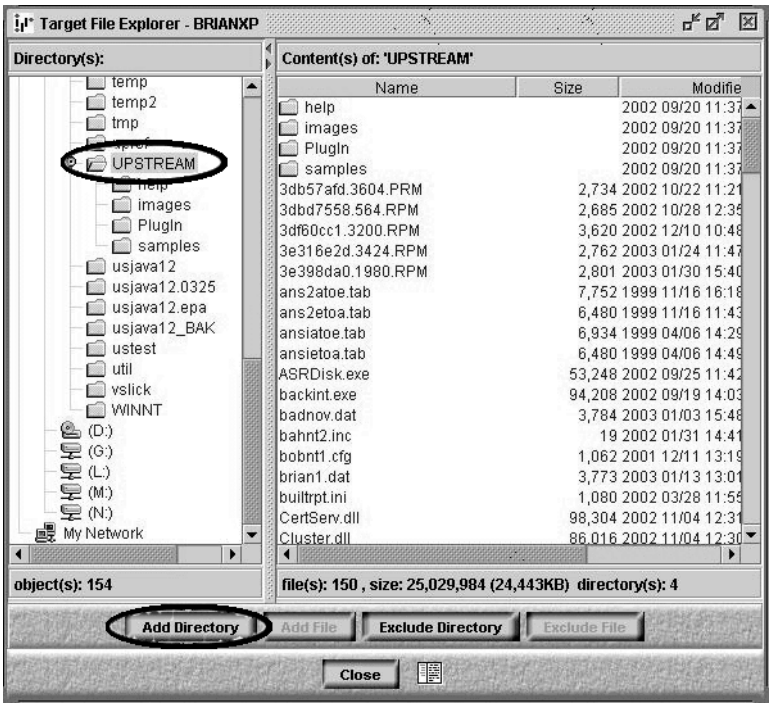


Type in the specification "c:\upstream\" in the "File spec:" text field and hit the "Add as include" button. Here, the ending final backslash "\" means the directory and its contents; it could have been "*.*", but that wildcard is not required - just the ending "\": If you need to change a specification, you must remove it, re-edit it and then re-add it.

You can also browse and select files and directories on the target system by hitting the "Browse" button:

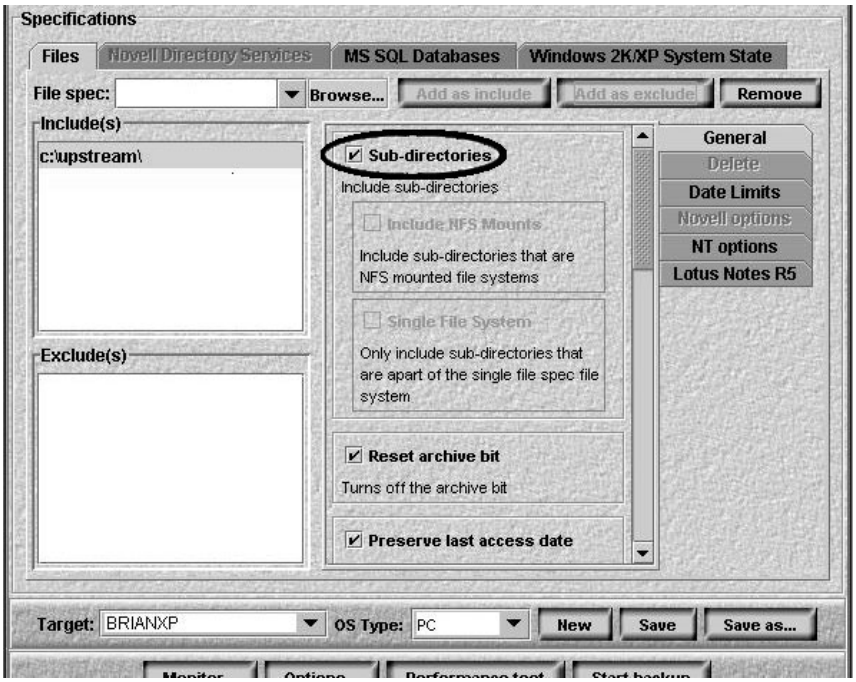


This will open up an "Explorer" like browser of the file system at the selected target:



Simply drill down by double clicking each level in the left panel till you see the directory you want. Select it by single clicking it to highlight it and hit the "Add Directory" for a directory selection or "Add File" for a file selection from the list on the right.

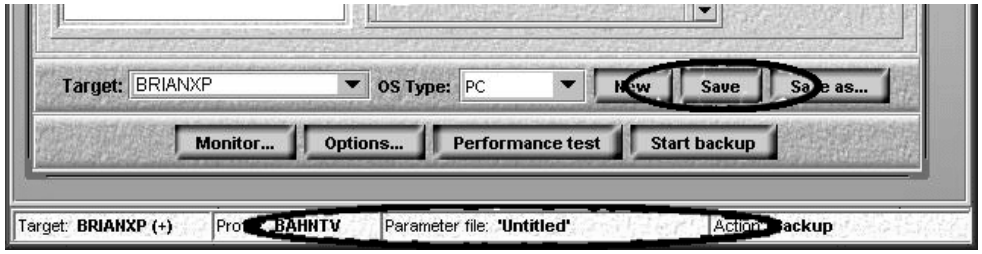
With either way you use, a file specification is added to the "Include(s)" or "Exclude(s)" list:



The tabs on the right group together various options into a separate panel for a highlighted (selected) include or exclude file specification. At the "General" options tab panel for example, you can click on or off the "Sub-directories" checkbox so that all the sub-directories below \upstream will also be included in the backup or not. Move the scrollbar to view all the options available. Notice how some tab panels and the options within them are not enabled (not selectable). This is because the option is not appropriate to either the backup type, the OS type or the highlighted include/exclude file specification.

8.6.7 Step 7

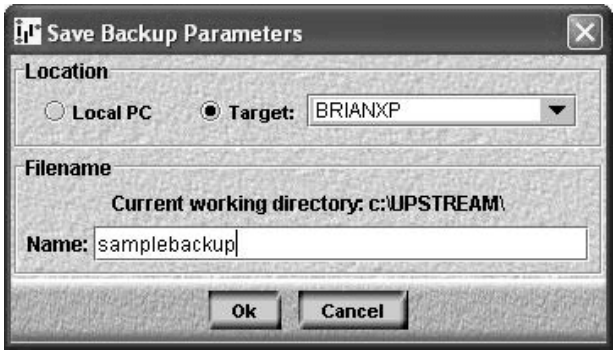
Now is a good time to save your work. This means naming the container of the “What, Where and How”, the parameter file, and saving it away. There is unsaved work for an action whenever the “Parameter file” reads: “Untitled” in the main panel bottom status panel of the Director window:



To save your work, hit the “Save” button and a dialog will come up for you to name the parameter file:

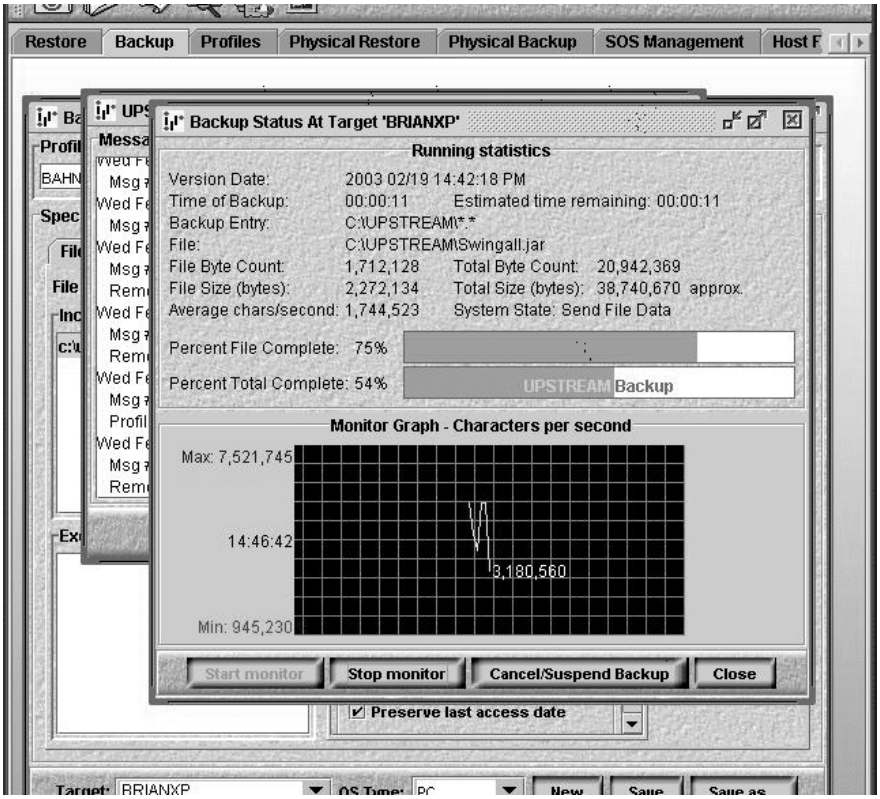
Although the parameter files can be saved on the local PC running the Director, it is better to save them on the target for which they are intended to be used; this is also better logistically because the Parameter File Dialog can summarize, display and load parameter files by selected target. Saving on the target is done by selecting the "Target" radio button which enables the drop down list of targets to be viewed and selected.

After you have selected a target, the default directory running the UPSTREAM service is selected and displayed. Type in the name "samplebackup" and hit "Ok". Although parameter files are filenames with the extension of ".DAT", you do not need to type that at the end of the name:

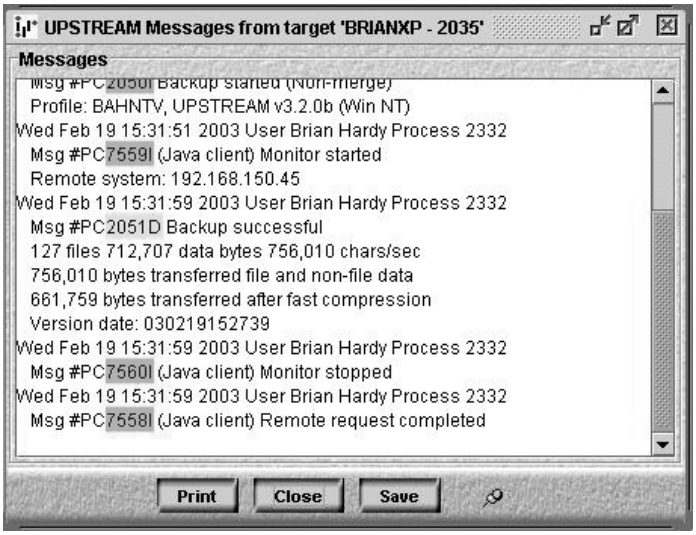


8.6.8 Step 8

All we have to do now is start the backup operation. Hit the “Start backup” button and a dialog asking if you want to proceed will come up and hit “Ok”. Next the monitor backup panel comes up displaying the progress of the backup:



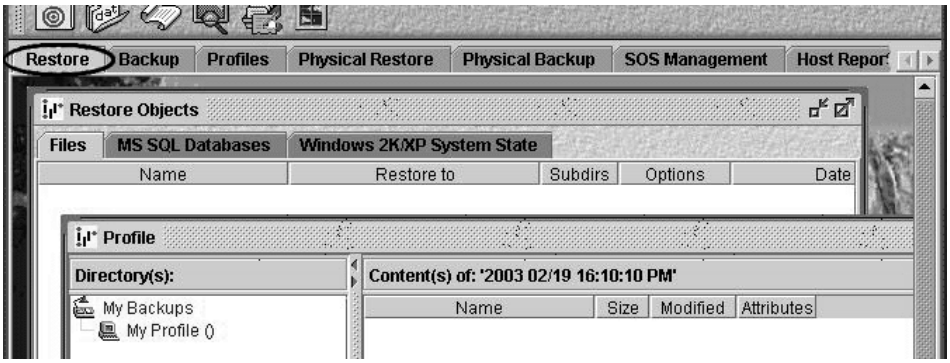
Near the monitor window, a "Messages" window for the target is also opened which displays the messages coming from the target system. If this gets closed or you want to view the message from any target you have used, go to the main panel menu item "View", choose "Messages", then choose "Current target":



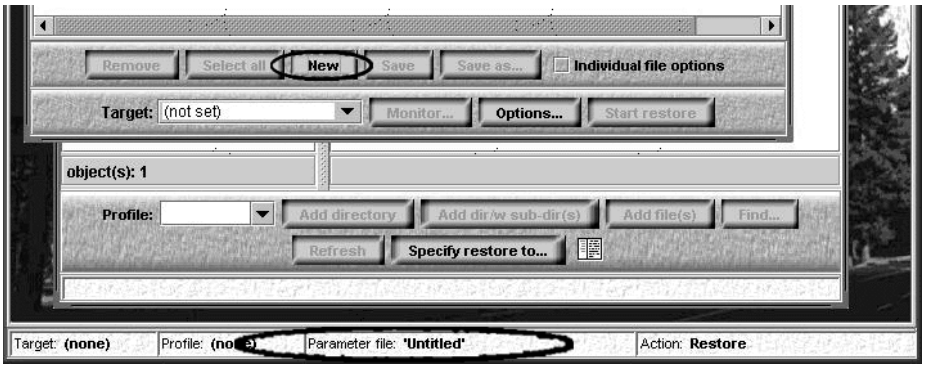
8.7 Step by Step Restore

8.7.1 Step 1

Select the "Restore" action operation tabbed panel. It contains two non closeable windows titled "Restore Object(s)" (items selected to be restored) and "Profile" (version contents view window):



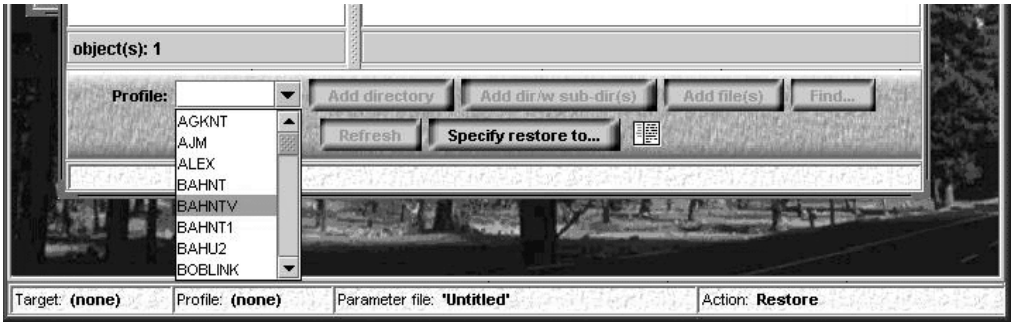
The action will be set as "Action: Restore" in the main panel bottom status panel of the Director window: The "Parameter file:" to the left of it should say "Untitled". If it does not, hit the "New" button in the Restore Object(s) window to start with a fresh parameter file and settings:



These two panels are used together to setup a restore operation action. The Profile version contents view window is for browsing and selecting files backed up with a particular profile and the Restore Object(s) window holds the selections and all the controls and options for actually doing the restore operation action.

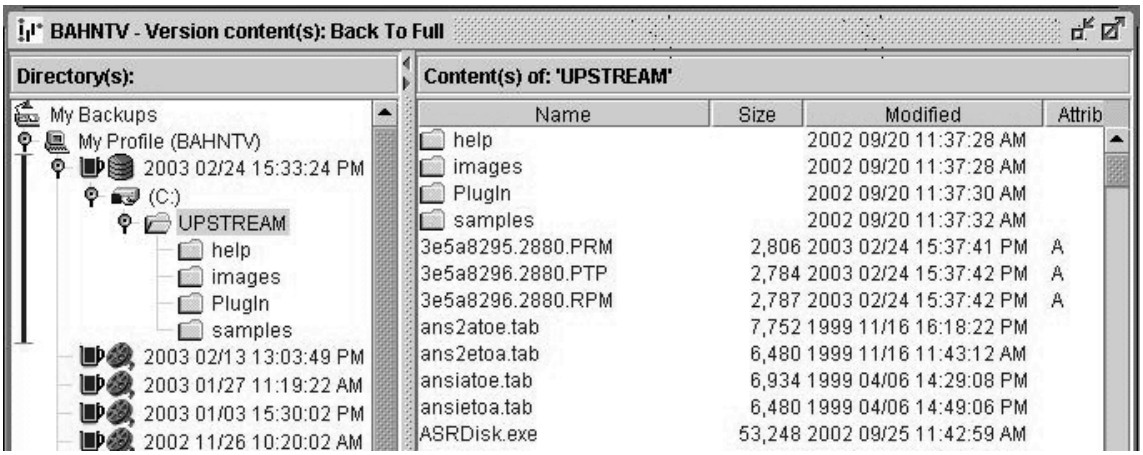
8.7.2 Step 2

Now we need to select a backup profile. We do this because we want to view and select from the contents of a backup and these backup profile versions are grouped by their backup profile name.. In the Profile window, you can choose one from the Profile drop down combo box list in the bottom left part of the panel. You can also just type the name of a profile in the text field of the combo box.



After selecting the profile name or typing it in and hitting enter or leaving the field, the profile name will be set in the main panel bottom status panel of the Director window:

The contents of all the backups taken with the profile selected are now displayed in the Profile window. It is presented in an explorer-like fashion in which each level is clicked to expand the next level down. Starting with the Profile name, then backup profile version names, the contents are expanded: usually a drive letter, and then directories

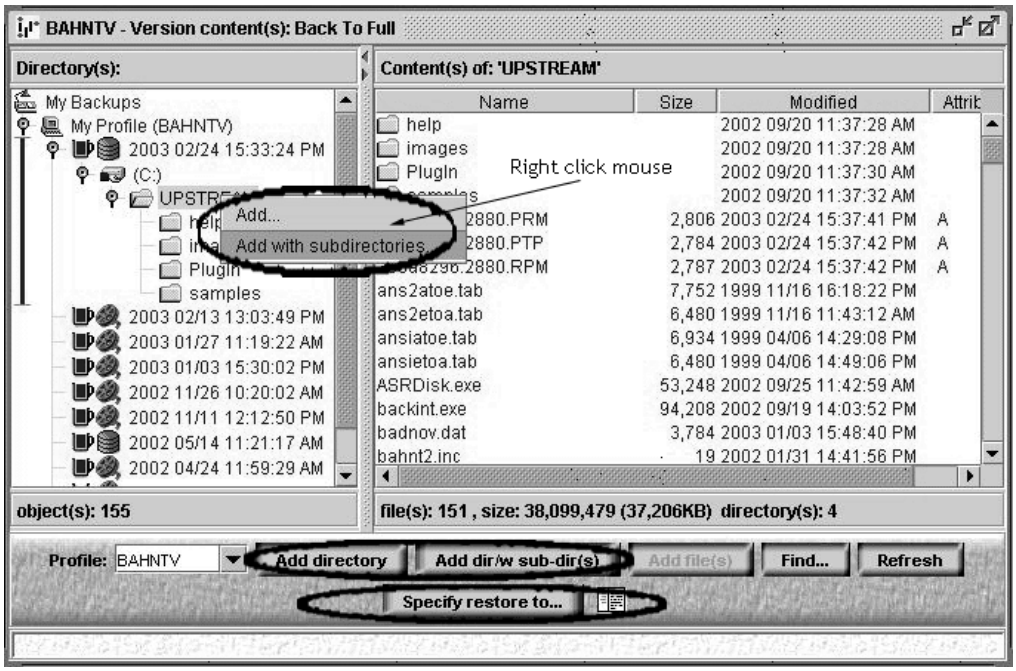


Here the profile is "BAHNTV" and it has one backup profile version "2003 02/24 15:33:24 PM" and it contains files from drive "C:", directory "upstream" and so forth...

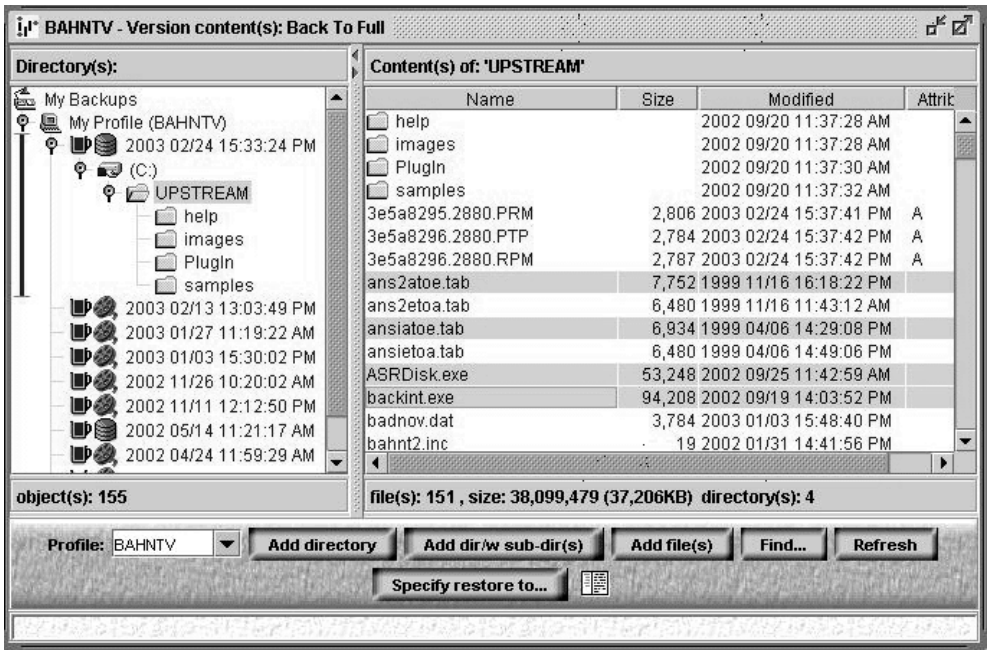
8.7.3 Step 3

Now that we have the contents of a backup displayed, we can select items or files to restore. As we do this, they are put on the list in the Restore Objects window - the Profile version contents window works together with Restore Objects window this way back and forth, selecting items from the Profile version contents window that

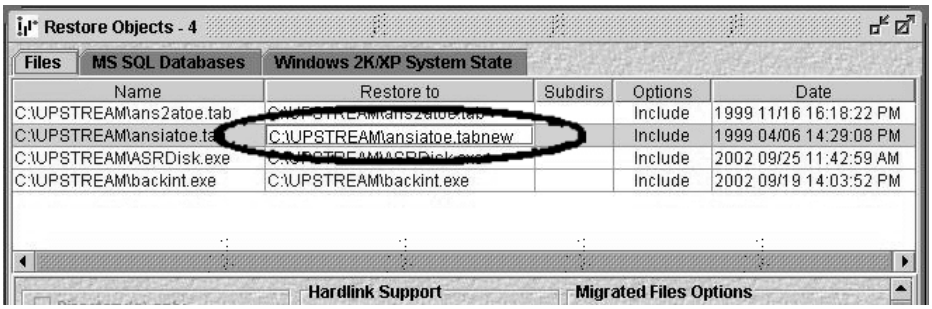
are put on the list in the Restore Objects window. Once a file(s) or directory(s) are put on the Restore Objects list, they can be selected to have their individual options set or they can be removed from the list:



Directories are selected in the LEFT panel and files are selected in the RIGHT panel. Select an entry by clicking on it to become highlighted. Then to add it to the Restore list, you can hit the "Add directory", "Add dir/w sub-dirs(s)" or "Add files(s)" button. You can also right click anywhere in the panel to get a pop-up menu to do the same thing. You can also select multiple files by holding down the "Ctrl" key as you select each file, or select a range of files by using the "Shift" key:

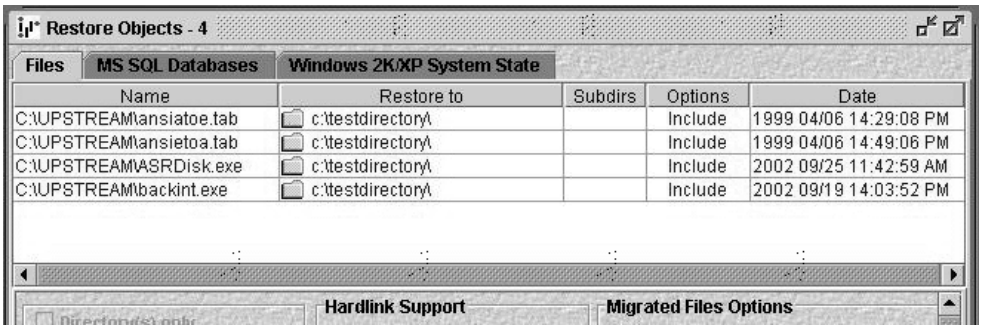


When directories or files are added to the list, the destination or "Restore to" column setting of the Restore list is set to the same (i.e. original) location and filename:



You can edit the "Restore to" destination setting of any entry by clicking on the field and typing in your changes. You will probably want all of your entries restored to a different location first, perhaps for testing or to inspect them. To have added entries set with a different fixed location, use the "Specify restore to..." dialog by hitting that button:

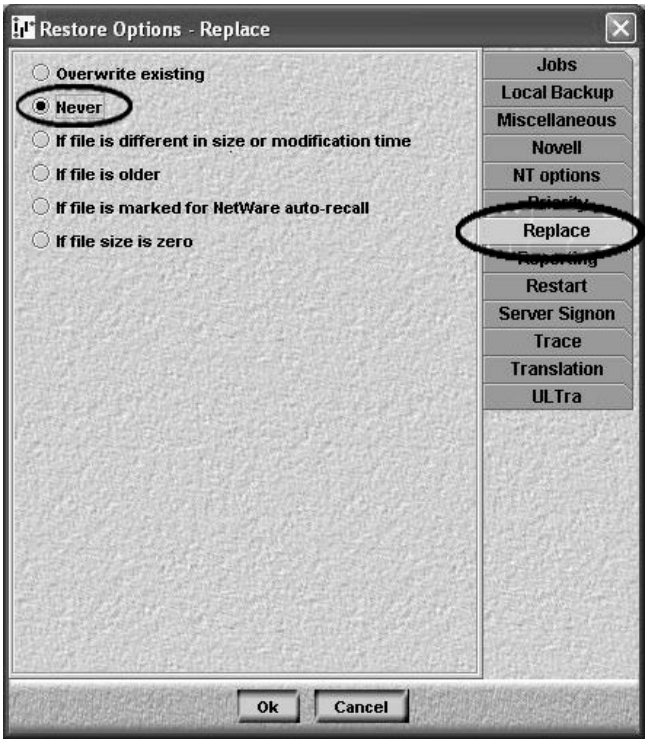
Type in a directory, click on the "Use specified path" checkbox item and hit "Ok". Now, all subsequent "adds" will set the destination to the directory you specified. To see this, select the "Select all" button, and then the "Remove" button to remove all the entries and re-select some files from the Profile list and add them:



Now, all the files in the list will be restore to the same directory: "C:\testdirectory".

8.7.4 Step 4

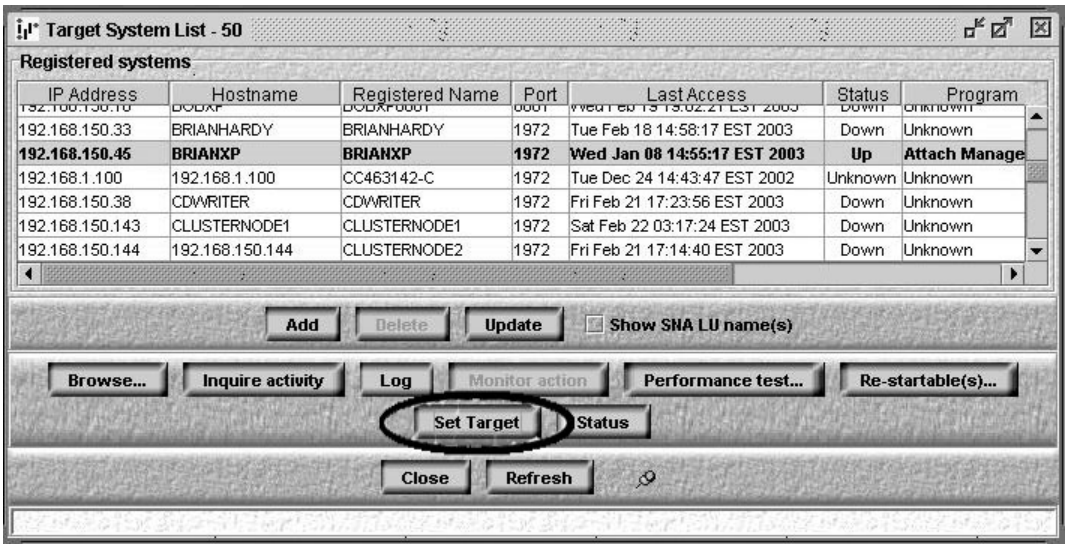
Bring up the Options dialog panel by hitting the Options button in the Restore Objects window. All the categories of option settings are grouped together at each named tab. Select the tab named "Replace" and the panel changes showing those option settings and check the "Never" checkbox option:



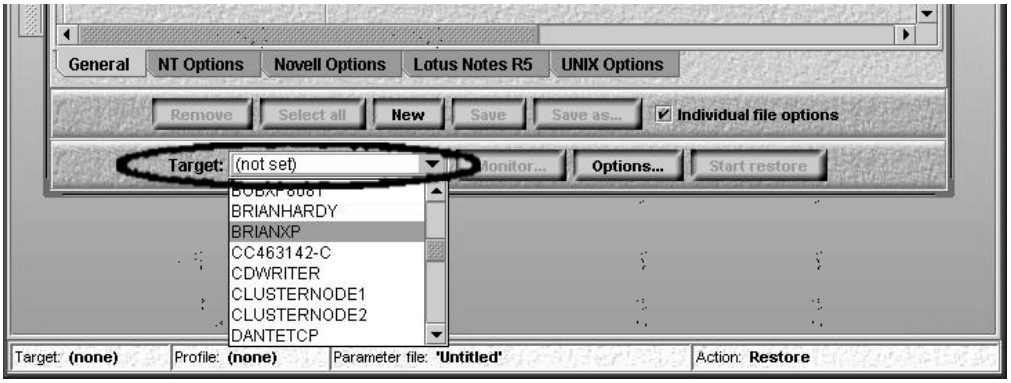
8.7.5 Step 5

Now we will have to set the location or Target system Services component that will do the restore for us - remember we are just directing a Services component to do the work for us. The profile that you are using is usually the profile that was used for the backup of the files at a Target Services component system. In most cases a well chosen Profile name will reflect the name of the Target system, but you will have to know what system this is and set it as the Target.

Hit the "Target." Icon (image of a folder with a bull's eye in it) next to bring up the Target system list OR locate the target drop down list in the Restore Objects window. Scroll through the list and select one - it may be all bold and the column heading "Status" will say "Up/Down". If none are active, you can still selected a target Services component, in this case the Director will try to activate (connect) to the target when the restore operation is initiated.



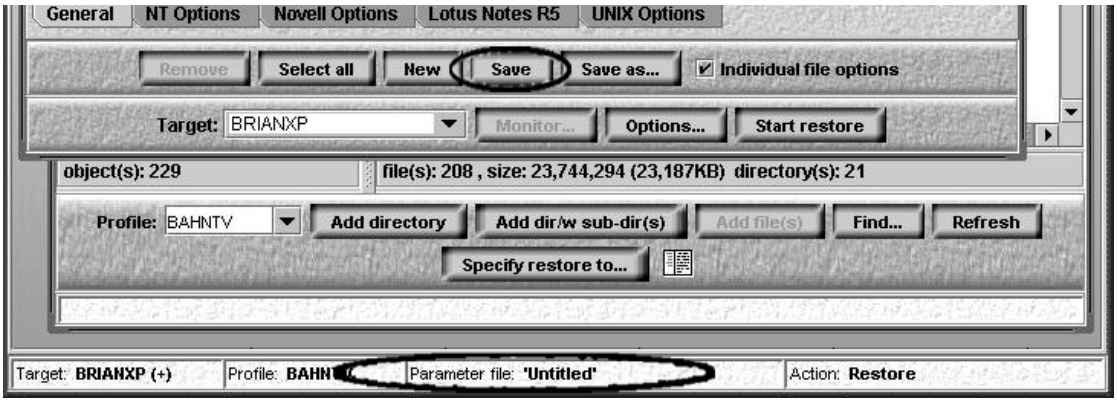
Once you select a system, hit the "Set Target" button (the Target System List closes) OR use the drop down list of target systems right in the Restore Objects window:



Click the down arrow of the drop down list labeled "Target" to view and scroll through the list of targets and select one - the registered name of the system is then set as "Target: xxx" in the main panel bottom status panel of the Director window:

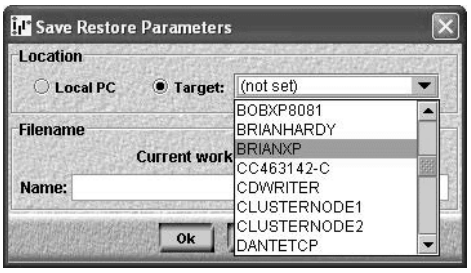
8.7.6 Step 6

Now is a good time to save your work. This means naming the container of the "What, Where and How", the .DAT parameter file, and saving it away. There is unsaved work for an action whenever the "Parameter file" reads: "Untitled" in the main panel bottom status panel of the Director window:



To save your work, hit the "Save" button and a dialog will come up for you to name the parameter file:

Although the parameter files can be saved on the local PC running the Director, it is better to save them on the target for which they are intended to be used; this is also better logistically because the Parameter File Dialog can summarize, display and load parameter files by selected target. Saving on the target is done by selecting the "Target" radio button which enables the drop down list of targets to be viewed and selected:. Although parameter files are filenames with the extension of ".DAT", you do not need to type that at the end of the name:

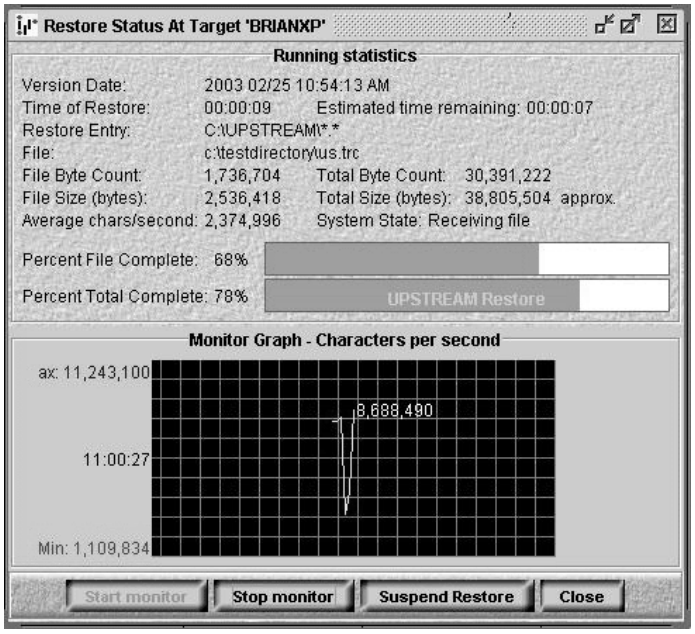


After you have selected a target, the default directory running the UPSTREAM service is selected and displayed:

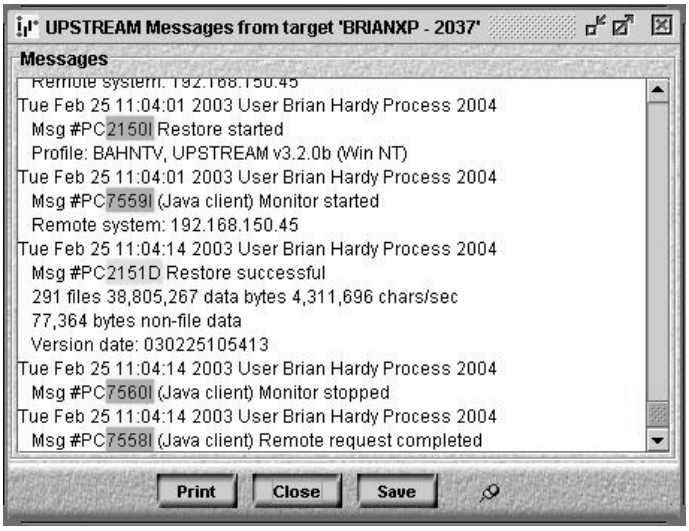
Type in the name "samplerestore" and hit "Ok". Although parameter files are filenames with the extension of ".DAT", you do not need to type that at the end of the name:

8.7.7 Step 7

All we have to do now is start the restore operation. Hit the "Start restore" button and a dialog asking if you want to proceed will come up and hit "Ok". Next the monitor restore panel comes up displaying the progress of the restore:



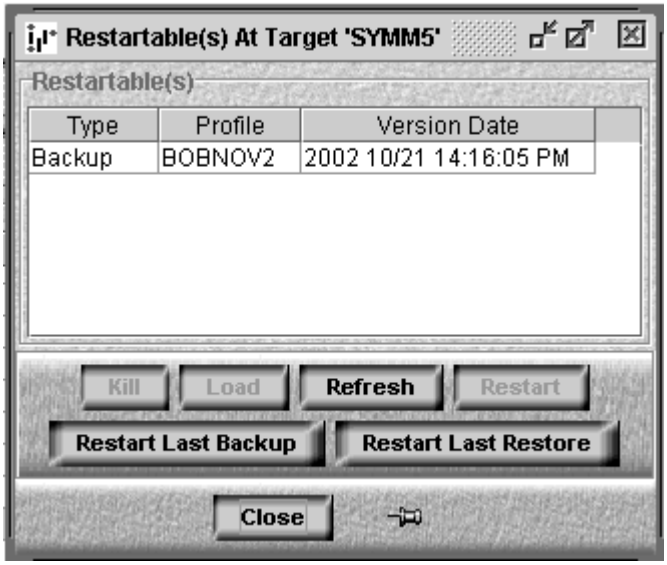
The Director also opens up a window that displays the messages coming from the target system. At the main panel menu item "View", choose "Messages", then choose "Current target": If this gets closed or you want to view the message from any target you have used, go to the main panel menu item "View", choose "Messages", then choose "Current target":


UPSTREAM Messages from target 'BRIANXP - 2037'
Messages
Remote system: 192.168.150.45
Tue Feb 25 11:04:01 2003 User Brian Hardy Process 2004
Msg #PC2150I Restore started
Profile: BAHNTV, UPSTREAM v3.2.0b (Win NT)
Tue Feb 25 11:04:01 2003 User Brian Hardy Process 2004
Msg #PC7559I (Java client) Monitor started
Remote system: 192.168.150.45
Tue Feb 25 11:04:14 2003 User Brian Hardy Process 2004
Msg #PC2151D Restore successful
291 files 38,805,267 data bytes 4,311,696 chars/sec
77,364 bytes non-file data
Version date: 030225105413
Tue Feb 25 11:04:14 2003 User Brian Hardy Process 2004
Msg #PC7560I (Java client) Monitor stopped
Tue Feb 25 11:04:14 2003 User Brian Hardy Process 2004
Msg #PC7558I (Java client) Remote request completed
Print
Close
Save

8.8 Restarting Backups or Restores

The UPSTREAM Director now supports manually restarting pending backups or restores.

In the Director, in the Target window, press the **Re-startable(s)...** button:



If you have version 3.2.0a or lower of UPSTREAM, an error message will be displayed: *Unable to determine restart information at target* , the list will not be filled in and a message will be logged in UPSTREAM.

If you have a version 3.2.0b or higher of UPSTREAM on the target system, then a list will be displayed of all pending restartable backups or restores.

- To restart one, highlight the entry in the list and press the **Restart** button.
- To delete restart information highlight the entry in the list and press the **Kill** button.
- To see details on the original specifications for the backup or restore, highlight the entry and press the **Load** button; you will be brought to the backup or restore screens and all of the fields will be filled with the values specified for this backup or restore.

The **Restart Last Backup** and **Restart Last Restore** buttons allow you to restart the most recent backup or restore without having to highlight the entry in the list. These are the action buttons you should use with older UPSTREAM client versions.

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9 End-User Restores

9.1. Introduction

End-User Restores is a separate program, written as a Java application, providing a Windows Explorer-like interface for the selection and monitoring of restores for users. This facility greatly reduces training for user specified restores and allows a GUI restore facility in environments where none existed previously including UNIX systems and the Java console on NetWare file servers.

End-User restores is the first in a whole new line of Java-based facilities. Taking advantage of the cross-platform nature of Java, this facility will run on many of the current FDR/UPSTREAM platforms including all UNIX systems (with X-Server support), Windows 95/98, Windows NT and Novell file server Java consoles or the Novell X-Client. It performs interprocess communications the FDR/UPSTREAM Windows, NetWare or UNIX system client and with the FDR/UPSTREAM host. Thus it can be used to specify restores locally, or on another machine.

As well as specifying restores, this facility also allows you to start the restore, monitor its progress with a number of informative display controls including graphs and progress bars, monitor FDR/UPSTREAM messages, and cancel the restore.

Though not full-featured and intended for end-users, it is nonetheless ideal for administrators, help-desk operators and most other users of FDR/UPSTREAM.

This program is a Java application which means that it requires the Java run-time environment be installed on your system to operate it (version 1.1.6 or higher). The Java runtime is included in the install for Windows platforms. It does not use or require web browser facilities.

The *Installation*, *Configuration* and *Using End-User Restores* sections is intended for administrators. The *Getting Started* section mirrors the end-user restore help facility section named *Getting Started* and is intended as the primary documentation for casual users.

9.2. Installation

For UNIX systems, see below. For NetWare v5 Java Consoles, contact Innovation Technical Support for installation instructions.

For Windows systems, there is a new subcomponent option **End-User Restore** in the FDR/UPSTREAM Setup program which is not checked by default.

If the setup program does not find a Java Runtime Environment (JRE) version 1.2 installed, it will note that it is required for end-user restores and ask you if you have a prior version installed. If you do not, press the **No** button and you will be asked if you wish the Sun JRE v1.2 installed now. Pressing the **Yes** button will install the JRE.

If you are running the single file version of the Setup program (which you obtained from the Innovation FTP site or via email from technical support), you will need to cancel the restore, retrieve the JRE single file install (jre12i-win32.exe) from the Sun or Innovation FTP site, install it and restart the FDR/UPSTREAM Setup program.

If you have a 1.1.6 version or higher installed and you do not wish to add the 1.2 JRE, press the Yes button. The Setup program will warn you that you must obtain a number of jar files from technical support and continue the restore. Proceed to the Configuration section below.

For UNIX you must have a Java Runtime Environment (v1.1.6 or higher) installed. **These are available from your operating system vendor**.

To install the End-User Restore facility for UNIX you must:

- su or login as root.
- Copy from the **/upstream/unixjava** directory to your FDR/UPSTREAM directory the files: **usjinst** and **usjrest.tar**.
- Change the mode on the installation script (**usjinst**) to make it executable and execute it with the command line option **install**:

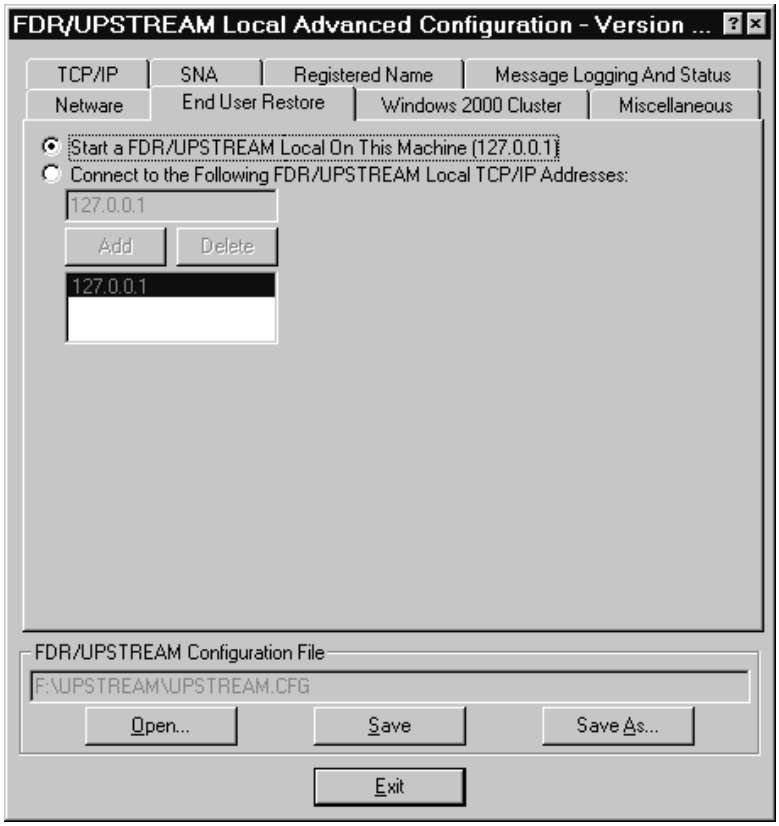
```
chmod 755 usjinst
./usjinst install
```

The installation script will untar the files into the UPSTREAM directory and then it will build the **usjrest** script. To do this it will attempt to find the Java runtime automatically. However, if it can not, you will need to know the directory where it is installed. You should not include the /bin part of the directory, as that is assumed (for example, enter /usr/java rather than /usr/java/bin). The directory you specify can not be a symbolic link but must actually be the directory where Java is installed. When the script completes, proceed to the Configuration section below.

You can always rerun **usjinst** (with no command line parameter) if it asks for information that you don't have at this time and wish to rerun the installation without reextracting the files.

9.3. Configuration

Configuration for end-user restores is done primarily within the FDR/UPSTREAM Configurator (USCFG.EXE). When you enter the configurator, press the **Advanced** button and the **End User Restore** tab.



- **Start a FDR/UPSTREAM Local on this Machine:** If you select this radio button, the FDR/UPSTREAM End User Restore will start FDR/UPSTREAM when necessary on your local machine. This is the default.

- **Connect to the Following FDR/UPSTREAM Local TCP/IP Addresses:** Select this radio button if you wish to connect to a running FDR/UPSTREAM. This is often used when you wish to connect to the UNIX daemon or FDR/UPSTREAM running on a Novell server. If you select this radio button you must enter one or more IP addresses of machines where FDR/UPSTREAM is running.

  If you press this radio button, you will need to enter the IP addresses of the UPSTREAM machines you wish to connect to. Enter an IP address or DNS name in the edit field immediately below this radio button and press the Add button. To remove an address, highlight the address in the list and press the Delete button.

  The UPSTREAM advanced configuration option *Status Port* is used by the Java program to communicate with FDR/UPSTREAM. If you are running multiple copies of FDR/UPSTREAM, each copy should have its own Status Port. Status Ports should be separated by 2 numbers; FDR/UPSTREAM uses Status Port and the subsequent two port numbers.

When an UPSTREAM Java program starts, it initially searches for a CONFIGFILE=<configfile> on the command line. After that, it searches for the file **useui.cfg** and if that is not found, then **upstream.cfg**. For most environments you can save your configuration parameters to upstream.cfg.

End-User Restores require a template FDR/UPSTREAM parameter file. By default it will look for **useui.dat**, if it is not found it will use **upstream.dat**.

The template parameter file allows you to specify a variety of FDR/UPSTREAM parameters which can not be specified in the end-user restore facility including:

- Default backup profile name (end-user restores allows you to specify and switch backup profiles, but the template parameter file allows you to specify the default).
- PC Reporting
- Restartability
- Non-File data
- ...and all other FDR/UPSTREAM features not modified through the End-User Restore interface.

To create a template end-user restore parameter file, use the standard version of FDR/UPSTREAM (the **US.exe** executable) and set up a restore, specifying the specific FDR/UPSTREAM parameters that you wish to use, then save your parameters to **useui.dat**.

9.3.1. End-User Restores and OS/390 Unix

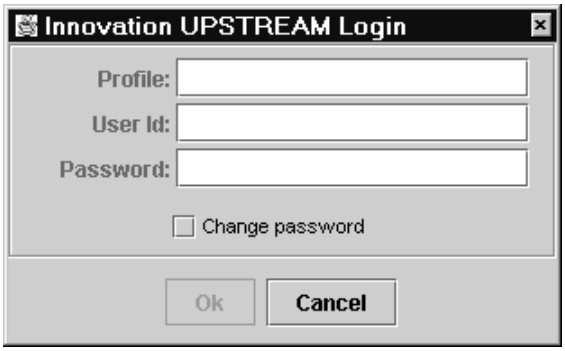
Since the FDR/UPSTREAM host and OS/390 Unix share the same IP address and thus don't use the same listening ports, you must configure the separate configuration file, useui.cfg to speak to FDR/UPSTREAM for OS/390 Unix.

Go into the FDR/UPSTREAM configurator. Set the IP addresss of your host, and set the *TCP/IP Host Port* to be the listening port of the FDR/UPSTREAM host (usually **1972**). Set *TCP/IP PC Port* to be **2972** (the listening port of FDR/UPSTREAM for OS/390 Unix). Press the **Connect to Running UPSTREAM** radio button and enter the IP address of your host in the edit field. Press the **Ok** button. When it displays the Save dialog, enter **useui.cfg**.

When you next start End-User Restores, it will use useui.cfg and should perform inquiries and restores correctly.

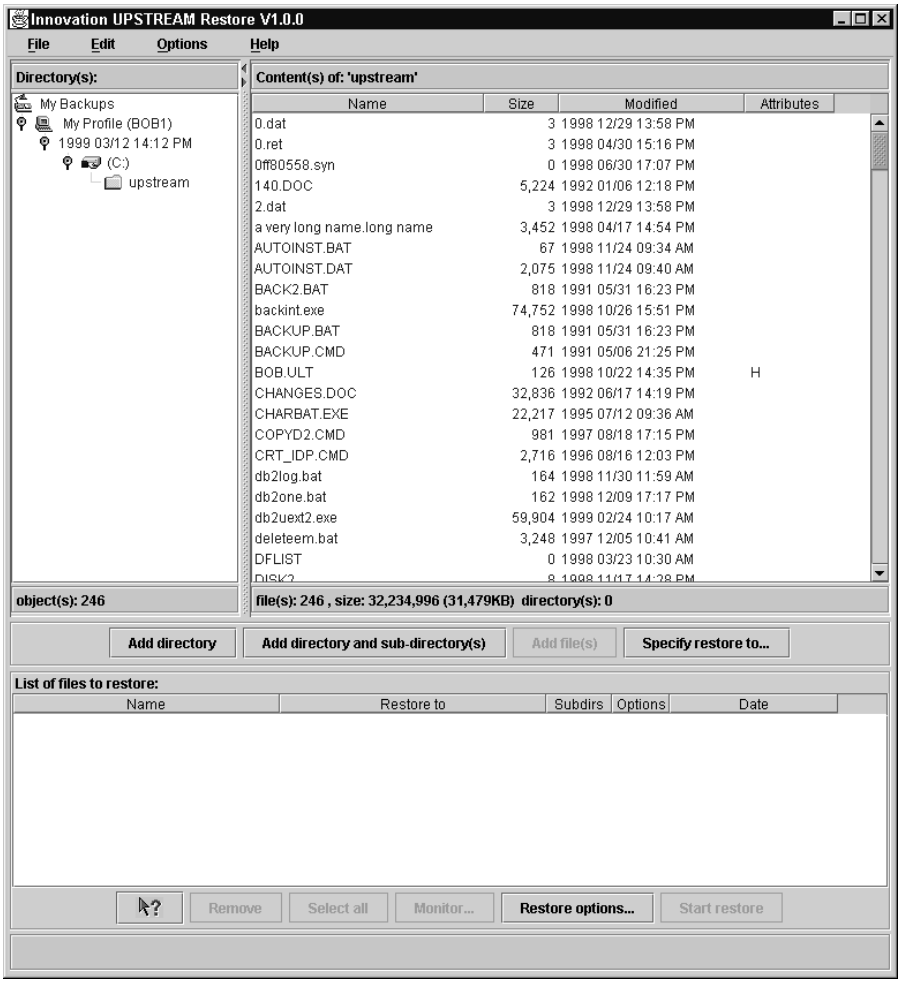
9.4. Getting Started

If you are using Windows, the installation program will have created a shortcut named “End-User Restores”; for UNIX or from the command line on all systems run the installed script file **usjrest**. This will display the initial login dialog. Note that for Windows users, this may not be the top level dialog (other windows may be on top of it).



Enter the backup profile you wish to inquire and restore from and if required, enter your host User ID and Password and press the **Ok** button. The End-User Restore facility will perform a version inquiry using the specified backup profile and display the main End-User Restore screen.

You can use this screen to change your host password. Check the **Change password** checkbox and the dialog will be updated with fields allowing you to enter and then re-enter your new password. When you press the Ok button you will be connected and your host password will be changed.



Similar to the Windows Explorer, the top two frames of End-User Restores display a left-hand frame consisting of a high level view titled *Directory(s)*, and on the right hand side, the contents of the currently highlighted level titled *File(s)* or *Contents of:* (when there are entries displayed). You expand a level by double-clicking the entry with the mouse or highlighting it and pressing [ENTER]. The File(s) frame is a multiple selection frame allowing you to highlight more than one file at a time.

The bottom frame consists of the files which you have selected to be restored.

The buttons and mouse selections provide the commonly used features. The following paragraph mirrors the facility in the end-user restore help, also named Getting Started.

- **Setting a Destination.** If you wish to restore the files back to their original location, you can skip this step. The first thing you will want to consider is where on your system you want to have the files restored to. You can have them restored to their original drive, directory and name. But probably in most cases, you will want to put them in some other directory where you can test or checkout the version BEFORE you move or restore them to their final destination.
  The FDR/UPSTREAM restore application provides a way to set a fixed directory name to use whenever a file or directory is added to the restore list. What this does is use a fixed name for the "Destination" column of each entry that you will add to the restore list in the bottom panel. Just click the **Specify restore to...** button in the center panel. You will get a dialog to fill out:

First click on the checkbox: **Use specified path**. This allows you to enter a directory name in the "Name:" text field above it. You can return to this checkbox to turn this behavior on or off at any time as you add to your restore list.

Next you can also choose whether the name specified is used "as is" (the default) which is the "Use specified path only" radio button option or you can choose the **Append path and file name to specified path option**: this will add the directory (or the directory of the file) name to your specified path name as it is added to the restore list. For example, if you chose "C:\TEMP" as your fixed directory and you select the directory "\PROD\FILES" to be added to the restore list, the destination name formed for the restore entry would be "C:\TEMP\PROD\FILES".

At any time you can individually edit the *Restore to* column of a restore list entry by just double-clicking in the row and column cell and change the *Restore to* location/name.

- **Browse a Version.** The next step is to browse through the versions (backups) that are available with the Profile name used at sign on. A version is a date and time name of the backup taken. The most recent to the oldest are in the directory tree in the top left panel for selection. The date of a file you need restored is probably the major selection criteria. As you select a version, then drive and then directory name from the tree in the top left panel, the files and directories along with their dates in the "Modified" column are shown in the panel to the right of it. This is the last modified date of the file when the backup (version) was taken.

- **Select Directory/File(s)**. Now you can start to select those directories or files you want to have restored. The tree in the top left panel is where a directory may be chosen and the top right panel is where files may be chosen.
  To select a directory to be restored, simply highlight it by clicking on the directory (double-click it to expand the directory). Once selected, you can click the **Add directory** button in the middle panel, and the directory will be added to your list of files to restore in the bottom panel.

  You may also use the **Add directory and sub-directory(s)** button, in which case the selected directory and all the subdirectories below it will be restored. Note this option is signified with a check-box option in the "Subdirs" column of the entry added to the restore list. You can un-check this at any time to switch back to restore only that directory and likewise, check it on at any time to include all the subdirectories. Note that switching on or including subdirectories may remove some selected directories in the list if they were subdirectories of the directory since they would be redundant requests.

  To select a file to be restored, simply highlight it by clicking on the file name and hit the **Add file(s)** button which will add it to your list. Multiple files may be selected by simply holding down the control key (Ctrl on the keyboard) while you select each file name with your mouse. A range of files may also be selected by selecting a starting file name, holding down the shift key (Shift on the keyboard), and selecting the ending file name. As before, once selected (highlighted) you can hit the "Add files(s)" button to add the multiple files to your list.

If you have selected a file or directory to be added to your list, and the directory that the file or directory is in is already in your list of items to restore, you will be prompted to add them as *Excludes*. This means that the selection(s) will not be restored when the directory is restored. This will be indicated in each entry in the *Options* column in the list of files to restore if you proceed to allow the add. This is how you exclude file(s) or directory(s) from the restore process: select and add a directory first, and then add the files or directory(s) from that directory you DO NOT want restored - the dialog prompt will come up asking you if want these selections excluded from the restore.

As a shortcut, instead of using the middle panel buttons, after items have been selected (highlighted) in the directory panel on the left or the file panel on the right, you can also use the mouse right-click button. This will pop up a convenient pop-up menu panel containing the same add operations as the middle panel buttons.

- **Update Restore List Table**. The list of things to restore in the list table in the bottom panel can be tailored before the restore is initiated. Items that you do not want in the list may be selected by single clicking the row, using the Ctrl-key for multiple selections or using the Shift-key for a range selection. Once highlighted, you can hit the **Remove** button in the bottom panel to remove the items.
  The *Subdirs* checkbox for any directory entry my be turned on or off to signify whether you want to include the subdirectories under it for the restore. As discussed in the Select Directory/Files(s) help panel, switching this on or off may remove appropriate entries in the list to conform to logical include and exclude operations.

  The *Restore to* column for any entry may be modified by double clicking the cell in the table which will cause it to go into edit mode. Position the cursor anywhere in the text to edit it, and end the operation by hitting the enter key.

- **Start Your Restore.** You are now almost ready to start your restore, but the last thing to consider will be some restore options. These basically are concerned with what to do when a file already exists in a directory where you want it restored to. Press the **Restore options..**. button to see the three options: *Overwrite existing* (replaces the file), *Never* (skips the file for restore because it exists), and *If files differ in size or mod time* (only replaces it if the size OR modification times are not the same). Once you decide on your file replace option, you can finally press the *Start restore...* button which will prompt you to start the restore operation.

9.5. Using End-User Restores

This section describes the facility in more detail. The frames are:

- **Directory(s).** In the top left-hand frame high level view the hierarchy is:
  - My Backups
  - My Profile
  - The list of versions. This list always assumes *Highlighted Back to Full* and goes from most recent to oldest.
  - Drives or UNC highlevels for PCs or the root directory ('/') for UNIX.
  - Each level of the directory tree.

  As you expand each level, an inquiry is done of the FDR/UPSTREAM host.

  By using the mouse, you can expand or contract the size of this frame by grabbing the center divider and moving it. You can also completely expand or contract the frame by pressing the arrows at the top of the center divider.

- **Contents of:** The top right-hand frame displays the contents of the highlighted entry in the Directory(s) frame. This frame displays columns of Name, Size, Modified and Attributes. For PC backups, the attributes are the standard PC attributes. For UNIX system backups are the attributes displayed when you perform an ls -l and include the owner and group. This frame is sizable by grabbing the center divider and moving it or pressing the arrows on the center divider.
  The *Modified* column is unique to the End User Restore application because multiple dates of backups (versions) taken may be available to view without going down a different version date expansion of the directories and files to see them. This is indicated with a parenthesized number to the right of the date. When this number appears, the modified dates are available as a drop down combo list box to view and select. Each version date of the file is listed from most recent to oldest with a -1, -2 -3... etc. indicator. Selecting one of these dates sets the version to restore when the file entry itself is selected to be added to your restore list. Please note that the list of versions goes back only to the previous full backup version. You must navigate past that full backup to see even later backup versions of a file. Backup version types and media types (disk or tape) are shown in the Attributes column when the Profile name is selected (highlighted) in the directory tree panel on the left.

  Each column is individually sizable by grabbing the divider for that column with the mouse and moving it right or left. You can reorder the columns by grabbing the title for the column and moving it.

- **List of files to restore:** The bottom frame displays the files or directories which have been selected for restore.
  You can change the destination of a file or directory by double-clicking the mouse in the **Restore to** column of a file or directory entry and entering the destination.

  For directories, you can use the mouse to check or uncheck the **Subdirs** checkbox.

  Each column is individually sizable by grabbing the divider for that column with the mouse and moving it right or left. You can reorder the columns by grabbing the title for the column and moving it.
  The middle set of push-buttons are:

- **Add Directory:** If you press this button, or right mouse click in the Directory(s) frame and select **Add...** the highlighted drive or directory in the Directory(s) frame will be added to the *List of files to restore* frame.

- **Add directory and sub-directory(s):** If you press this button, or right mouse click in the Directory(s) frame and select **Add with subdirectories...** the highlighted drive or directory in the Directory(s) frame will be added to the *List of files to restore* frame and *Subdirs* checked (indicating that all files and directories subordinate to the selected entry) will be included.

- **Add file(s):** If you press this button or right mouse click in the File(s) frame and select **Add...** the highlighted files in the File(s) frame will be added to the *List of files to restore* frame.

- **Specify restore to...:** Allows you to specify the drive/directory destination for directories or files for subsequent adds. When you press this button a dialog is displayed:

  - **Name:** The drive and/or directory of where you wish the added drive/directories/files to be restored to (the destination).
  - **Use specified path:** Check this box to enable the radio buttons below.
  - **Use specified path only:** Select this radio button to add all entries to the Name specified.
  - **Append path and file name to specified path:** Select this radio button to use the Name specified as a prefix and to use the original path as a suffix. This allows you to maintain the original directory structure when restoring files from multiple directories.

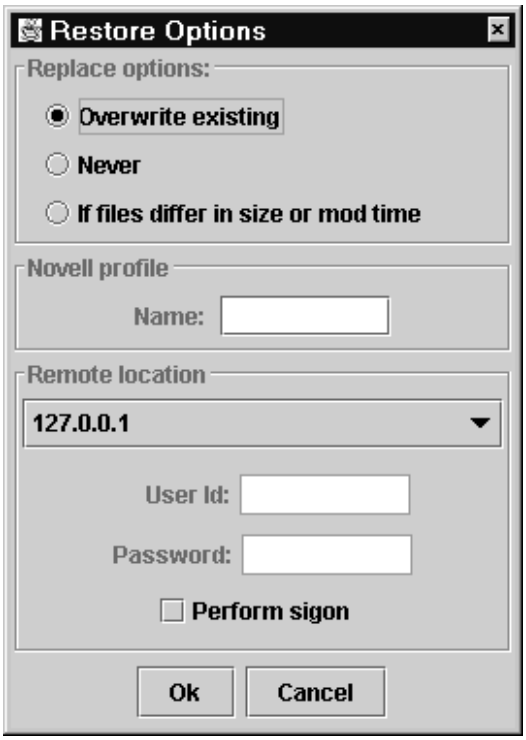
- : Enables the context sensitive help facility. After pressing this button the mouse cursor is now used to bring up specific help for any control that you click.

- **Remove:** Removes the highlighted entry in the *List of files to restore* frame.

- **Select all:** Selects (highlights) all the entries in the *List of files to restore* frame. This is useful when you wish to remove all the entries selected for restore.

- **Monitor:** This button is grayed unless you have started a restore from this facility and stopped monitoring. Press to resume monitoring.

- **Restore options...:** Allows you to specify some restore overwrites. Displays the following dialog:



- **Restore options** are:
  - **Overwrite existing:** Any existing files will be overwritten by files from the restore.
  - **Never:** Do not overwrite any existing files.
  - **If files differ in size or mod time:** Do not overwrite existing files from the restore if the files on disk have the same size and modification date/time.
- **Novell Profile:** If you are restoring to a Novell server and need to specify a Novell Profile which is different than the one in the template parameter file, you can specify this here.
- **Remote Location:** If you specified **Connect to Running UPSTREAM** (in the FDR/UPSTREAM configurator) and then specified multiple IP Addresses in the FDR/UPSTREAM configuration, a list of those addresses is displayed here as a combo box. You can select to which running FDR/UPSTREAM you wish this restore directed. The default is the first item in the list.
- **Perform signon:** If the FDR/UPSTREAM client system you are connecting to is personalized to require local logins, check this box. Then you must fill in the **User Id** and **Password** fields with your security signon for that system.

☐ **Start restore:** Begins the restore if there are files in the *List of files to restore* frame.

The **File** menu consists of:

☐ **New Profile:** Brings up a dialog allowing you to specify a new backup profile.

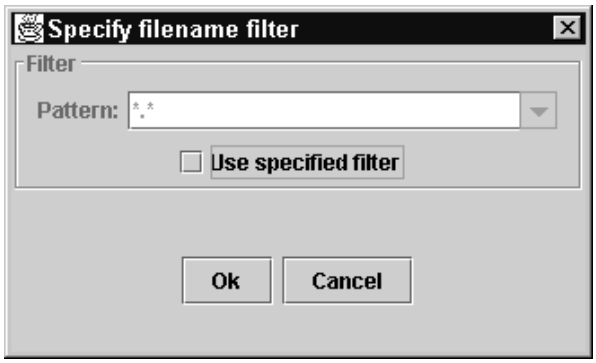
☐ **Exit:** Exits the program. You can also exit by selecting the Close option from system menu, or by pressing the 'X' on the top right of the frame.

The **Edit** menu allows you to cut, copy or paste any highlighted entry to/from the clipboard.

The **Options** menu consists of:

- **Colors:** Displays a pallet of colors for the foreground or background of the display. The colors are not preserved between executions of the program.

- **File Filter:** Displays a dialog which allows you to specify a wildcard mask to be used in selecting files to be displayed. Note that this does not filter files in the restore.

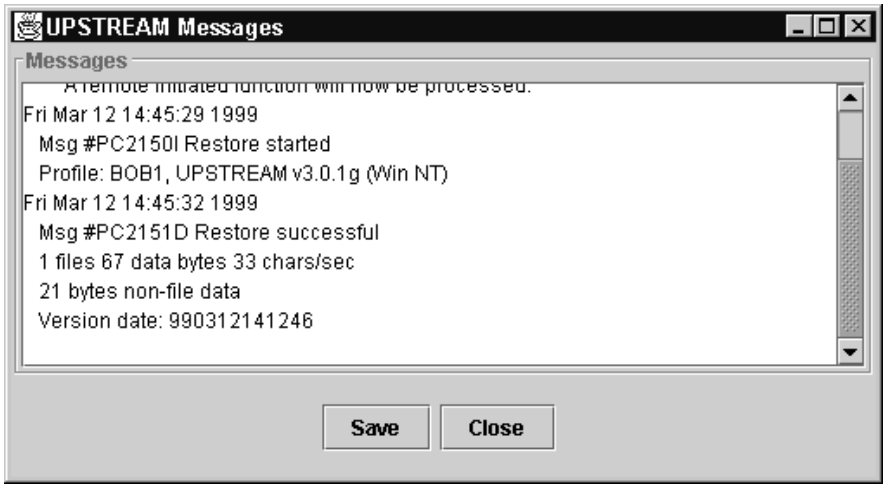


  - **Use specified filter:** If this button is not checked, all files are included.
  - **Pattern:** If Use specified filter is checked, then the specified pattern is used to restrict files displayed. The default for PCs is *.*, for UNIX systems is *. This field includes a pull down menu allowing you to easily recover previously specified patterns.

- **Font:** Allows you to specify the font for virtually all text displayed. The fonts are not preserved between executions of the program.

- **View Messages:** Displays a list displaying all messages written to the FDR/UPSTREAM log by FDR/UPSTREAM during a restore, most recent at the bottom. The list of messages accumulates between restores. This display is movable, resizeable and can be viewed during the restore process.

  Whenever a restore ends in a non-zero return code or is aborted, this panel of messages should be viewed to see the reasons for failure as well as actions performed.



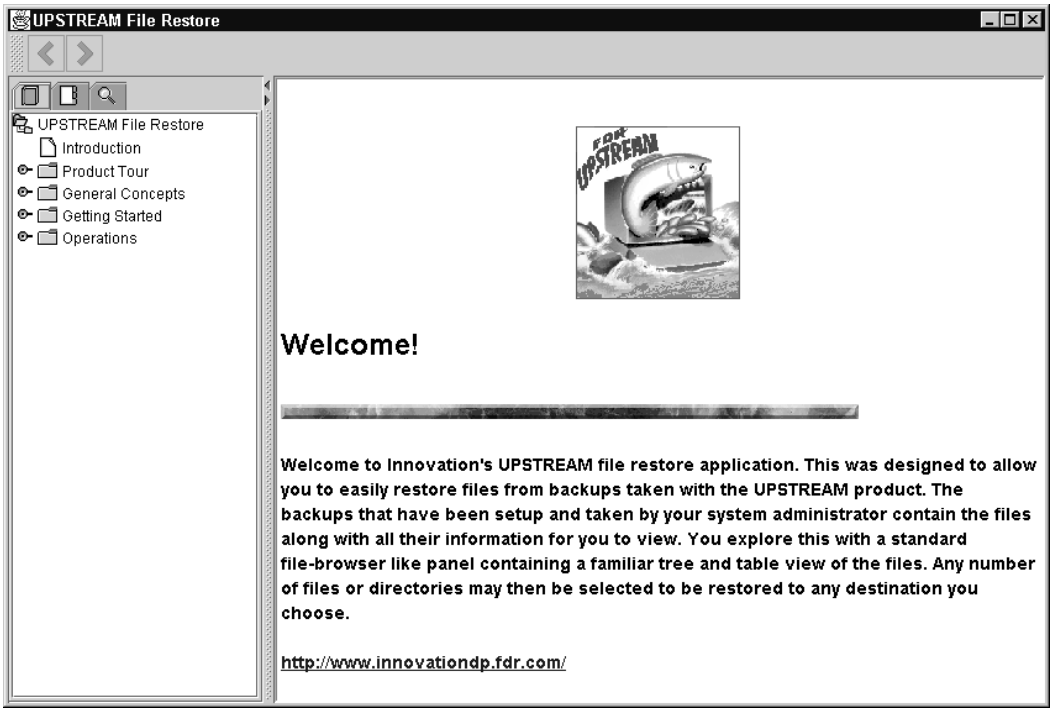
- **Restore options:** Displays the same dialog as the *Restore options...* button.

- **Look and feel** options change the way that the entire facility is displayed: buttons, frames, etc. change in the display to the given form. **Metal** is the default and offers high contrast and easy viewing in most environments. **CDE/Motif** displays the facility in the Motif (UNIX) form. **Windows** displays the facility using Windows conventions.

- **Browser** displays the Innovation Directory Browser which allows you to view the contents of your system using a Windows Explorer-like interface.

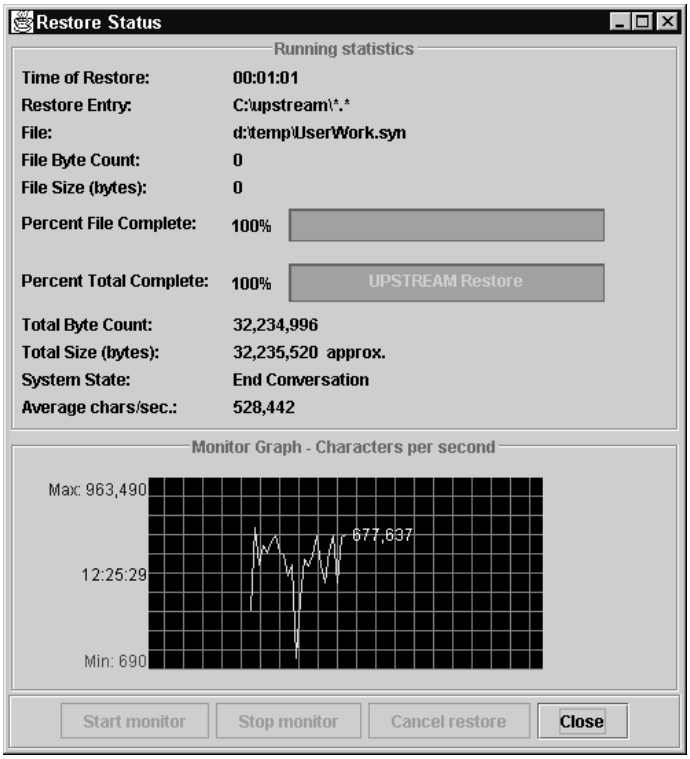
The **Help** menu contains:

- **Help Contents:** Displays the End-User Restore help facility. It consists of two frames, the left a hierarchical list of topics. When you select a topic, the right frame displays its details. The arrows on the top allow you to go back to the last viewed topic to return to a topic. On top of the left frame are three tabs. The left tab (with a book icon) displays the list of topics. The center tab (with a tabbed folder icon) display a list of indexed items and allows you to search on them. The right tab (with a magnifying glass icon) allows you to perform a text search.



- **About:** Displays the version number of this program.

When you begin a restore, a restore status screen is displayed.



The status display shows many of the same items as in a FDR/UPSTREAM status display with the addition of two progress bars, one for a given file and one for all the files in the restore. It also shows a graph which shows the instantaneous performance of the restore.

Note that during the restore, to see any FDR/UPSTREAM error messages you will want to have the Messages window displayed, which is available in the main display by pulling down the **Options** menu and selecting **View messages...**

This is a non-modal dialog which means that it is independent of the other dialogs in the program. If you close it while a restore is running, you can return by **Monitor...** button in the main display. You can use facilities in the main display while the restore monitor is displayed.

The buttons are:

- **Start Monitor:** Allows you to resume monitoring after pressing the *Stop Monitor* button.
- **Stop Monitor:** Suspends monitoring. Monitoring may slow down the restore slightly so you may wish to stop it for the very fastest restore performance.
- **Cancel Restore:** Allows you to cancel the restore.
- **Close:** Closes the monitor window. You can reopen this with the **Monitor...** button at any time during an active restore.

If you exit the program while a restore is running you will be asked if you wish to terminate the restore. You can not exit the end-user restore program with a restore running.

9.5.1. Security

If you configure End-User Restores to start FDR/UPSTREAM, it has the same security attributes as FDR/UPSTREAM itself. See the Security chapter in the FDR/UPSTREAM Workstation/Server User's Guide for details in securing FDR/UPSTREAM for remote client requests.

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10 Performance

10.1. Overview

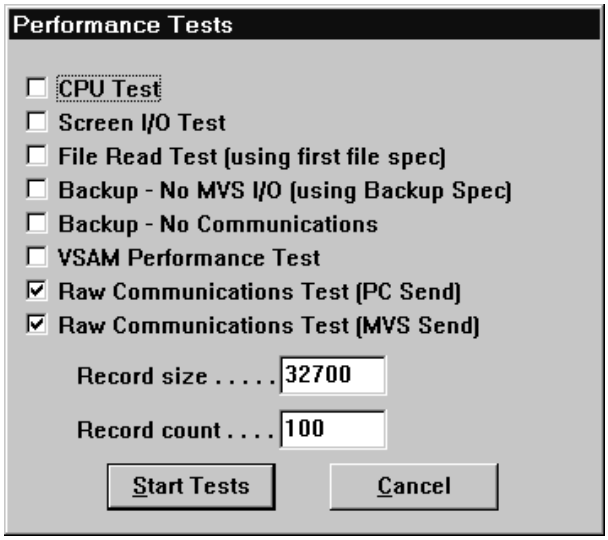
High performance is one of the major features of FDR/UPSTREAM. But, as with any communications product, performance requires some tuning to adjust it for your environment.

You must *scientifically* isolate the performance bottlenecks and then take the actions based on where the bottlenecks actually are. Your goal is to avoid wasting time optimizing areas where performance is not actually bottlenecked.

FDR/UPSTREAM provides performance isolation tools based on where performance bottlenecks generally are.

10.2. Performance Dialog

Selecting **Performance** from the **Action** menu of the main FDR/UPSTREAM program displays the Performance dialog.



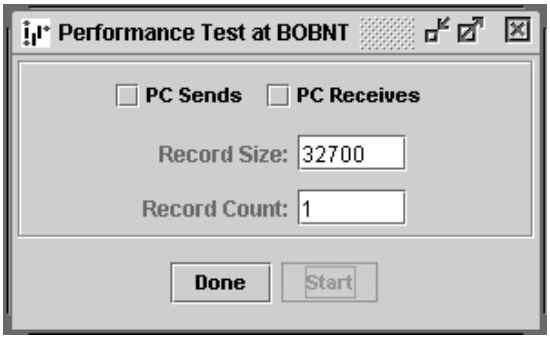
Use this dialog to help you isolate any issues which are impacting performance. You select an option in this dialog by pressing one or more of the performance testing buttons (with the space bar or the mouse) and then pressing the **Start Tests** button. When all the performance tests are complete, a message box is displayed and logged with all the results.

Each test is described below with performance tuning suggestions. When you are first attempting to isolate performance issues it is recommended that you select all the options and then when fixing each option, perform one fix at a time until acceptable results are obtained. Feel free to contact FDR/UPSTREAM technical support at any step in the process to help you get the best from your environment and to help you set your expectations.

Setting your expectations reasonably is an important step. There is a finite point where you cannot appreciably improve performance. Remember that your goal is to get the best *possible* performance.

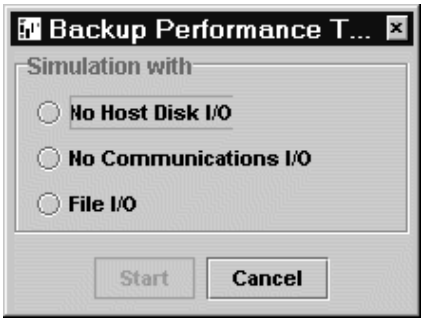
You can request Performance tests on other FDR/UPSTREAM machines (including Novell servers) by specifying the performance test options you wish to use and pressing the **Cancel** button. FDR/UPSTREAM will preserve your options in memory; you can then use **Request a Remote Function** with the **Use your parameters** option to send the Performance test request to another machine. See the *Advanced FDR/UPSTREAM* chapter for more information on sending requests to other FDR/UPSTREAM machines.

You can use the FDR/UPSTREAM Director to run some of the Performance tests as well. The Raw Communications performance tests are available from the Target Systems list. To get to it, press the **Target** icon or pull down the **View** menu and select **Registration/Target List**. From the Target Systems list, highlight an active target, and press the **Performance tests...** button to display the Performance Test dialog:



Check the performance test option you wish, with the record sizes and counts and press the **Start** button to begin the test. You'll be notified with a message box when the test is completed. As with all functions in the Director, If you encounter any errors you can view the remote FDR/UPSTREAM messages for the event; pull down the **View** menu, select the **Messages** submenu and the **Current Target** item.

You can access the file read test and the backup performance tests from the Backup Specifications screen. After you complete the parameters necessary for a backup, the Performance test button will activate. You can press it to specify these tests:



10.2.1. CPU Test

The CPU test returns a number indicating the number of times that a simple compression can be performed on your machine in a given period of time (10 seconds). A result of less than 2500 indicates that fast compression will impact performance on high-speed connections. A number less than 500 indicates that fast compression will impact performance in just about all links.

High compression requires very high CPU performance test numbers when used on high speed links. The general rule of thumb is that the best performance high compression can generate on a high speed link is somewhere around the CPU index * 100 bytes per second. Thus a CPU index of 5000 would have a maximum performance somewhere around 500,000 bytes per second. Thus, we only recommend high compression in lower-speed links.

CPU performance impacts ALL aspects of FDR/UPSTREAM. Slow machines perform slow file I/O, slow communications, slow screen writes and are generally slow everywhere.

10.2.2. Screen I/O Test

The screen write test tests to see how many times a string can be written in a dialog box in 10 seconds and displays updates per second. This is useful in determining if the status display should be enabled during a backup or restore for best performance. A number less than 2500 indicates that performance will be impacted in high-speed connections. A number less than 500 indicates that performance will be impacted in just about all speed connections.

When optimizing performance it is a good idea in just about every case to limit the status display by setting a Status Screen Time (in the Advanced menu in the FDR/UPSTREAM Configurator program) to a value or 2000 or 3000 (2 or 3 seconds).

10.2.3. File Read Test

This test reports the performance of reading all the files specified in the first backup file specification screen in characters per second. It does not test subdirectories even if the subdirectory box is checked. The record size is used to determine the blocking of the files read. Note that in many cases a **Backup - No Communications** performance test is more definitive as it reads all non-file data as well as well as traversing subdirectories.

PC file read speeds are critical in backup performance. In many file server environments, file I/O performance is the principal bottleneck. But these numbers can be deceiving. Most operating systems are usually very fast in reading an open file but are slow in the actual file opens. And as the number of files in a directory increase,

the file opens get slower. In the same environment it is common to see speeds ranging from 10,000,000 characters per second to 20,000 characters per second depending on the file sizes and the number of files in the directory. So plan on running this test several times on different directories to get a reasonable estimate of aggregate throughput.

The file read/write size in FDR/UPSTREAM is not controlled by the record size, but by the **BACKUPBUFFERSIZE** environment variable (see the *Advanced FDR/UPSTREAM* chapter for a description of FDR/UPSTREAM environment variables). It's default is 32768 for most environments (262144 for OS/390 UNIX).

To improve file read performance there are several things to try:

- Check real-time virus checking settings. If you have real-time virus scanning enabled on your system, this can severely impact FDR/UPSTREAM's throughput.
- If you are accessing files via a LAN, look into adapter tuning. For example, with Ethernet LANs you may need to try changing the duplex (full to half or vice-versa), or explicitly setting the adapter speed (to 100Mb for example).
- If you have many large files, increasing the BACKUPBUFFERSIZE may help to improve performance.
- In some environments (particularly Novell servers), reducing the BACKUPBUFFERSIZE has shown in some tests to improve performance.
- Reorganize your directories to reduce the number of files in a directory. It is faster to open a small number of files in many directories than a large number of files in a single directory.
- Faster CPUs improve performance. If you can, use a faster workstation and/or a faster server. Increasing memory in servers often helps improve performance as well.

10.2.4. Backup - No MVS I/O

This test helps you by performing all the functions of a backup without actually writing the data on the host. A normal backup is done using the backup specifications currently defined. The data is transmitted to the host but the host does not record it. You can not use FDR/UPSTREAM/SOS (local backup disks) with this test.

It is a good idea that before you run this test you perform a File Read or Backup - No Communications test to determine the file read performance to compare against total throughput reported. You should perform Raw Communications tests before running this test to see how backup performance changes when real data is read.

Thus this test is good to helping you in see the affect of latency (during the read) and slightly different buffer sizes (as FDR/UPSTREAM record packing will send slightly varying record sizes) in overall performance.

10.2.5. Backup - No Communications

This test does all the functions of a backup, but does no data transmission to the host. This is actually a better test for file access performance as it transverses subdirectories, accesses non-file data and performs all other functions of accessing data that are performed during a backup.

See the File Read test section (section 10.2.3.) for suggestions for tuning based on your results.

10.2.6. VSAM Performance Test

This test reports the number of single File Information and 6000 byte File Data cluster writes that can be performed in a second. The results of this test are reported as an error message during the test.

You would get an indication that VSAM performance may be affecting the overall performance of your backups if you see long pauses (5-10 seconds) during the backups.

VSAM performance varies significantly based on MVS CPU utilization and disk pack utilization. Results often vary by large increments even when run within seconds of each other. For the most useful results, run and average several of these tests at the same time of day you will be running the backups.

The VSAM results give you an indication of the maximum amount of data that can be received by the host. For example, 40 file information records and 35 file data records would indicate that no more than 40 small files in a second or more than 35 records (35 * 6000 bytes = 210,000 characters) in a second can be written to disk.

If you are using IAM files for the file information cluster, you will see a vast difference in performance numbers between file information and file data. This is due to the very high performance of IAM versus VSAM; IAM should be used for both the file information and catalog clusters whenever possible. IAM should not be used for the file data cluster.

10.2.7. Raw Communications Test - PC Send

The raw communications tests are the most used performance tests as they indicate in a simple step, the ability of the communications network to transfer large quantities of data. All users are encouraged to run these tests when tuning FDR/UPSTREAM as the initial starting point for isolating performance bottlenecks. We also recommend running these tests whenever setting up a new workstation to verify that communications performs as expected.

This test allows the sending of a specified number of blocks of a specified size to MVS. This can be used to determine the overall throughput which can be accomplished in a backup. When this box or the Raw Communications Test - MVS Send box is checked the record size and record count fields become available for entry.

Note that the total number of bytes transmitted is the product of the record size and record count fields. Do not specify values too large as this test cannot be interrupted once begun.

10.2.8. Raw Communications Test - MVS Send

Allows the receiving of a specified number of blocks of a specified size from MVS. This can be used to determine the overall throughput which can be accomplished in a restore. When this box or the Raw Communications Test - PC Send box is checked the record size and record count fields become available for entry.

Note that the total number of bytes transmitted is the product of the record size and record count fields. Do not specify values too large as this test cannot be interrupted once begun.

10.3. TCP/IP Tuning

TCP/IP is somewhat more difficult to tune as it is designed to be self-tuning. However, there are some things that can be done to improve your performance. Some of these include:

- LAN Adapter tuning
- Send and receive buffer sizes
- Adjusting your record size
- MTU size
- Window Size
- Host tuning

Note that many of tuning parameters suggested here will affect all of your TCP/IP applications. As a starting point, we recommend that you perform a bulk move with a standard TCP/IP application (such as FTP) to get a benchmark of non-UPSTREAM TCP/IP performance. Then perform the Raw Communications tests using FDR/UPSTREAM to see how FDR/UPSTREAM performance compares to performance with other TCP/IP applications. As you modify parameters, verify that your changes do not negatively impact performance by comparing them against your initial benchmarks.

10.3.1. LAN Adapter Tuning

A poorly tuned LAN adapter can degrade performance significantly for all LAN accesses. Making sure that you have the newest driver from the manufacturer is the first step. Then verify that your settings are correct (full vs. half duplex, LAN speed, etc.). Note that these setting must match your other hardware (such as Ethernet switches or other Token-Ring cards on the LAN). For Ethernet, you may want to try changing the duplex even if you are confident that you have duplex matched with your switch

10.3.2. Send and Receive Buffer Sizes

The lower layers in TCP/IP allocate buffers which are used to hold send and received data in transit. Increasing the size of these buffers can, in some cases, make a dramatic difference in performance. The initial sizes are vendor dependent.

You can set these buffer sizes in the advanced options in the FDR/UPSTREAM configurator: **TCP/IP Send Buffer** and **TCP/IP Receive Buffer**.

We have found that most often the value 65535 seems to work the best and is the default for most environments. However:

- In a number of UNIX environments, using the system default (which is set by no value or a value of 0) occasionally works better than 65535.
- OS/390 UNIX seems to always work best with a value of 32768 and it’s the default in that environment.

You should run Raw Communications performance tests to verify the best value for your environment.

10.3.3. UPSTREAM Record Size

The FDR/UPSTREAM transmission record size can, in many cases, be the most significant performance modifier. The actual data record transmitted in a single TCP/IP send command is determined by the structure of the data but will be as close as possible to the **Packing Size** (the PACKRECSIZE parameter), which is specified in the Backup or Restore More... Dialogs. This parameter seems to have the greatest affect when you are using the Interlink TCP/IP product on your host.

To determine your optimal Packing Size, perform multiple FDR/UPSTREAM Raw Communications Performance tests, using various record sizes. We recommend that you try 6000, 8192, 12000, 18000, 24000 and 32700 - don't forget to reduce the record count as you increase the record size to keep the tests from running too long. If you find that your performance is best at smaller record sizes (6000 is much better than 32700), then set your record size to the record size that you had the best performance with and set your packing size to be 0 (to disable packing) or near that size, but slightly larger (say 6200 for example).

10.3.4. Setting TCP/IP parameters

Some system specifics for setting overall TCP/IP parameters:

- Windows NT: Virtually all TCP/IP parameters can be modified. Parameters are set using manual registry modifications. Microsoft Knowledge Base article Q120642 describes the process in detail. Note that most parameters are properly negotiated.
- OS/2: The TCPCFG (TCPIPCFG for older versions) allows you to modify the MTU size. No other parameters can be modified.
- Others: Most other systems (Windows 95, many UNIX systems, etc.) provide few if any modifications. See your system administration guides for more information.

10.3.5. Increasing MTU size

The maximum transmission unit (MTU) is the largest size that a IP packet can be. It is fixed at 1500 for most forms of Ethernet and should be set to that value.

For Token-Ring you can significantly improve your performance by adjusting the value upwards from the default of 1500. We recommend for most users a value of 4400.

10.3.6. Window Size

This parameter determines the maximum TCP receive window size offered by the system. The receive window specifies the number of bytes a sender may transmit without receiving an acknowledgment. In general, larger receive windows will improve performance over high (delay * bandwidth) networks. For highest efficiency, the receive window should be an even multiple of the TCP Maximum Segment Size (MSS).

10.3.7. Host Tuning

The UPSTREAM/MVS manual has a number of performance tuning suggestions.

10.3.8. Other TCP/IP Notes

Some TCP/IP issues you may run into:

- TCP/IP Timeouts during long tape mount delays: If possible, adjust upwards your Maximum Data Retransmission Count (for Windows NT, the parameter is **TcpMaxDataRetransmissions**). Adjusting it upwards slightly (from 5 to 20 for example) will generally get rid of the problem. See Microsoft KnowlegeBase article Q120642 for more information.

  For Windows platforms a simple program to read/set the TCP/IP registry timeout values (TCPTIMEOUT.EXE) helps avoid direct registry editing.

- Situations where security validation works, but backups or restores don't can often be caused by MTU or Window Sizes set too large.

Note that we recommend using the FDR/UPSTREAM TCP/IP Attach Manager if you are executing more than one copy of FDR/UPSTREAM. See the *Running More Than One Copy* chapter for more information.

TCP/IP has a number of architected return codes. Some of their more common ones and their likely causes are:

- Broken Pipe: Usually caused by an intermediate system outage such as a lost router, a pulled cable, etc. This can also be caused by the remote system going down completely (crashing).
- Address Already in Use: Usually caused by brining up a 2nd copy of FDR/UPSTREAM listening on the same port.
- Connection Reset By Peer: This is the most common error and it can be caused by the remote system or application crashing, or an intermediate software failure (long tape mounts may cause this - see the TCP/IP timeout values and TCPTIMEOUT.EXE above).
- Connection Refused: Usually caused by FDR/UPSTREAM not running on the remote system.

10.4. Other Performance Improvements

Besides the issues you can isolate and help improve in the performance facility, other performance improving items include:

- Duplicate files
- Local backups
- Improving Line Speed
- Using Multiple PCs
- Eliminating or reducing Bridges and/or Routers
- Choosing appropriate test times
- Screen savers
- Disabling server compression
- Record size tuning
- Careful use of compression

10.4.1. Duplicate Files

The FDR/UPSTREAM duplicate file facility can be an excellent way to improve performance if you are backing up a number of systems that are logically similar (servers or workstations). See the duplicate file section for a description of the facility and its best usage to improve performance.

10.4.2. Local Backups

Local Backups are a technique of FDR/UPSTREAM where some data is stored on the local system as well as being transmitted to the host. In low-communications speed environments this technique can significantly improve restore performance. See the Local Backup section for a more detailed description of this facility.

10.4.3. Line speed

Line speed is the most important performance modifier. 2400 baud dial up lines are always slower than 16 megabit Token-ring connections. However, for most users this is the hardest to modify. But, when looking for the largest improvements, this is where you must start.

Line congestion affects line speed. Even Token-ring lines can get congested (though this is rare).

10.4.4. Multiple PCs

Running more than one PC at a time, on the same LAN with the same server will provide better performance than a single machine, due to the advantages of using multiple CPUs and multiple conversations.

The key to doing this is careful planning. For example, if you have two volumes on your file server, you may choose to use two PCs, each backing up one volume. Remember that you must use separate backup profiles.

10.4.5. Bridges and Routers

Bridge and/or router hops reduce overall performance. To increase performance, the goal is to place as few intermediate devices as possible between the file server and the backup PC, and the backup PC and the host connected device.

10.4.6. Test Times

Test FDR/UPSTREAM when you will actually be performing the backup. File server congestion, host connection congestion, host utilization and other multi-user usage issues will impact performance, and may in fact be less significant at the time the backups will actually be run. If you can, attempt to run your final performance benchmarks at the same time of day and the same day of the week the backups will actually be run.

10.4.7. Screen Savers

Screen savers can take an enormous amount of CPU overhead. It is recommended that these always be disabled.

10.4.8. Server Compression

Some file server systems (most notably NetWare v4.x) support compression. Since FDR/UPSTREAM uses standard file access methods, the file server system will be constantly working to decompress/recompress files for transmission to the FDR/UPSTREAM machine. It is recommended that file server compression be disabled when optimizing for performance.

10.4.9. Record Size Tuning

The FDR/UPSTREAM parameter Record Size is the size of the logical record stored on the host. However, it does not have to be the physical disk read/write record size or the communications send/receive record size.

To change the transmission record size, there is a parameter PACKRECSIZE, whose default is 32700, which defines the TCP/IP or SNA transmission size. In most environments this is the best value, however, you may find that you may be able to improve performance by reducing it.

To change the disk read/write size, specify an appropriate Record Size (usually best done as a power of 2 i.e. 4096, 8192, 16384) and then specify the environment variable parameter BACKUPBUFFERSIZE to be a multiple of this value (up to 65500). The actual data read size is an even multiple of the Record Size up to the BACKUPBUFFERSIZE. The default is 32768.

10.4.10. Careful use of Compression

Compression can help or hurt performance. If the time to process data is more than made up for the fact that you have to send or receive less data, then compression will help. You should try testing all the compression levels on sample data in a realistic environment to determine which one, if any, helps the best.

A good rule of thumb is that high compression is best on slow links (56K bps or slower), fast compression is good with fast machines (486 or faster) on all fast links or on medium links (like coax) with all machines, and

that no compression should be used elsewhere. Compression testing should always be done with the MVS storage requirements in mind.

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11 THE FDR/UPSTREAM PROGRAM

11.1. Overview

This chapter describes all the options and functions available in the FDR/UPSTREAM main program US.EXE. It is helpful, but not required, to have looked through the previous chapters to get a feel for using FDR/UPSTREAM.

This chapter explains what FDR/UPSTREAM does when it starts, and it explains the menus and functions available when you run FDR/UPSTREAM.

There are additional parameters that can be specified on a backup that are specific to each specification. This chapter describes these parameters.

Migration (or Grooming) is the ability to automatically delete files which have been backed up. FDR/UPSTREAM has the ability to automatically delete files once the files have been successfully backed up and track them properly. If you are backing up a file system that supports file last access date, FDR/UPSTREAM can also automatically detect which files have not been accessed for some specified period of time. This chapter explains how to do this. FDR/UPSTREAM can also auto-recall Novell files as well. See the Novell chapter for a description of that facility.

There are additional parameters that can be specified for backups and restores. These include:

- Novell specific parameters
- Compression levels
- Reporting features
- ...and more...

Each backup or restore specification can also have metadata parameters (server security options) and other options. This chapter describes these parameters.

There is an alternate restore facility to the one described in the previous chapter. This chapter describes that facility.

11.2. When FDR/UPSTREAM Starts

When US.EXE starts it performs many different actions, some of them transparently. These include:

- Read and Verify Files
- Check for Failed Backups and/or Restores
- Start Unattended Operations
- Check for Remote Initiates
- Register your Registration information
- Perform automatic updates

This section outlines each of these steps to help you understand them.

11.2.1. Read and Verify Files

(non-UNIX only) The first thing US.EXE does is load the communications and file systems drivers. If any of these executables or libraries cannot be found, FDR/UPSTREAM displays an error message.

(UNIX only) The first thing US.EXE does is open its system file. This file US.RES must exist in the default directory. If it does not, you will receive a message stating that FDR/UPSTREAM could not load its resource file.

US.EXE then displays the main screen and reads in the configuration and transfer parameters. *Advanced Configuration* and *Advanced FDR/UPSTREAM* chapters describes how to set parameters in other ways than using the automated parameter files.

If there are missing or no parameter files, and the remainder of the startup functions are skipped. If the parameter files are found, then they are read in and checked for correctness and completeness.

11.2.2. Check for Failed Backups and/or Restores

Once the communications services have been started, FDR/UPSTREAM checks to see if there was a restartable failed backup and/or a failed restore. If you are running attended (you checked the Attended box in the backup or restore <More...> dialog), you will be asked if you wish to continue this backup or restore. If you say no, then the backup or restore can be restarted later. If you say yes, then the backup or restore will restart immediately from the first failed file.

If you running unattended and have a failed backup pending, it will be automatically restarted (unless you checked the **Do not automatically restart failed backups** checkbox in the FDR/UPSTREAM configurator, or started with the option **NORESTART Y**). Note that setting these options still allows backups to be manually restarted or restarted remotely.

11.2.3. Start Unattended Operations

If you specified an unattended backup or restore (by not checking the Attended check box in the backup or restore <More...> dialog), then the backup or restore will immediately begin. When the requested function has completed, FDR/UPSTREAM will terminate.

If the unattended operation that you selected was to wait for host initiates, FDR/UPSTREAM will wait for the specified amount of time after the last received request (for RMTPARM.DAT this is 1 minute) and then terminate.

11.2.4. Check for Remote Initiates

FDR/UPSTREAM continually checks for remote backup or restore requests every 15 seconds after it is started with communications activated and you are at the main display (not in a dialog). Remote requests are also checked for when you begin a new backup or restore.

11.2.5. Registration

Registration is performed when the first remote check request has returned no remote initiates. It will be performed periodically thereafter depending upon how it is configured in the FDR/UPSTREAM configurator.

11.2.6. Automatic Update

If you have specified that this workstation is to be automatically upgraded, the version of FDR/UPSTREAM for your operating system type is checked at registration time. If it is different than the master version, when FDR/UPSTREAM is idle (not performing a local or remotely requested function), the automatic update process will be honored. See the Management chapter for a complete description of the process.

11.3. The FDR/UPSTREAM Menus

Once you enter FDR/UPSTREAM, you have many options available via pull down menus. This section describes the functionality available beyond the backup and restore specifications described in prior chapters.

The menus available are:

- File menu. Its functions include parameter file and system options.
- Action Menu: Besides the backup and restore specification functions, it also allows file transfer, the restart of failed backups, performance bottleneck isolation, toggling of the trace for support purposes, and various other functions.
- Communications Menu: (OS/2, Windows and Windows NT) Allows you to see session parameters. (APPC/PC only) Allows you to control the session and to see the current session status.
- Remote Menu: Allows you to set up for unattended remote operation, accept or reject remote requests, perform your own remote request and perform various registration operations.
- Management Menu: Allows an authorized user to perform certain management functions including viewing/deleting of existing backups, modifying host configuration entries, viewing the status of FDR/UPSTREAM MVS, host reporting and duplicate file management.
- Security Menu. Allows you to modify your active security information and invalidate it.

11.3.1. File Menu

This menu allows you to perform parameter file options as well as several system functions. The parameter file options include:

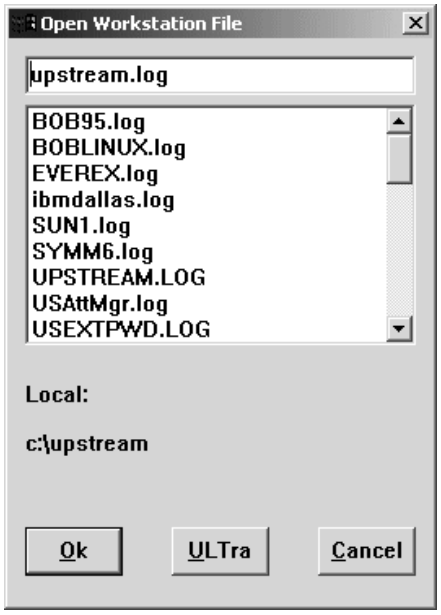
☐ **Open:** This option displays a dialog allowing you to use a previously saved backup or restore parameter file. In Windows the standard system open file dialog is displayed. In other operating systems a dialog similar to the following is displayed:

Only those files with the .DAT suffix are displayed in the box (though you can enter any file name). When you open a parameter file, the dialog for the function specified in the parameter file is displayed and the fields in the

dialog are changed to reflect the new parameters. An accelerator for selecting this option is [ALT]O. Note that passwords are not retrieved from parameter files in attended mode for security reasons.

- **Save:** This allows you to save parameters that you changed in the backup or restore dialog, but did not save when you exited it. It displays the same save dialog as when you press the <Ok> or button in the backup or restore dialog to allow you to specify the file name to save. An accelerator for selecting this option is [ALT]S.

- **View:** This option allows you to view a standard text file without starting another program, and is most often used to viewing the FDR/UPSTREAM logs and reports. When you select this option, you see the Open Workstation File dialog .



If you press the <Local Workstation> radio button, the list and the file you view will be a file on your workstation or server. If you press the <ULTra> button you can specify ULTra workstation information which will be used to select the file from the remote ULTra machine.

When you select a file, you will see it displayed in a list box. There are <Top of File> and <End of File> push-buttons to move through the file as well as push buttons to open another file and to close the current file. Note that in many cases, using the scroll bars to scroll through the file will not work as it is paged into memory based on the highlighted item in the list box, so we recommend the use of the cursor keys, control keys (i.e. [PgUp], [PgDn]) or control push buttons.

The system options in the file menu include:

- **Exit:** When you select this option a message box is displayed asking if you wish to exit FDR/UPSTREAM at this time. Press <Ok> to exit, or <Cancel> to remain in FDR/UPSTREAM. An accelerator for selecting this option is [ALT]X or [F3].

- (UNIX only) **Shell: When** you select this option a message box is displayed asking you to press <Ok> to go to a shell, or <Cancel> to remain in FDR/UPSTREAM. If you press <Ok> to go to a shell, then the screen will clear and you will see a standard prompt. FDR/UPSTREAM is suspended, but the session with the mainframe remains active.

When you are ready to return to FDR/UPSTREAM, type EXIT from the command prompt. An accelerator for selecting this option is [ALT]D.

- **About:** Selecting this item displays a dialog providing a simple explanation of FDR/UPSTREAM and the current version number. The only option is the <Ok> button.

11.3.2. Action Menu

This menu provides the backup and restore functions described as well as a trace option.

- **Backup:** See chapter 6. An accelerator for selecting this option is [ALT]B.
- **List and Restore:** See chapter 7. An accelerator for selecting this option is [ALT]L.
- **Restart Backup:** This option is grayed and unavailable unless there is a failed backup and communications are currently available. If this option is not grayed, you can restart a failed backup (or a backup where certain files were unavailable) by merely selecting this option.
- **Kill Restartable Backup:** This option is grayed and unavailable unless there is a failed backup pending and communications are currently available. If this option is not grayed, you can specify that a backup never be restarted by selecting this option. You will have to confirm that you really don't ever want to restart the backup and then FDR/UPSTREAM will delete it's restart information for that backup.
- **Restart Restore:** This option is grayed and unavailable unless there is a failed restore pending and communications are currently available. If this option is not grayed, you can restart a failed restore by merely selecting this option.
- **Kill Restartable Restore:** This option is grayed and unavailable unless there is a failed restore pending and communications are currently available. If this option is not grayed, you can specify that a restore never be restarted by selecting this option. You will have to confirm that you really don't ever want to restart the restore and then FDR/UPSTREAM will delete it's restart information for that restore.
- **File Transfer:** This option allows you to exchange files with the host. See the File Transfer chapter for a complete description.
- **File Migration:** A facility designed to migrate (identify, and remove) files off the workstation/server. See later in this chapter for a description of the facility.
- **Trace:** Select this option only on the request of FDR/UPSTREAM technical support.
- **Performance**: This option displays a performance test dialog which allows you to isolate performance bottlenecks. See the performance chapter for a complete description of this option and other suggestions on how to improve performance. An accelerator for selecting this option is [ALT]P.
- **Set Environment:** Allows a method of setting lesser used FDR/UPSTREAM parameters that are usually set through environment variables. See the Advanced FDR/UPSTREAM chapter for a complete description.
- ***(OS/2, Win32 only)*** **Set Priority:** See the Advanced FDR/UPSTREAM chapter for a complete description.
- **Run a Job:** See the Advanced FDR/UPSTREAM chapter for a complete description. An accelerator is [ALT]J.
- **Restore and Inquiry (old):** See later in this chapter. An accelerator is [ALT]R.

11.3.3. Communications Menu

The communications menu provides services which allow you to view negotiated communications information:

- ☐ ***(non-UNIX only)*** **Session Status:** This option displays some of the LU 6.2 parameters such as the local LU name, the partner LU name and the mode name. It also displays whether the session is currently active. Even if APPC has been started, the session may still drop. You can activate a lost session by starting a backup or restore, or by deactivating and then reactivating the session.

  (OS/2, Windows, Windows NT) This facility will also show you the negotiated session values of RU size and pacing. The values are extremely important for performance optimization. You must have an active session for these value to be displayed - you may have to perform a function such as security validation, list and restore, etc. Some Windows implementations do not support this facility. These values are written to the log as well as the screen.

11.3.4. Remote Menu

The remote menu supports functions related to remote initiation of backups and restores.

- ☐ **Unattended Remote Functions:** This option allows you to specify unattended operations where the control of these operations is remote. This is primarily used to have the PC wait a given amount of time for a remote system to request a function. See later in this chapter for more information.

- ☐ **Accept Remote Functions:** This is a single flag which indicates whether you will accept and process remote requests. Remote functions are accepted if there is a check mark next to the option; they are disabled if there is no check mark. You toggle this flag by selecting the option on the menu (with the mouse or by pressing the [ENTER] key when the option is highlighted). Even if remote functions are disabled, FDR/UPSTREAM will continue to look for them, but will send an error message to the remote indicating that they are disabled.

- ☐ **Request Remote Function:** This option allows you to request that a remote function be performed on another PC. These requests can be directed via the FDR/UPSTREAM MVS program or directly (via APPN, LEN or directly). See the Advanced FDR/UPSTREAM chapter for more information.

- ☐ **Listen for Remote Functions:** This is a single flag which indicates whether FDR/UPSTREAM will periodically check for remote functions. Since checking for remote functions is very important for avoiding deadlock situations, we recommend unchecking this only when you are sure that your computer will not receive remote requests (either from another workstation/server or from the host).

- ☐ **Registered Names:** Allows an authorized user to modify the host registered name table as well a specify automatic updates. See the Management chapter for more information.

- ☐ **Resend Target Name:** If you have configured to use a target (registered) name, you can resend it at any time by selecting this option.

- ☐ **Notification Targets:** See section 11.8. on page 11-32 for more information on email and SNMP notification.

11.3.5. Management Menu

The management menu allows authorized users to perform certain management tasks.

- ☐ **Profile Management:** Allows an authorized user to view backups for all profiles or a selected subset of profiles and delete full backups. See the Management chapter for more information.

- ☐ **Profile Configuration:** Allows an authorized user to view, add, modify or delete host profile configuration entries. Options such as allowing a given type of backup, host file names generic and global profiles and more can be set here. See the Management chapter for more information.

- ☐ **Status of all FDR/UPSTREAM:** Allows an authorized user to view detailed status about the current functions being performed by FDR/UPSTREAM MVS and perform some functions to it. See the Management chapter for more information.

- ☐ **Host Reporting:** Allows a workstation/server user access to the facilities and data of the FDR/UPSTREAM MVS reporting facility. See the Management chapter for more information.

- ☐ **Duplicate Management:** Allows an authorized user the ability to view and delete the files currently in the duplicate file database. See the Duplicate File Support chapter for more information.

- ☐ **FDRSOS Local Backup Admin:** Administration of EMC disks shared between the host and the workstation/server. See the FDR/UPSTREAM/SOS chapter for more information.

11.3.6. Security Menu

The security menu allows a user to modify or invalidate their existing host security logon information.

- ☐ **Host Security Login:** Select this option to display the host security entry dialog. See Your First Backup chapter for the use of this facility.

- ☐ **Logout (Reset Security):** Invalidates your login. We recommend that you select this option if you are leaving your workstation/server and are not terminating FDR/UPSTREAM.

11.3.7. Physical Menu

(Non-UNIX only) The physical menu allows physical disk backups and FDRSOS/physical disk restores.

- ☐ **Physical disk backup:** Select this option to specify complete disk backups at the physical level. See the *FDRSOS/Physical Disk* chapter for more information.

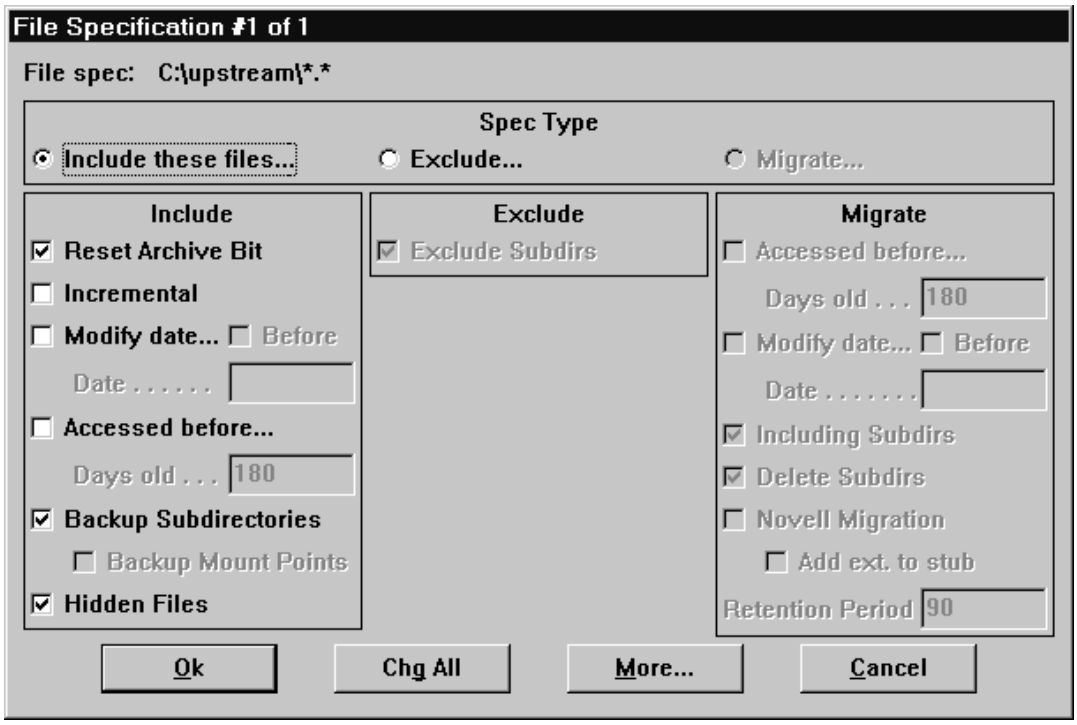
- ☐ **FDRSOS/Physical disk restore:** Select this option to specify complete disk restores of physical disk or FDRSOS backups. See the *FDRSOS/Physical Disk* chapter for more information.

11.4. Backup Specs

A specification used in a backup, specified by pressing the <Add> or <Update> buttons in the backup dialog, can be of three types. All of these types have additional options available.

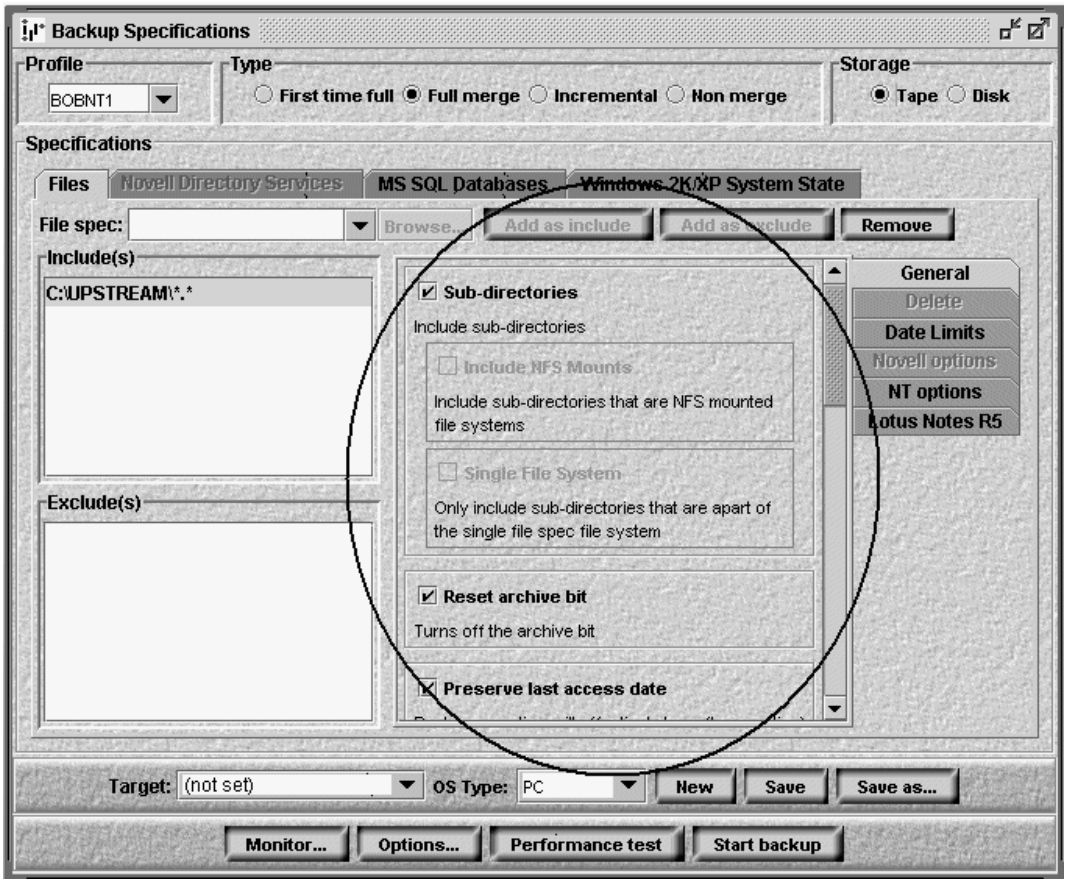
- Include: This is the default. These are specifications where the file(s) specified are included in the backup.
- Exclude: These are specifications where the file(s) are specified in another file spec and you wish to exclude these from the backup.
- Migrate: These are specifications where the file(s) are specified in another file spec, you are performing a full merge backup and wish to have certain files deleted from your PC or server and maintained on the host for a given period of time. Migration is further described later in this chapter.

To specify the type of file specification and to modify the associated parameters, add or update a file spec on the backup dialog (see Your First Backup chapter), highlight the file spec you wish to modify and press the **<Spec Detail>** button. You will then see the File Specification dialog.



When you select the backup type, the options beneath it are available and the others are grayed and unavailable.

In the FDR/UPSTREAM Director these fields are displayed in the Backup Specifications window, to the right of the file specs:



The options under Include these files... are:

- **Reset Archive Bit:** (non-UNIX) Check this box if you wish the included files to have the archive bit reset after they have been backed up. The archive bit is set by the operating system when a file has been changed and is used specifically for backups. Use this option for all backups if you wish to perform incremental backups; do not use this option if you wish to perform differential backups except on the full. The default is checked.

- **Incremental:** Check this box if you wish to perform an incremental backup; i.e.. the files included must have the archive bit set. For UNIX, these are files whose modification date is later than the date of the last backup for this backup profile. This box is grayed if you are performing a full or incremental merge backup.

- **Modify Date:** Check this box if you wish to include only those files whose modification date/time is before or after a specified date/time. The default is not checked.

- **Before:** Enabled only if you checked Modify Date above, allows you to include only those files from before the specified date. Otherwise, only those files after the specified date will be included. The default is not checked.

- **Date:** This field is grayed and unavailable unless you have checked the Modify Date box above. Enter a date (in MM-DD-YY format) which will be used to limit the files backed up. For example, September 1, 1994 would be represented as 9-1-94 (leading zeros are optional). You can also specify the number of days to add or subtract from the current date. For example, if you specify -90, then the current date will be retrieved and 90 days subtracted from it.

- ☐ ***(UNIX only)*** **Time:** This field is grayed and unavailable unless you have checked the Modify Date box above. Enter a time (in HH:MM:SS 24-hour clock format) which will be used to limit the files backed up. You must also specify a latest date.

- ☐ **Accessed before...:** Check this box if you wish to include only those files which have a last access date before the specified date. Use this option if you wish to migrate files without using the automatic migration facility and is generally not recommended. You can only use this option in file systems which support Last Access Date (such as Novell), and you should use the non file data option to reset the last access date during backups (see later in this chapter). The default is not checked.

- ☐ **Days old:** This field is grayed and unavailable unless you have checked the Accessed before... check box above. UPSTREAM will include a file if the number of days since it has been accessed is greater than this number. Thus if you wish all files included which have been accessed before today (yesterday and earlier), specify 0. The default is 180 days.

- ☐ **Backup Subdirectories:** Check this option if you wish the files which match the backup specification to be included in the backup in all subdirectories beneath the given one. Thus, if you wish to backup all the files on the F: drive, use a file specification of F:*.* and check the Backup Subdirectories check box. The default is checked.

- ☐ **Backup Mount Points**: A feature of Windows 2000 mount points allow you to associate an entry in the file system (a directory) with another location on disk. Check this if you wish to backup the mount point and all the files beneath it. The default is not checked.

- ☐ **Hidden Files:** Check this box if you wish hidden and system files to be included in the backup. Novell v3.x users must check this box to include the binderies. The default is checked.

The options under Exclude... are:

- ☐ **Exclude Subdirs:** Check this box if you wish the exclusion definition to include subdirectories under the specified one. The default is checked.

The options under Migrate... are:

- ☐ **All Files in Spec:** Press this radio button if you wish all the files in this file spec to be migrated to the host regardless of when they were last accessed. This is the default.

- ☐ **Accessed before...:** Press this radio button if you only wish to migrate files in this file spec which have been most recently accessed more than a given number of days ago. You can only use this option in file systems which support Last Access Date (such as Novell, NTFS or UNIX), and you should use the non file data option to reset the last access date during backups (see later in this chapter). Pressing this button activates the Days old field below. The default is not pressed.

- ☐ **Days old:** This field is grayed and unavailable unless you have checked the Accessed before... check box above. UPSTREAM will include a file if the number of days since it has been accessed is greater than this number. Thus if you wish all files included which have been accessed before today (yesterday and earlier), specify 0. The default is 180 days.

- ☐ **Including Subdirs:** Check this box if you wish the migration definition to include subdirectories under the specified one. The default is checked.

- ☐ **Delete Subdirs:** Check this box if you wish FDR/UPSTREAM to delete subdirectories that it empties during the migration. The default is checked.

- **Novell Migration:** Check this box if you wish to leave a "stub" file which will be used by the FDR/UPSTREAM Auto-Recall facility to automatically restore the file when a user accesses it. See the Novell chapter for more information.

- **Add ext. To stub:** Enabled only if you specified Novell Migration, adds a predefined extension **.UPSTREAM_MIGRATED** to the file to keep the Windows Explorer from recalling files when you browse a directory. The default is not checked. See the Novell chapter for more information.

- **Retention Period:** Enter the number of days that you wish the migrated files to be merged forward by the host software. Note that the files will remain on the backup tapes or disk files until they expire or are scratched, which may extend past the number of days specified here. The default is 90 days.

The buttons at the bottom of the dialog are:

- **Ok:** Press this button to save your changes and return to the backup dialog.

- **More...:** Press this button to specify additional parameters for this specification. These include metadata parameters (file system specific such as security information), and deletion options.

- **Chg All:** Press this button to have the changes that you have made in this specification copied to all the other specifications and then return to the backup dialog. This is not recommended if you have specified Exclude or Migrate file specifications as the type of specification is changed as well.

- **Cancel:** Press this button to abandon your changes and return to the backup dialog.

11.5. Migration

Migration is defined as the action of backing up a file and then automatically deleting it (this is also known as Grooming). FDR/UPSTREAM has the capability to do this and more.

Migration backups can be done in several ways:

- Using the File Migration facility. This is the recommended method.
- As part of a full merge backup. This has the added advantage of having the migrated files easily viewed and recovered through standard inquiry and restore facilities and the host will assure that these files are continuously moved forward until the given retention period has expired.
- As part of a separate merge backup, using a separate backup profile. This has the advantage of having the migrated files stored separately from the standard backup (thus saving space), but loses the advantages of easy inquiry and restore.
- As a non-merge backup using a separate profile. This method loses the advantage of real host migration control and it is discussed in the More Specifications section later in this chapter.

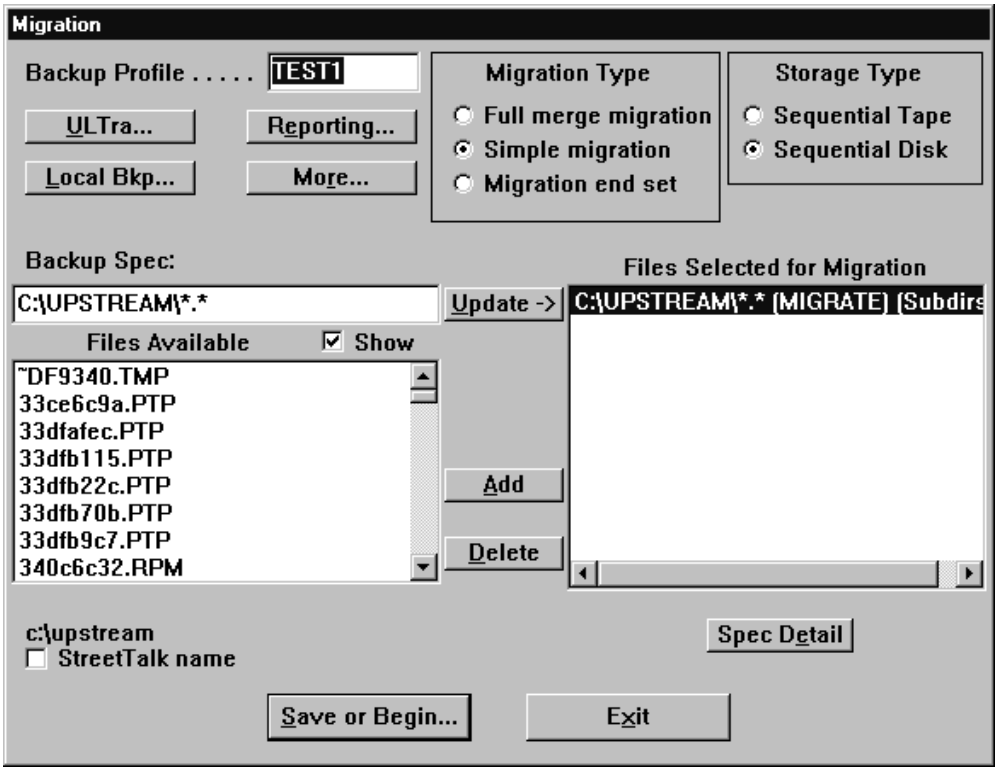
FDR/UPSTREAM can also automatically restore (auto-recall) files on your Novell server whenever a user accesses them. See the Novell chapter for more information.

11.5.1. File Migration

If you wish you can integrate your migrated and non-migrated data (see the following section), however, you are encouraged to separate migrated files from your normal production backups by using a **File Migration Only** backup profile.

A File Migration backup profile is a backup profile which is reserved for migrated files only. They cannot be used for regular merge backups and features such as duplicate file checking are specifically disabled. There is a new option in Profile Configuration for setting a profile as **File Migration Profile Only**. The notes at the end of this section denote recommendations for File Migration Profile Only backups.

To perform a migration using the file migration, pull down the **Action** menu and **select File** Migration.



Similar to the standard backup dialog, certain features are disallowed (include file specs, keyed and archived backups, NDS). It also generates a different action type (ACTION=11) which is used to indicate that this is a file migration backup.

- **Full merge migration:** Similar to a full merge backup, this creates a backup of all newly migrated files, plus it copies any unexpired files from previous full migrations and any files that were migrated with Simple Migration since the last Full Merge Migration. The Simple Migration backups will be uncataloged (if on disk, they will also be scratched). This is usually directed to tape.

- **Simple Migration:** Similar to a non-merge backup, this creates a backup of only the newly migrated files. This is usually directed to disk for faster backup and restore. You should not allow DASD management systems (such as FDR/ABR or DFHSM/DFSMShsm) to migrate these backups.

- **Migration End Set:** Identical to a Full Merge Migration, except that it marks the profile so that the **next** Full Merge Migration will not copy forward any migrated files from this (or previous) full migration backups. As the name "end set" implies, this ends a set of migration backups so that the next migration will create the beginning of a new self-contained set for this profile. See Note 3 below. This is usually directed to tape.

11.5.2. Usage notes

1. Migrated files are not deleted from the workstation until all of them are backed up. For Full Merge Migration, the deletion does not occur until the merge from previous backups is complete. If the migration fails while the workstation is sending files to MVS and the migration is marked restartable, you may restart the migration. However, if the migration fails while it is merging migrated files from previous backups, the backup will be discarded and must be started over. If the merge fails because some expected previous backup is not available (e.g., no longer cataloged or not on the expected disk), you must manually delete the unavailable backup from

FDR/UPSTREAM's records (see removing backups in Profile Management) or recover a vaulted copy of the missing backup before redoing the migration.

2. Innovation recommends that you do Simple Migrations on a frequent basis (e.g., daily or weekly) to disk. This allows for fast restores if the data is needed. Full Merge Migrations should be done on an infrequent schedule (perhaps monthly). The data set names used for the Simple Migrations on disk (DASDPREF) and for the Full Merge Migrations on tape (TAPEPREF) should be different. You may want to make the tape backups a GDG, with a limit of at least 3 or 4 generations so that backup copies of the migrated files are retained (but see the notes on backup retention below); the disk backups do not need to be a GDG, but you must insure that they are retained until the next Full Merge Migration (not deleted by a DASD management system).

3. "Migration End set" can be used when the amount of unexpired migrated data in the current full migration backup has become so large that merge processing time or the number of tapes required has become too large. The Full Merge Migration backup it creates will be the last one in this "set" of migration backups; subsequent migrations will contain only the files migrated after this point. But this means that this migration end set must be retained until all of the migrated files on it reach their individual expirations; see the notes on backup retention below. Migration End set will probably not be required unless:

- a large amount of data has been migrated under this profile with a long retention.
- the maximum file retention used under this profile exceeds 1 year.
- you do manual migration (not based on date of last usage) of a set of files and need to keep them for an extended period (longer than the usual migration retention).

4. Since these migration backups are the only copies of the migrated data sets, Innovation strongly recommends that you create backup copies using the USTVAULT utility (See the FDR/UPSTREAM MVS manual).

11.5.3. File Retention vs. Backup Retention

As mentioned earlier, migrated files are given a retention period as part of the file spec used to select them. This retention used to calculate an expiration date associated with each migrated file. When a Full Merge Migration is done, previously migrated files are always copied forward to the new full backup unless they are past their expiration date, so expired files are automatically discarded. If you do not use the Migration End Set option, this means that the latest full migration will contain all unexpired files that have ever been migrated under this profile (we recommend that you retain several previous full migration backups for safety). You can view the expiration dates by checking the **Display expiration dates** checkbox in the Restore parameters dialog from List and Restore.

However, if you do use the Migration End Set option (see Note 3 above), the migrated datasets on the backup created by that option are **not** copied forward to subsequent migration backups. You must insure that this end set backup is retained until every migrated file on it has reached its individual expiration date.

The easiest way to do this is to use the configuration option to include an exclamation mark (!) in the backup dataset prefix in the profile (see DSN Prefix in the description for Profile Configuration); "Migration End set" will replace that with an "E", while it is replaced with a "F" for Full Merge Migration or "N" for Simple Migration. This allows you to create one GDG for the normal Full Merge Migrations (keeping 3 or more generations) and a separate GDG for the Migration End Set backups, allowing them to be kept much longer. Depending on how often you intend to do a Migration End set, you must define this GDG with sufficient generations so that the backups are retained until the migrated files with the highest retentions reach their expiration dates. For example, if you do Migration End set once a quarter, and the highest retention is 365 days (1 year), the end set GDG should have at least 5 generations (5 quarters).

If you are doing migrations as part of MERGE BACKUPs, note that if you do a “First Time Full” backup, this will not copy any previously migrated files from previous full backups, so the previous full merge backup will need to be retained until all of the migrated files expire. There is no convenient mechanism for automating this, so you may need to manually change the retention of that previous full backup in your tape management system. This is one reason why separate migration is now the recommendation.

11.5.4. Last Access Date

Some file systems store and maintain much more information than is stored in the DOS FAT file system. Novell, OS/2 HPFS, UNIX file systems and NTFS will maintain a Last Access Date which is the last date that the given file was opened for any reason.

FDR/UPSTREAM can optionally respect this date on backups. When performing a backup of a file system which supports Last Access Date, FDR/UPSTREAM can save the directory information before opening the file and replace it after closing the file. As you would expect, this is essential for Migration.

WARNING: If you are using Last Access Date for Migration, you must have all backup products reset it. For FDR/UPSTREAM backups, see the <Spec Detail>, <More...> dialog.

11.5.5. Migration as Part of Backups

In releases of FDR/UPSTREAM prior to V2.5.4, file migration was done as part of regular backups (either MERGE BACKUPs or non-merge backups). This can still be done, but the separate migration described above is now the recommended way of doing this. In this mode, migration file specs are included with the backup file specs and the migrated files are included in the backups. For MERGE BACKUPs, the migrated files are copied forward to each successive full backup until they reach their expiration date.

For example, if you are regularly performing merge backups on the F: drive (F:*.*) and wish to migrate files in the F:\USERS directory which have not been accessed in more than 180 days create the following file specs when you are running a full merge.

```
Spec #1: F:\*.*
            Include these files:    Pressed
            Reset Archive Bit:      Checked
            Incremental:            Not checked
            Date Limit:             Not checked
            Accessed before:        Not checked
            Backup Subdirectories:  Checked
            Hidden Files:           Checked

Spec #2: F:\USERS\*.*
            Migrate:                Pressed
            Accessed before:        Checked
            Days old:               180
            Including Subdirs:      Checked
            Retention Period        90
```

When this backup is run, all the files on the F: drive will be backed up and the files in the F:\USERS directory which are older than 180 days will be deleted. These files will be stored on the host and merged forward onto subsequent full backups until the retention period (180 days) has expired.

11.5.6. Migration Inquiries and Restores

Version inquiries will display all backup file specs including Migration file specs as a check box in the version inquiry file spec dialog.

To see migrated files in file inquiries, you need to press the **Display Migrated Files** check box in the Restore Parameters dialog. When a File Inquiry is performed for a migrated file there will be the text [MIGRATED] in the column used to indicate file size.

Next to the Display Migrated Files checkbox are two checkboxes:

- ☐ **Only**. If checked, then only migrated files are displayed; standard (non-migrated) files are not displayed. This can be useful in determining specific migrated files to restore.

- ☐ **Display Expiration Dates:** (List and Restore only) If checked, the file list includes the expiration date for migrated files. Note that this is the last date that files will be merged forward - they will remain on the host until the disk or tape file expires.

There are two ways to restore migrated files:

- Specifically add or update a migrated file in the Inquire Files list box (using the mouse or keyboard)
- Specify wildcards in the Specification field and check the Restore migrated files checkbox in the <More...> dialog.

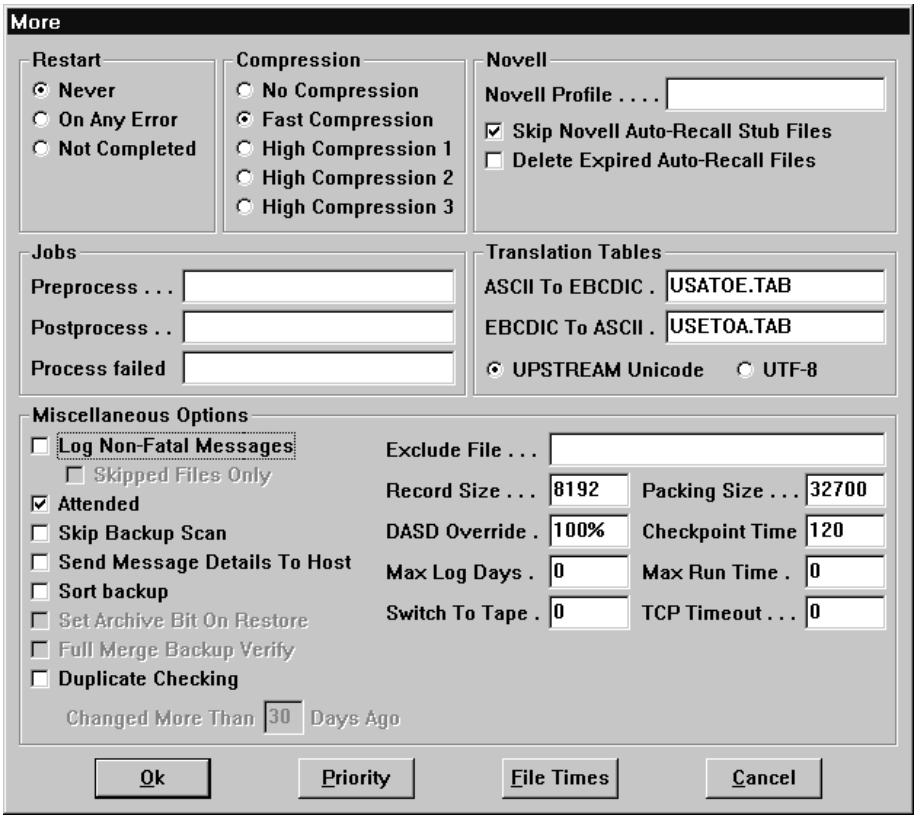
NOTE: Files which have been migrated, restored and then backed up again will no longer be marked as Migrated and will no longer be carried forward by the host automatically.

11.6. More Backup/Restore Parameters

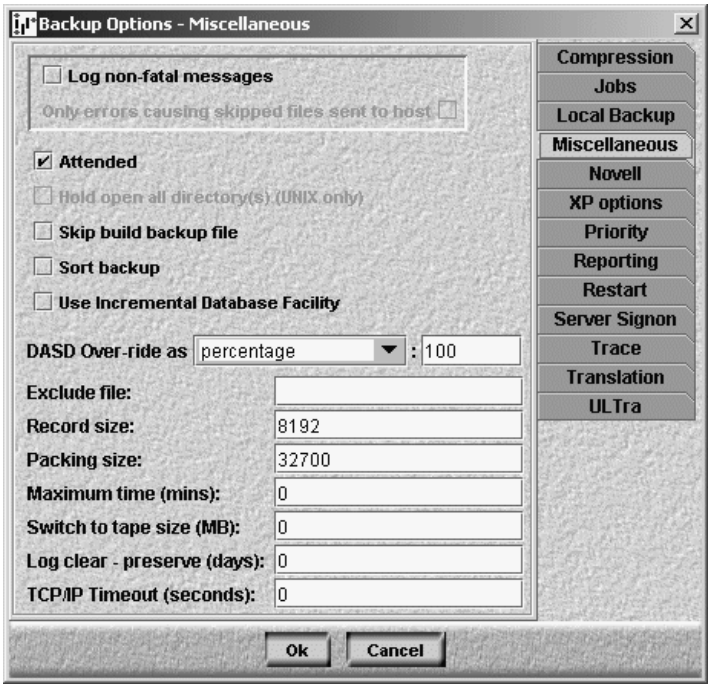
You can specify several significant parameters for either backups or restores by pressing the <More...>, <Reporting...>, <Local Bkp...> or <ULTra...> buttons from the backup or restore dialogs. Note that several of these fields may be grayed either because server support is not loaded or these functions are not appropriate to your context (for example, backup only parameters will be grayed when you are in a restore dialog). The <ULTra...> button is discussed in the ULTra chapter, the other buttons are discussed below.

11.6.1. More... Dialog

Below is the <More...> dialog:



These parameters can be changed in the FDR/UPSTREAM Director by pressing the **Options** button in the *Backup Specifications* or *Restore Options* windows. In the Director, the fields are broken up into multiple small screens, each of which is accessed via tabs:



The Restart Backup/Restore frame lists radio buttons which allow you to select the situations in which a failed backup or restore will be restarted.

- **Never:** If you press this radio button, and a backups or restores failed for any reason, it will not be restarted.

- **On any error:** If you press this radio button, and a backups fails for any reason or a file is skipped for any reason the backup will restart at the point of failure (if the backup did not complete) and/or skipped files will be retried. This field is grayed for restores.

- **Not completed:** If you press this radio button, and a backup or restore does not complete, the backup or restore will restart at the point of failure. Failed files during a backup will also be retried. If the backup or restore runs to completion (regardless of whether files were skipped), then it will not be restarted.

The compression radio buttons allow you to specify the type of compression used during the backup. These fields are grayed for restores. Each level or compression has advantages and disadvantages. The default is fast compression.

- **No Compression**: If you press this radio button, then the data will not be compressed. Select no compression for the highest performance in local Token-Ring environments with medium to slow PCs where reducing data storage is less important than throughput.

- **Fast Compression:** If you press this radio button, then a high performance compression method will be used. This method if not particularly effective with many types of files in reducing the amount of data transferred. Select this option for high performance in most high speed communications environments.

- **High Compression:** If you press one of the high compression buttons, then the maximum compression will be used. These methods are very effective on all types of files. However, they significantly impact the performance of the backup and require additional memory. High compression is recommended in low speed environments (56K bps or less), in high speed environments where MVS storage is at a premium and for small backups. The three levels of high compression run at about the same speed, but take increasing amounts of memory and are slightly more ef-

fective (1-3% per level).

The additional memory requirements are:

- High Compression 1: 26K
- High Compression 2: 46K
- High Compression 3: 91K

Note If you choose to use high compression, in most cases you should use high compression 3.

The Novell options are:

☐ ***(non-UNIX only)*** **Novell Profile:** (Novell Unattended Login) The Novell Profile references a profile name created using the SETNOV (Novell icon) program. This field is grayed unless you have Novell drivers loaded and active. Novell NetWare users who wish to automate their attachment to a particular server with a given user name and drive mappings should enter the predefined profile name value in this field. All other users should leave this field blank. See the Novell chapter for more information. The default is blank.

☐ **Skip Novell Auto-Recall Stub Files:** You must check this box if you are running FDR/UPSTREAM on a client (Windows or OS/2 machine) and have used the Novell Auto-Recall facility to avoid spurious recalls. If you are using the NLM version of FDR/UPSTREAM with SMS you may choose to not check this box and have the stub files backed up. The default is checked.

WARNING: You must check the Novell Auto-Recall Profile box if you are using Novell Auto-Recall on a Windows or OS/2 client to prevent all files from being recalled during backups.

☐ **Delete expired auto-recall files:** If checked, FDR/UPSTREAM will check all stubs left by FDR/UPSTREAM Auto-Recall during standard backups to determine if they have expired. If they have expired, the stubs will be deleted. The default is not checked.

☐ (Director only) **Target Service Agent:** For Novell SMS backups, the name of the target service agent. For example: SERVER.NetWare File System. If you leave it blank, UPSTREAM will use the standard file system TSA for the server.

☐ (Director only) **Target Service Name:** The target service name, within the target service agent. Typically only used when you have multiple target services on a Novell cluster. Use the Director Browse feature to determine the available target service names.

The jobs frame allows you to specify jobs to be run before, after and in the event of failure of an FDR/UPSTREAM process.

☐ **Preprocess:** This is the name of a program, batch file or script file which will be run immediately before the FDR/UPSTREAM function. While only displayed for backups and restores, this field is active for all other unattended FDR/UPSTREAM functions (file transfers, host reporting, etc.). If the preprocess job fails (can't be run or returns a non-zero return code), the FDR/UPSTREAM function will not be performed. If the pre or post process job

fails, and you are running CONV=WAIT host jobs, the entire function will return a non-zero return code on the host.

- ☐ **Postprocess:** This is the name of a program, batch file or script file which will be run immediately after the FDR/UPSTREAM function. While only displayed for backups and restores, this field is active for all other unattended FDR/UPSTREAM functions (file transfers, host reporting, etc.). If the postprocess job fails, and you are running CONV=WAIT host jobs, the entire function will return a non-zero return code.

- ☐ **Process Failed:** This is the name of a program, batch file or script file which will be run immediately after the FDR/UPSTREAM function if it fails. While only displayed for backups and restores, this field is active for all other unattended FDR/UPSTREAM functions (file transfers, host reporting, etc.).

  Process Failed jobs can be extremely useful in that they can run jobs which will notify support personnel in the event of a backup or other FDR/UPSTREAM job failure. For example, you can create a Process Failed job to run the Novell SEND command to notify users that a Novell server backup failed. Note though that if FDR/UPSTREAM or the operating system crashes, there will be no notification.

The Translation frame contains the file names for user loadable ASCII to EBCDIC translation tables. Note that you may want to use one of the supplied samples tables if you have files with characters outside the simple English alpha-numeric character set. See the *User Defined Translation Tables* section of the *Advanced FDR/UPSTREAM* chapter for more information.

- ☐ **ASCII to EBCDIC:** Enter the file name of the ASCII to EBCDIC translation table if you wish to load your own.

- ☐ **EBCDIC to ASCII:** Enter the file name of the EBCDIC to ASCII translation table if you wish to load your own.

- ☐ **UPSTREAM Unicode:** (Windows NT/2000) By default FDR/UPSTREAM will use it's own Unicode encoding for all characters outside the 8-bit ASCII range. See the *Windows NT/2000 Considerations* chapter for more information.

- ☐ **UTF-8:** (Windows NT/2000) A more efficient way to store characters outside the 8-bit ASCII range, but requiring one-to-one translation tables. See the *Windows NT/2000 Considerations* chapter for more information.

The checkboxes are:

- ☐ **Log Non-Fatal Messages:** If you check this box, FDR/UPSTREAM messages that do not terminate a backup will be displayed and written to the log. These messages include detail on why a file was skipped, failure to obtain non-file data and the like. It is recommended that this button be checked during testing and the initial phases of production and be unchecked when the log or reports are regularly checked for backup or restore completeness. The default is unchecked.

> **NOTE: Significant warning messages may be missed in backups if the Log Non-Fatal Messages button is not checked.**

- ☐ **Skipped files only:** If Log Non-Fatal Messages above is checked you can reduce the amount of logging by checking this checkbox. Thus only those messages which result in skipped files will be logged; messages which do not result in a file being skipped (inability to access non-file data, resetting the archive bit, etc.), will not be logged. The default is not checked.

- ☐ **Attended:** If you check Attended it is assumed that this is an attended backup or restore. Do not check this box if you are building a parameter file for unattended backups or restores. The default is checked.

NOTE: Unchecking the Attended button and saving it as the default parameter file will cause FDR/UPSTREAM to automatically perform a backup or restore when it is started. Do not save an unattended parameter file to UPSTREAM.DAT

- **Skip Backup Scan**: When FDR/UPSTREAM begins a backup, it usually pre-scans the data to be backed up before it actually begins the backup. This provides an estimate on the amount of data that will be backed up and minimizes the amount of time that the tape is mounted. You can disable the pre-backup scan of the data so that FDR/UPSTREAM will begin sending data almost immediately. In some cases, particularly when you are performing a merge full backup of a large number of small files, this can result in some performance advantage. SMS backups which contain a large number of small files may show a particular benefit. However, the disadvantages are many. For example, without an estimate of the backup size, host disk datasets including FDR/UPSTREAM/SOS pseudo-datasets can't be properly preestimated. If you check this option, you must also specify a DASDOVERRIDE to avoid backup failures. Even if you check this box, FDR/UPSTREAM still creates a backup file as it needs it for restart, merge backups and file deletions. So you will still need to reserve adequate space for it in the workpath. The default is not checked.

- **Send message details to host:** If you check this box, FDR/UPSTREAM will send all message lines (except for the additional text for each message) to the host whenever it reports an error; otherwise FDR/UPSTREAM only sends the first line of the message. The default is not checked.

- **Sort backup:** Will be used for a future feature in the FDR/UPSTREAM host. Not recommended at this time as it slows down the backups slightly and consumes memory. The default is not checked.

- **Host Sort:** Check this box if you wish the host sort utility utilized on restores. There is a certain amount of overhead in using the sort, so the default is not checked though you may want to enable it if there are problems in using the standard method. This field is grayed for backups.

- **Set archive bit on restore:** If checked, the archive bits will be set for files when they are restored. The default is not checked.

- **Full Merge Backup Verify:** Only enabled for full-merge backups. If checked, FDR/UPSTREAM will read, and compress the data, but not send it to the host. A checksum of the data will be compared against a checksum on the host and if a mismatch occurs, the file will be transmitted. As it degrades performance, it is only recommended with slow lines when you wish to verify non-file data. A message warning you about the performance penalty of checking it is displayed if you check this option.

- **Duplicate Checking:** If you check this box then placeholder records are send instead of the actual file data for files with last modification dates greater than the value specified. See the Duplicate Files chapter for more information. The default is not checked.

The remaining fields are:

- **Exclude File:** Enter an exclude list file, formatted as described later in this chapter.

- **Record Size:** The record size determines how the file is blocked during the transfer to the mainframe and is usually considered a tuning parameter. This field is grayed unless you are defining backup parameters. Smaller records require less memory but can be slower in transfer speed. Larger records require more memory and may be inefficient in remote storage utilization. We recommend that you use the default value of 8192.

- **Packing Size:** This is the host communications record packing (blocking) size. The actual records transmitted to the host over communications are an even multiple of the record size, less than or equal to the specified packing size.

0 disables record packing. Records are stored on the host using the record size; this is a communications tuning parameter. For example, a 6000 byte record size and a record packing size of 32700 will result in communications of 30000 byte records (excluding the affects of compression). For some environments, you may actually be able to increase performance by decreasing this value (or disabling record packing entirely). The default is 32700.

- ☐ **DASD Override:** See the *Sequential Disk Size* section of the *Advanced FDR/UPSTREAM* chapter for a complete description.

- ☐ **Checkpoint time:** For restores, this is an interval (in seconds), when a checkpoint is taken. If the restore is restarted, it restarts on checkpoints. The checkpoint interval is also used for physical disk backups as the restart point.

- ☐ **Max log days:** If non-zero, the FDR/UPSTREAM log file will be automatically cleared after a backup completes. Specify the number of days worth of log information to preserve (similar to the uslogclr program). The default is 0.

- ☐ **Max run time:** This allows you to have a backup, migration or restore automatically terminated if it runs for more than the specified number of minutes. The default is 0 which indicates an unlimited amount of time.

- ☐ **Switch to tape (in MB):** Allows you to specify that a backup run to disk and have it automatically switch to tape instead if the estimate is larger than the specified size (in megabytes). Be aware that FDR/UPSTREAM will use the tape data set name rather than the disk data set name specified in the profile which may cause GDG issues.

- ☐ **TCP Timeout**: The number of seconds of inactivity before a send or receive times out. 0, which is the default, disables the timeout. A non-zero TCPTIMEOUT may cause performance degradation unless you have specified a TCP/IP Send and Receive buffer size (in the FDR/UPSTREAM Advanced Configurator) of at least 65535. Certain FDR/UPSTREAM functions, such as registration will timeout automatically regardless of the TCPTIMEOUT value.

The following section describes the exclude list option mentioned above. Section 11.6.3., 12.6.3., 12.6.3. describes reporting options. Section 11.6.4., 12.6.4., 12.6.4. describes the local backup facility.

11.6.2. Exclude List

UPSTREAM supports an exclude list file which can allow you to specify any number of files to be excluded from a backup or restore.

The exclude list is a text file, each line indicating the file(s) to be excluded:

```
"<File name>" <subdirectory flag> <comments>
```

Where:

- "<File name>": The fully qualified file name, surrounded by quotes, of file(s) you wish to exclude from the backup or restore. You may use wildcards in the file name. Non-UNIX systems may use the generic '#' drive letter indicating any drive.

  If you wish to exclude all files in a directory and all files in all directories beneath that you can specify a file name of the directory name itself, without wildcards and without a trailing slash.

  For exclude specifications, wildcards can now be included in the middle of paths. For example, if you wish to exclude all the Novell printer queue entries on the SYS: volume of all servers, specify the exclude list entry below.

  ```
  "!:\*\SYS\QUEUES\*.QDR\*.*" Y
  ```

Wildcards are operating system specific; use “*.*” to indicate all files for PC operating systems and “*” for UNIX operating systems. Use “?” to indicate single characters or to exclude a given number of characters. For example, “???” would exclude entries with 3 characters.

- <subdirectory flag>: Y indicates that all files in subdirectories beneath the one selected will be excluded. N indicates to only exclude these files in the specified subdirectory.
- <comments>: Any text, to the end of the line, that will help you remember the entry.

You specify the exclude list file name in the <More...> backup or restore dialog. You can also specify it from the command line, environment or the host with the FDR/UPSTREAM parameter EXCLUDELISTNAME.

Note that exclude definitions can slow down the process of building the backup file or the restore, in some cases significantly. You should experiment with adding entries and determining the performance impact before actually implementing a long exclude list in your environment.

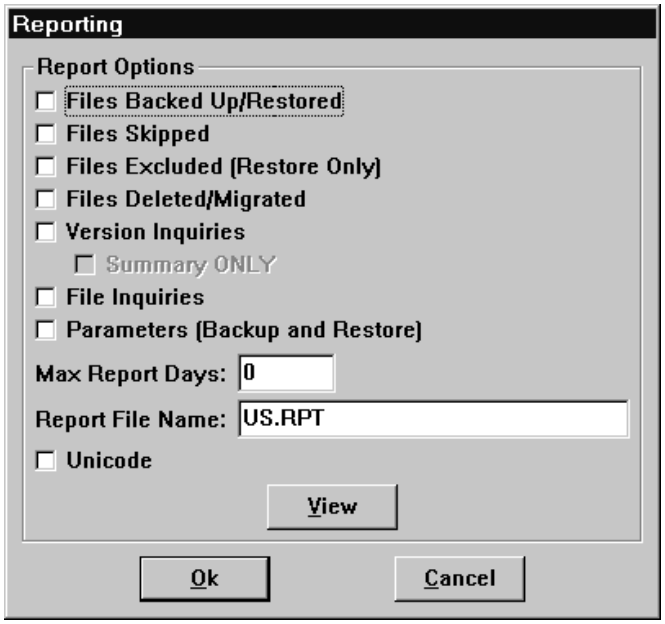
If you do not specify a drive or directory for a file, the ‘#’ (universal) drive and subdirectories flag will be assumed.

(Non-UNIX) A sample EXCLUDE.LST file is provided (see below) which will work with most environments. We recommend deleting lines inappropriate to your environment.

```
"#:\BACKOUT.TTS"  Y   NetWare     Transaction Tracking File
"#:\EA DATA. SF"  Y   OS/2        Extended Attribute File
"#:\SWAPPER.DAT"  Y   OS/2        Virtual Storage Paging File
"#:\386SPART.PAR" Y   Windows 3.1 Virtual Storage Paging File
"#:\SPART.PAR"    Y   Windows 3.1 Virtual Storage Paging File
"#:\WIN386.SWP"   Y   Windows 95  Virtual Storage Paging File
"#:\PAGEFILE.SYS" Y   Windows NT  Virtual Storage Paging File
"#:\US1.TRC"      Y   UPSTREAM    Trace File
"#:\US2.TRC"      Y   UPSTREAM    Trace File
"#:\UPSTREAM.BKP" Y   UPSTREAM    Temporary Backup File
```

11.6.3. Reporting

When you press the <Reporting...> button from the backup or restore dialogs you will see the following dialog:



A similar dialog is available in the FDR/UPSTREAM Director when you press the **Options** button and the **Reporting** tab.

- **Files Backed Up/Restored:** If checked, file names included in a backup or restore will be written to the report file.

- **Files Skipped:** If checked, files skipped during the backup are written to the report file as well as written to the local and MVS logs. Note that skipped files are written to the local and MVS logs only if **Log non fatal messages** is checked.

- **Files Excluded (Restore Only):** If checked, files which were excluded during a restore will be reported. This is particularly useful for Windows 2000 where a wide number of files may be automatically excluded by FDR/UPSTREAM (based on Windows 2000 requirements). Excluded files are also written to the FDR/UPSTREAM log. You can suppress this logging with the environment variable **USDONTLOGEXCLUDEDFILES**.

- **Files Deleted/Migrated:** If checked, all files deleted during a backup (with file deletion or migration options) are written to the report file.

- **Version Inquiries:** If checked, the results of version inquiries (all version and file specs within the versions) are written to the report file. Check the **Summary ONLY** for a more compact description of each version.

- **File Inquiries:** If checked, the results of each file inquiry (in directory format) is written to the report file.

- **Parameters (backup and restore):** If checked, the specified parameters are written to the report file at the beginning of a backup or restore.

- **Max Report Days**: The FDR/UPSTREAM report files will grow infinitely unless you take steps to occasionally shrink it. This parameter allows you to shrink the report after a backup in the same way as the 'uslogclr' program. Enter the number of days worth of report entries to preserve. The default of 0 keeps FDR/UPSTREAM from shrinking the report.

- **Report File:** The file name where the report information will be written. We recommend that it be fully qualified. This is required for reporting.

- **Unicode:** Check this box if you wish all entries in the report be written in Unicode rather than single byte. Use this in multi-byte environments (Japan, China, etc.), where you wish the report to contain file names in their original unicode form. If you check this option, the View button will use Notepad for the display rather than the FDR/UPSTREAM file viewer.

- **View:** Press this button to view the report file specified.

  The report file is simply a text file on the PC which contains the date and time of each event followed by the specific information for that event. Report files can be displayed with the viewing facility, your favorite text editor, printed, and, like UPSTREAM.LOG, maintained by USLOGCLR (see the *Errors* chapter).

  A simple backup report entry might look like:

```
Tue Apr 12 16:05:10 1994
   Backup starting
   Backed up: c:\AUTOEXEC.BAT
   SKIPPED: c:\GO.BAT
   Backed up: c:\CONFIG.SYS
```

  A simple inquire files entry might look like:

```
Mon Apr 11 15:21:27 1994
   Inquire files starting:
   Inquire files: g:\test\*.*
                          <DIR>        ..
      01/18/94 17:06:28          3 US.RET
      02/17/93 16:19:15        512 BACK$LOG.000
```

  Report options are written to parameter files. Thus, if you wish you can change reporting options with each backup or restore, or control them from the host.

11.6.4. Local Backups

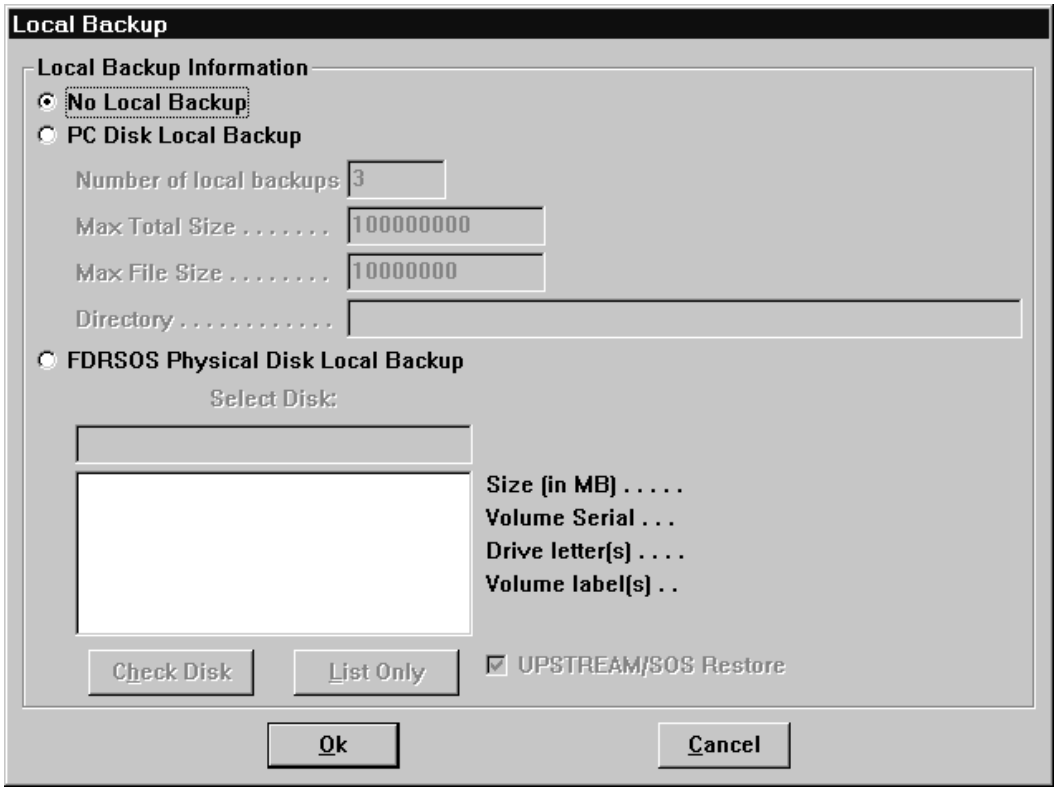
Local backups are yet another way to improve restore performance. In a local backup, the files are stored on the workstation/server, in compressed format, in a directory of your choosing, with certain restrictions you can specify as well as being transmitted to the host.

If you have FDRSOS and an EMC disk which can be shared between the workstation/server and the host, the local backup can be written to a shared disk thus eliminating the need for transmission, dramatically improving backup and restore performance and reducing network overhead.

Inquires and restores appear as if the data is stored only on the host, but if enabled, the data is recovered from the local workstation's repository rather than being transmitted from the host. This results in much faster restore performance, particularly in low-speed communications environments. Management tasks such as merges, profile management, etc. are local backup aware.

Note that if the local workstation's backup information is lost, the files will automatically be transmitted by the host. Furthermore, if you perform a restore where some files are locally stored and some are stored only on the host, FDR/UPSTREAM will recognize this and use local storage whenever possible, and transmit the remainder from the host.

When you press the **<Local Bkp...>**button you will see the Local Backup dialog:



In the FDR/UPSTREAM Director you can see a similar dialog when you press the **Options** button and the **Local Backup** tab.

- **No Local Backup:** Press this radio button if you do not wish to use the local backup facility.

- **PC Disk Local Backup:** Press this radio button if you wish to enable local backups to PC disk files to improve restore performance. If you press this radio button you must enter the fields below.
  - **Number of local backups:** Enter a number from 1 to 255 indicating the number of local backup files that will be maintained on the local machine (each backup creates one file). When the number of local backups exceeds this number the oldest is deleted.
  - **Max. total size:** The maximum that a local backup file can be. When this maximum is exceeded, no more is written. The default is 100000000 bytes.
  - **Max. file size:** The maximum number of bytes of a single file that can be stored in the local backup. If a given file is larger, it is not written. The default is 10000000 bytes.
  - **Directory:** The directory where the local backup files will be stored. The default is the WORKPATH directory. If you change the directory and leave this field, and there are local backup files in the original directory, you will be asked if you wish to move your current local backups to that directory. If you answer Yes, then the files are moved. If you answer No, you will be asked if you wish to delete the local backup files in the original directory.

- **FDRSOS Physical Disk Local Backup:** Press this radio button to enable local backup to FDRSOS initialized physical disk volumes. See the *FDR/UPSTREAM/SOS* chapter for a complete description.

  Disk local backup files are stored in the specified directory with the name:

  ```
  <Backup Profile>.<number>
  ```

Where <number> is from 1..255. The number 0 is reserved as a control file. For example, backups using the backup profile SERVER1 will have backup files named SERVER1.000, SERVER1.001, etc.

The host is notified of all local backups stored on the workstation whenever a merge backup, a restore or profile management is performed. Thus, it is very important that if local backups are enabled, that the local backup directory be correct. If you move files to a new directory, all parameter files (workstation/server or host stored) must be modified to show the new directory.

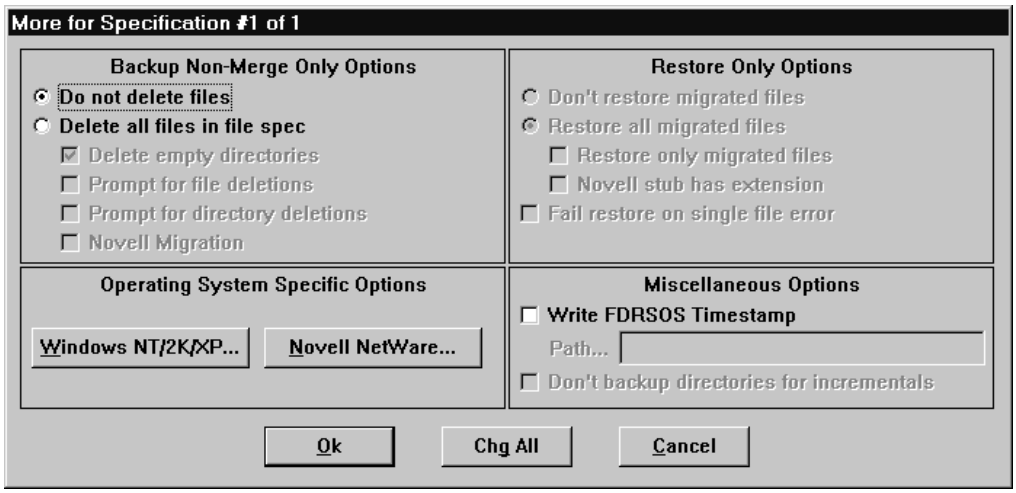
There is a column in the Profile Management and Restore Parameters dialogs: **Lcl**. This column displays the local backup file number if the local backup is currently known to the host (the host must know about local backups for them to be utilized for restores). If you delete a backup in Profile Management the local backup file is also deleted. See the Management chapter for a more detailed description of Profile Management.

Local backup support can be Personalized so that only authorized users can use it. See the Advanced Configuration chapter for a detailed description of this facility.

11.7. More Specification Parameters

There are additional parameters that can be specified with each backup and restore file specification. These parameters relate to metadata (file system specific features such as security) and rarely used parameters. If you wish additional information about the file system parameters see the appendix associated with your server vendor.

You can access these options by pressing the **<More...>** button in the backup file specification dialog, or the restore file inquiry dialog.



Some fields will be grayed and unavailable in the dialog depending upon whether you are performing a backup or restore. Also, the screen will be somewhat different depending on your operating system (UNIX is substantially different).

In the FDR/UPSTREAM Director, you can set these options for backup in the right hand frame of the *Backup Specifications* window. For restore, you set these options in the *Restore Objects* window by checking the **Individual file options** checkbox.

The **Operating System Specific Options** buttons display a dialog specific to that Operating System:

- **Windows NT/2K/XP...** Lets you specify Windows NT/2000/2003/XP specific file system options including the registry, ACLs, permissions, mount points, etc. See the *Windows NT/2000/2003/XP Considerations* chapter for more information.
- **Novell NetWare...** Lets you specify Novell specific options such as file and directory information, trustees, etc. You must have the Novell Requester from Novell loaded on your machine. See the *Novell Considerations* chapter for more information.

The Backup Non-Merge Only Options frame consists primarily of parameters which are used in specifying automatic deletions. You would only use these options if you are performing migration and do not wish to use the automatic migration facilities described earlier in this chapter because you are not using merge backups or wish to store these files in a different backup profile. It is strongly recommended that you use the merge backup migration facility rather than these features.

- ☐ **Do not delete files:** If this radio button is pressed, when the backup has completed, files are not automatically deleted. This radio button is pressed by default.

- ☐ **Delete all files in file spec:** If this radio button is pressed, all the files in the backup will be automatically deleted (subject to prompting specifications below). The default is not pressed. When this box is checked the following options are enabled.

The following checkboxes are enabled only with the Delete all files in file spec button pressed.

- ☐ **Delete empty dirs:** If you check this box, directories which are emptied through automatic deletions are removed automatically. The default is checked.

- ☐ **Prompt for file deletions:** If you check this box, you are prompted with a message box asking if you wish to delete each and every file. These messages boxes do not time out and there can be a large number of them so check this box with care. The default is not checked.

- ☐ **Prompt for directory deletions:** If you check this box, you are prompted with a message box requesting if you wish to delete the files in the displayed directory. Note that this is also a message box which does not time out. The default is checked.

- ☐ **Novell Migration:** See the *Novell Server Considerations* chapter for details on using Novell auto-recall.

  In a backup in which deletions are specified, you are given a chance to abort the deletion process when the backup has completed and before the deletions begin, regardless of whether you have prompting enabled or not. A dialog is displayed with message 2080D which does time out.

  If you press the <Ok> button before the time-out, the deletion process will be skipped. The time-out can be configured separately from the Messages Time Out by specifying the environment variable Environment Variable USDELETETIME. The default is 10 seconds.

The UNIX non-file data options displayed on this dialog include:

- ☐ **Reset Last Access Date:** Check this box if you wish a file's last access date to be reset to its original value after it has been backed up. This is usually required when using migration or planning to use migration. The default is checked.

- ☐ **Backup files opened for Update:** Check this box if you wish to perform a "dirty" backup - one which the files are not guaranteed to have internal integrity due to application/system buffering. This option is only valid for AIX; all other UNIX systems only support dirty backups. The default is not checked.

The Restore Only Options frame consists of parameters enabled only when specifying restores:

- ☐ **Don't restore migrated files:** Check this box if you wish migrated files to be excluded from the restore. Non-migrated files are always included if selected. This is the default.

- ☐ **Restore all migrated files:** Check this box if you wish migrated files included in the restore. Migrated files are automatically included if you select them individually from the Inquire Files list. This check box is only valid if this file spec includes wildcards. You can press the **Only** checkbox if you wish to not restore standard files (only migrated files).

- ☐ **Novell stub has extension:** See the Novell Server Considerations chapter for details on using Novell auto-recall.

- ☐ **(UNIX only) Write file sparse:** If you check this option, FDR/UPSTREAM will attempt to write files which contain long blocks of binary zeros using sparse techniques. When you check this option, you enable the sparse file buffer size options where you can set the minimum block size that is used for sparse file operations; the options are 1024, 2048, 4096 and 8192. The default option for this checkbox is not checked.

- ☐ **Fail Restores on Single File Error:** Useful for restores of one or very few files, check this option if you wish FDR/UPSTREAM to terminate as soon as the first file fails. The default is not checked.

- ☐ **(UNIX only) Use UID instead of name:** Check this box if you wish UPSTREAM to restore the owner user by number rather than name. This reduces portability across systems, but is slightly faster and may properly restore owners if there was no mapping for the user name at backup time.

- ☐ **(UNIX only) Use GID instead of name:** Check this box if you wish UPSTREAM to restore the group by number rather than name. This reduces portability across systems, but is slightly faster and may properly restore groups if there was no mapping for the group name at backup time.

- ☐ **(UNIX only) Change existing dir attribs:** Check this box if you wish UPSTREAM to overwrite the owner, group and attributes for existing directories which are included in a restore. The default is checked.

- ☐ **(UNIX only) Single file system restore:** Check this box if you wish UPSTREAM to only restore files from a given file system, regardless of the subdirectories flag. Files in other file systems will be skipped. The default is not checked.

The Miscellaneous Options frame consists of:

- ☐ **FDRSOS Timestamp:** See the **FDR/UPSTREAM/SOS** chapter for more information.

- ☐ **(UNIX only) Hard Links:** Whether hard linked files should be included in the backup or restore. The default is checked.

- ☐ **No dirs for incrs.:** If you check this box, FDR/UPSTREAM will not send directory entries to the host for incremental backups. This may cause important security information not to be backed up until the full, but will result in significantly smaller incremental backups.

11.8. UPSTREAM Notification

UPSTREAM now has the capability of sending Email and SNMP Trap notifications. By configuring your backups and restores to send notifications of specific events, you can add another valuable management tool to your data management tasks.

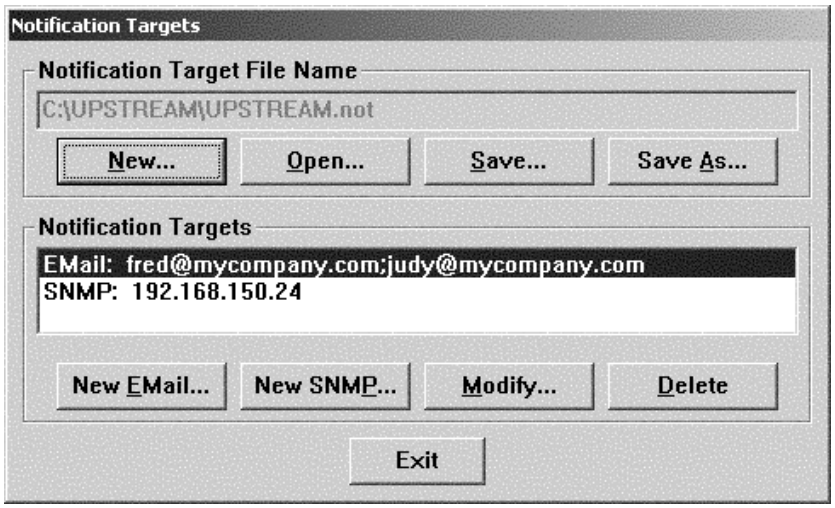
11.8.1. Notification Target Files

Notification is accomplished by defining the notification type (Email or SNMP) and the destination users in a notification target file. When you specify the action (backup, restore, etc.), you then specify the notification target file name along with the status (success or failure) and attachments (log or report).

A notification target file is a simple text file with a default extension of .not that contains the specifications of one or more EMAIL and/or SNMP targets. A notification target file can be specified for any action that UPSTREAM can perform so that notifications for events associated with that action may be sent to the targets defined in the notification target file.

A set of dialogs in the FDR/UPSTREAM US.EXE (**FDR/UPSTREAM Local** in Windows) and **us** (UNIX) is used to create, modify or delete notification target files.

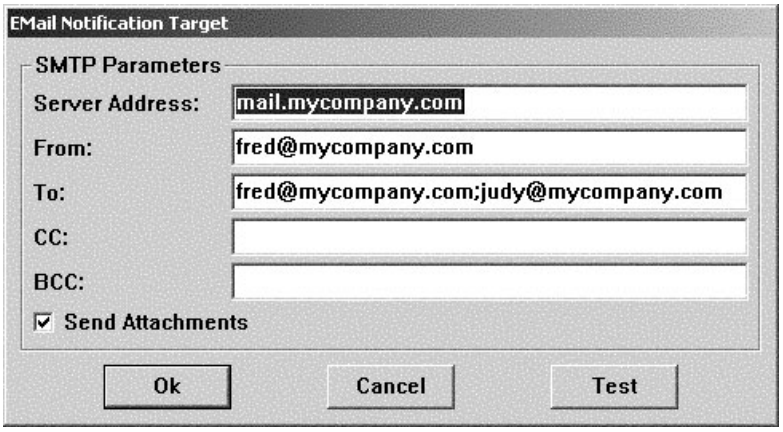
To enter the notification target facility, pull down the **Remote** menu and select **Notification Targets**:



The upper frame (Notification Target File Name) displays the name of the currently active notification target file name along with a number of buttons relating to the file. The New button is used to create a new notification target file and the **Open** button is used to open an already existing notification target file. The **Save** button is used to save the notification target information to the file specified in the Notification Target File Name field. And the **Save As** button is used to save the notification target information to a different notification target file.

To create a new EMAIL notification target click the **New EMAIL** button. To create a new SNMP notification target click the **New SNMP** button. To modify the currently selected notification target, either double-click the entry or click the **Modify** button. To delete the currently selected notification target, click the **Delete** button.

When the **New EMAIL** button is clicked or the **Modify** button is clicked for an EMAIL notification target, the EMAIL Notification Target dialog is displayed:

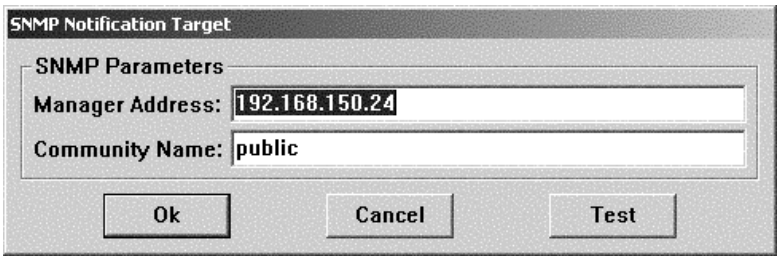


The fields on this dialog are:

- **Server Address:** The IP address or DNS name of a SMTP (Email) server that the EMAIL is to be sent through.
- **From:** An EMAIL address that is authorized to send Emails.
- **To:** One or more EMAIL addresses separated by semicolons (;) that will receive the EMAIL notifications.
- **CC:** Zero or more EMAIL addresses separated by semicolons (;) that will receive a Carbon Copy of the EMAIL notifications.
- **BCC:** Zero or more EMAIL addresses separated by semicolons (;) that will receive a Blind Carbon Copy of the EMAIL notifications.
- **Send Attachments:** Check this check box to have attached files sent to these recipients. If this check box is not checked attachments will not be sent with the EMAIL notifications.

You can click the **Test** button to get a fast confirmation that the information that you specified is correct. When clicked, the **Test** button causes a test EMAIL to be sent to the specified recipients.

For SNMP notification (not Email) , when the **New SNMP** button is clicked or the **Modify** button is clicked for an SNMP notification target, the SNMP Notification Target dialog is displayed:



- Manager Address: The IP address or DNS name of a SNMP manager that the SNMP trap is sent to.

- **Community Name:** The name of the SNMP community that is required by the SNMP manager.

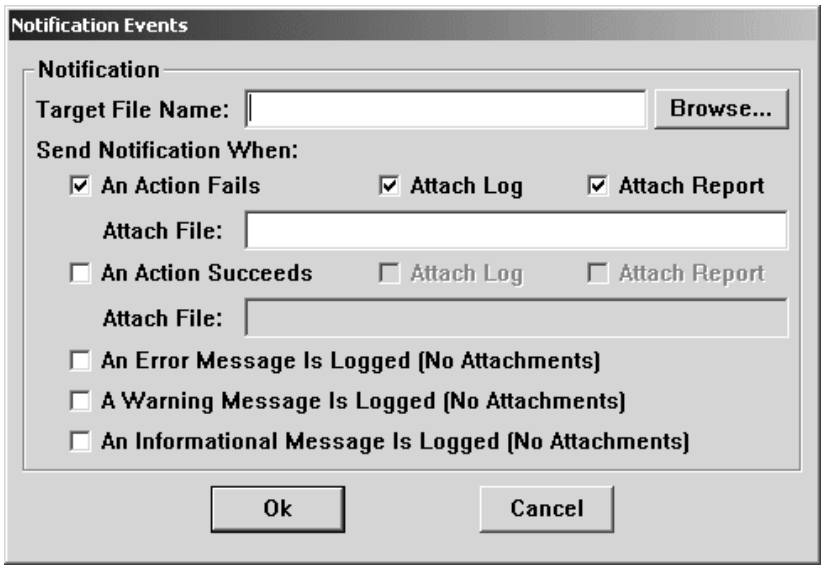
  You can click the **Test** button to get a fast confirmation that the information that you specified is correct. When clicked, the Test button causes a test SNMP Trap to be sent to the specified SNMP manager.

11.8.2. Notification Events

Once a notification target file has been created with one or more notification targets, it can be specified for any action that UPSTREAM can perform. The name of the notification target file to use is specified with the **NOTIFYTARGETS** parameter.

Before UPSTREAM can use a notification target file, the events for which notifications will be sent must be specified. The **NOTIFYEVENTS** parameter is used to specify which events will trigger notification messages to be sent to the various notification targets specified in the notification target file.

The **NOTIFYTARGETS** and **NOTIFYEVENTS** parameters are set from the **Notification Events** dialog:



The **Notification Events** dialog can be reached from a number of UPSTREAM dialogs such as the Backup Parameters and Restore Parameters dialogs along with others. Just find the Notify button and click it.

The fields on this dialog are:

- **Target File Name:** The name of a notification target file (created in the Notification Targets dialog). Press the Browse button to help you find an already configured notification target file.

The **Send Notification When** options include:

- **An Action Fails:** Check this check box to be notified of any failed action. This item is checked by default.

  If you check this option the following two checkboxes are enabled:

- **Attach Log:** If you check this box the relevant portion of the UPSTREAM log will be attached to the notification message for a failed action. Only EMAIL notification targets can receive attachments and only if they are configured to receive them.
- **Attach Report:** Check this check box to have the relevant portion of the UPSTREAM report attached to the notification message for a failed action. Only EMAIL notification targets can receive attachments and only if they are configured to receive them.

Along with the following edit field:

- **Attach File:** If you wish, any user defined text file can be transmitted as an attachment with this notification. Specify the fully qualified file name here.

☐ **An Action Succeeds:** Check this check box to be notified of any successful action. If you check this box, there are similar checkboxes for Attach Log and Attach Report along with Attach File as for the Action Fails option (above).

☐ **An Error Message:** Check this check box to have UPSTREAM error messages trigger a notification.

☐ **A Warning Message:** Check this check box to have UPSTREAM warning messages trigger a notification.

☐ **An Informational Message:** Check this check box to have UPSTREAM informational messages trigger a notification.

WARNING: Selecting notification for Error, Warning or Informational messages may result in an excessive number of notifications.

11.8.3. Remote Initiated Notification

When you specify a MVS or other remote initiated request, you can also request notification using the following two non-repeating UPSTREAM parameters. These parameters go with the other client non-repeating parameters such as ACTION.

Parameter Name	Default	Required	Description
NOTIFYEVENTS	769	No	If a NOTIFYTARGETS parameter is specified, the conditions in which a notification will occur. This is a bit map, where you add the notification values: 1 : Notify if the action failed 2 : Notify if the action succeeded 4 : Notify for any errors 8 : Notify for any warnings 16 : Notify for any informational messages 256: Attach the log if the action failed and value 1 is specified. 512: Attach the report if the action failed, value 1 is specified and reporting is enabled. 1024: Attach the log if the action succeeded and value 2 is specified. 2048: Attach the report if the action succeeded, value 2 is specified and reporting is enabled.

NOTIFYFAILUREATTACHMENT	None	No	The file name to send if a file should be attached on operation failure. You must also specify a NOTIFYTARGETS file.
NOTIFYSUCCESSATTACHMENT	None	No	The file name to send if a file should be attached on operation success. You must also specify a NOTIFYTARGETS file.
NOTIFYTARGETS	None	No	The name of the notification targets file name if you wish to enable notification.

For example, if you wish to backup a complete Windows system with the backup profile SERVER, and notify the users specified in the notification file upstream.not when the backup failed, your batch job might look like:

```
ACTION 1
BACKUPPROFILE SERVER
MERGE 1
NOTIFYTARGETS upstream.not
NOTIFYEVENTS 769
SPEC \\.
```

11.8.4. Email Messages

If you enable Email messages for successful or failed actions, UPSTREAM will generate Email text and attach the log and report if you request it. The following is a sample message from a failed backup:

```
Date: Mon, 02 Dec 2002 17:26:18 -0400
From: <user@company.com>
To: <user@company.com>
Subject: Backup failed
X-RCPT-TO: user@company.com

This message was automatically generated by the FDR/UPSTREAM Client application pro-
duced by Innovation Data Processing, Inc. Please do not reply to this message as your
reply will most likely be discarded.

The application issued message #2053:
2053D Backup failed

Additional information:
Error in receive started
Variable: BACKUPPROFILE = “PROFILE"
Variable: VERSIONDATE = “”
Variable: MACHINENAME = “MACHINE"
Variable: USERNAME = “user”
Attached file: C:\UPSTREAM\ACTION.1296.log

Content-type: text/plain; charset="iso-8859-1" name="ACTION.1296.log"
Content-disposition: attachment; filename="ACTION.1296.log"
```

If you enable notification messages for error, warning and informational messages, you will get a notification for each message logged (which may result in lots of notifications). For example, if you had enabled informational message notification, the message indicating a backup had started would result in the following notification:

```
Date: Mon, 02 Dec 2002 14:28:24 -0400
From: <user@company.com    >
To: <user@company.com>
Subject: FDR/UPSTREAM Informational Message
X-RCPT-TO: user@company.com

This message was automatically generated by the FDR/UPSTREAM Client application pro-
duced by Innovation Data Processing, Inc. Please do not reply to this message as your
reply will most likely be discarded.

The application issued message #2050:
Msg #PC2050I Backup started (First-time full)

Additional information:
Profile: PROFILE, UPSTREAM v3.2.0b (Win NT)
```

11.8.5. Notification File Contents

A notification file is a simple text file in the TITLE=VALUE format. You can have multiple groups of systems to notify within a single notification file, each group of systems begins with the keyword TARGETTYPE. Other keywords can be placed arbitrarily within a group.

Title	Type	Value
BCCADDRESSES	Email	A list of 0 or more semicolon separated blind, carbon-copy Email addresses. Optional, no default.
CCADDRESSES	Email	A list of 0 ore more semicolon separated carbon-copy Email addresses. Optional, no default.
COMMUNITYNAME	SNMP	The name of the SNMP community required by the SNMP manager. Required.
FROMADDRESS	Email	The Email source address. Required.
SENDATTACHMENTS	Email	Y or N to indicate whether attachments should be sent to this set of addresses. Optional, no default.
SNMPMANAGERADDRESS	SNMP	The IP address or DNS name of a SNMP manager that the SNMP trap is sent to. Required
SMTPSERVERADDRESS	Email	The IP address or DNS name of a SMTP (Email) server that the Email is to be sent through. Required
TARGETTYPE	-	0 for Email and 1 for SNMP. Required
TOADDRESS	Email	One or more EMAIL addresses separated by semicolons (;) that will receive the Email notifications. Required

The following is an example of a notification target file:

```
TARGETTYPE=0
SMTPSERVERADDRESS=mail.mycompany.com
FROMADDRESS=fred@mycompany.com
TOADDRESSES=fred@mycompany.com;judy@mycompany.com
CCADDRESSES=
BCCADDRESSES=
SENDATTACHMENTS=Y
TARGETTYPE=1
SNMPMANAGERADDRESS=192.168.150.24
COMMUNITYNAME=public
```

11.8.6. SNMP Considerations

If you plan on sending SNMP Trap notifications to one or more SNMP managers, referred to as Network Management Systems or NMSs, you will need to perform some SNMP configuration work before the NMS will be able to properly interpret the SNMP Trap notifications that UPSTREAM will send. In the \UPSTREAM\WIN32 directory of the FDR/UPSTREAM CD are two files: **idp.mib** and **usclient.mib**. These two files are MIB source files that need to be incorporated into the MIB database for your NMS system.

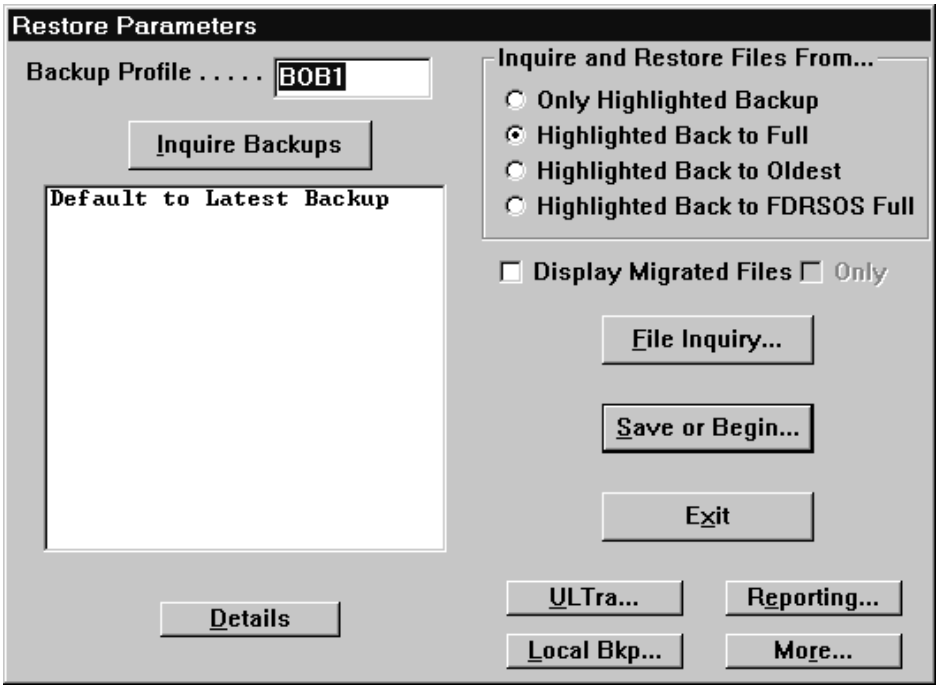
The process of incorporating idp.mib and usclient.mib into your NMS's MIB database is different for each NMS. If you plan on using Microsoft's SNMP implementation you can find a program named **mibcc.exe** in the Windows 2000 Resource Kit. This program is used to compile source MIB files into a **MIB.bin** file that is used by the SNMP Service. For other NMSs, the process of incorporating the two MIB files will have to be determined by reading the specific NMS documentation or contacting the NMS vendor.

11.9. Restore and Inquiry (old)

The old Restore and Inquiry facility has several advantages over the List and Restore facility and is thus still included in the product, including:

- Available when host connectivity is not functioning. The List and Restore facility requires host connectivity to be used. Thus if you wish to build parameter files or perform other off-line restore preparation functions, you can do this.
- Restore backups which were taken with an UPSTREAM plugin to be restored as files. This is of advantage for a number of database agents including SQL Server where the data is then recovered using SQL Servers file based restore facilities.
- Allows access to drives which are not included in the highlighted file spec.
- Easier to use when mouse support is not available (for the UNIX full-screen versions for example).
- Allows users familiar with older versions of FDR/UPSTREAM a familiar user interface.

When you pull down the Action menu and select Restore and Inquiry (old) you see the Restore Specification dialog.



The meanings of the first edit field is:

☐ **Backup Profile:** Specify the same Backup Profile that you specified for the backup. This field has a maximum of 8 characters and is required.

The push button under the edit fields is:

- ☐ **Inquire Backups:** This button performs an Inquire Versions. The PC establishes a conversation with the mainframe and receives the information for all backups for the Backup Profile. If you do not press this button, the information you will view and restore will be from the last backup stored for the profile.

- ☐ **Backups List:** This list box contains the formatted version dates once you have performed an inquire versions (with the <Inquire Backups> button). If you double click on an entry with the mouse, then details about that backup is available. The entry highlighted is used if you press the <Details> button.

- ☐ **Details:** This button allows you to examine the specific information for the backup version highlighted in the Backups list box above. You must press the <Inquire Backups> button to extract versions before viewing their detail.

The Inquire and Restore Files From... radio buttons allow you to select whether file inquiries and restores will use a single version or multiple versions (which may display multiple files). Note that these options are only used when working with Merge backups.

- ☐ **Only Highlighted Backup:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) File Inquiries will show only the files stored in that one backup.

- ☐ **Highlighted Back to Full:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) and all versions back to and including the full. If there are multiple copies of a file, all will be displayed. A restore will include the latest copy of each file (regardless of which backup it is on), or any specifically selected files. This is the default option.

- ☐ **Highlighted Back to Oldest:** File inquiries and restores will use the backup version which is currently highlighted, or the latest version (if you have not pressed the <Inquire Backups> button) and all versions back to the oldest version stored on the host for this profile. If there are multiple copies of a file, all will be displayed. A restore will include the latest version of each file (regardless of which backup it is on) from the selected backup back to the full, or any specifically selected files (which may be before the full backup).

- ☐ **Highlighted Back to FDRSOS Full**: If you have FDRSOS® and if selected, the workstation/server software will extract the modification date/time of the FDRSOS Timestamp file and the host software will transmit files in backups which were performed since that date. If selected, the workstation/server software will extract the modification date/time of the FDRSOS Timestamp file and the host software will transmit files in backups which were performed since that date. See the *FDRSOS/Physical Disk* chapter for more information.

The check boxes are:

- ☐ **Display Migrated Files:** Check this box if you are using Merge type backups and you have migrated files stored on the host. Checking this box does not necessarily include the files selected in a restore. See the Migration section in The FDR/UPSTREAM Program chapter for more information on migration/grooming. The Only checkbox is available if you check this box. The default is not checked.

- ☐ **Only**: Check this box if you wish to display only migrated files; i.e. no regular files. You must check the Display Migrated Files checkbox to check this box. The default is not checked.

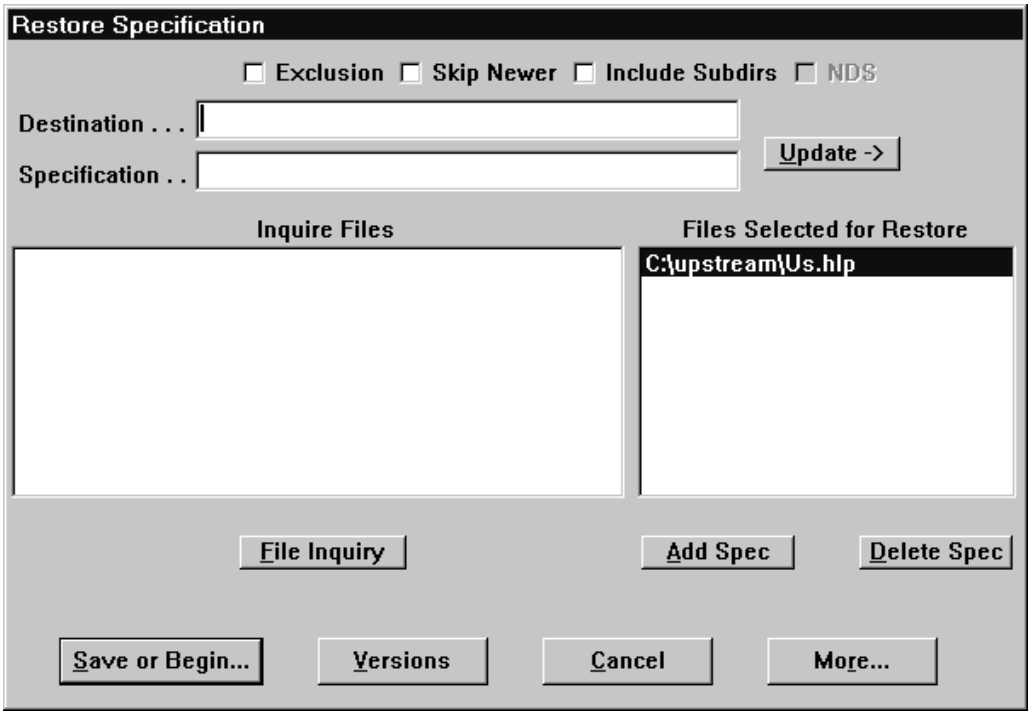
The push buttons at the bottom of the dialog allow you to continue.

- ☐ **File Inquiry...:** Press this button to specify which files are to be included in the restore and to perform file inquiries (listings of files stored on the host for each version).

- ☐ **Save or Begin:** Press this button to indicate that you are finished with this dialog and may wish to begin the restore now, and/or may wish to save your changes. Pressing ENTER has the same effect as pressing this button.

- **Exit:** Press this button when you wish to leave this screen without saving parameters. Pressing this button is the same as pressing the ESC key.

When you press the **File Inquiry** button, you will see the Restore Specification dialog.



- **Exclusion:** If you have specified in another file spec, a file specification which includes files which you do not want restored, then by checking this box, you can use this file spec to specify files which are excluded. If you check this box, some of the other fields on this screen will become inaccessible because they are not used. The default is not checked. A '#' character can be used in place of the drive letter to exclude files on any drive.

- **Skip Newer:** If you check this box, and FDR/UPSTREAM attempts to restore a file which already exists on disk, it will check the file dates and only overwrite files which FDR/UPSTREAM has stored which carry a later date. Otherwise, all files are restored regardless of date (you would use this if you suspect corrupted files on your disk). The default is checked.

- **Include Subdirs:** If you check this box, all files matching the file specification in directories underneath the one specified will be restored. If you checked Exclude these files, then this field will change to say Exclude Subdirs. The default is checked.

- ***(non-UNIX only)*** **NDS:** Check this box if you wish to restore NetWare Directory Services. Checking this box cause the Specification field to change to (NDS). See the Novell chapter for more information. This field is grayed and unavailable unless you have a server mapping defined to a server running the USNDS NLM. The default is not checked.

The following two edit fields work together in allowing you to specify the source and destination file names:

- **Destination:** Allows you to specify a different drive, directory or file name than the one originally used for the backup. If you leave this field blank, the original drive, directory and path will be used. This is a scrollable field and you can enter up to 256 characters. The default is blank (files restored to their original names). Specify the same

number of wildcards in this field as you specify in the Restore Specification, use a path and the generic wildcard *.*, or just a path ending in a backslash ('\').

For example, if the Restore Specification is C:\Test*.txt and you want to rename all the txt files to doc files, you could enter in the Destination field:

- C:\Test*.doc or
- C:\Test*.* or
- C:\Test\

☐ **Specification:** Allows you to specify the drive, directory and file name that was used originally to back up the files. This is a scrollable field and you can enter up to 256 characters. This field is required.

The first button is:

☐ **Update:** Press this button to update the highlighted Selected for Restore entry with the values entered in the Specification, Destination, Subdirs, Skip Newer, Exclusion and StreetTalk fields. Pressing the <Save or Begin> button also updates the Selected for Restore entry.

The first list box is:

☐ **Inquire Files:** The list box is filled by performing an Inquire Files, which is done by pressing the <File Inquiry> button. Like other list boxes in FDR/UPSTREAM, when you move the cursor into the box (by using the up or down arrow keys), the Restore Specification gets the value currently highlighted in the list.

If you change drives or directories in the list box, the list will only be updated the next time you press the <File Inquiry> button or double-click the mouse on a directory entry. Double-clicking the mouse on a file the first time will cause the Selected for Restore box to clear and the selected entry added as the only entry. Subsequent double-clicked files will cause the files to be added. Double-clicking on a directory entry has the same effect as selecting the directory entry and pressing the <File Inquiry> button.

You can tell which directory is currently displayed in the list box by the path specification directly beneath the box.

The buttons are:

☐ **File Inquiry:** Press this button to perform an inquire files of the file information specified in the restore specification currently stored on the mainframe for this backup profile/version date combination. You must provide the following parameters: backup profile, user ID and password (if required on the mainframe), and a restore specification. It is recommended that you perform an inquire backups before you perform the inquire files. This will fill in the originally specified backup specifications in the Files Selected for Restore list.

☐ **Add Spec**: Press this button if you wish to have the values entered in the top of the dialog (specification, destination, subdirectories, etc.) to be added as a new Selected for Restore specification and added to the end of the list box.

☐ **Delete Spec:** Press this button if you wish to delete the highlighted specification in the Selected for Restore list box. The prior entry is highlighted afterwards. You must leave at least one entry in the Selected for Restore list box.

The Selected for Restore list box controls the context of many fields in this dialog.

☐ **Files Selected for Restore:** Selecting different values in this box will cause the Specification, Destination, subdirs, skip newer, exclusion and StreetTalk name fields to reflect the updated values. If you have performed an inquire files, the list box will either clear (if your most recent file inquiry was not for this specification) or be filled (if your most recent file inquiry was for this specification).

The push buttons at the bottom allow you to leave the dialog:

- **Save or Begin:** Press this button to indicate that you are finished with this dialog and may wish to either save your changes and/or begin a restore. Pressing ENTER has the same effect as pressing this button.

- **Versions:** Press this button to return to the Restore Parameters dialog.

- **Cancel:** Press this button when you wish to leave this screen without saving parameters. Pressing this button is the same as pressing the ESC key.

- **More:** Press this button to determine which non-file data types that were backed up will be restored. See server specific information chapter for more information.

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12 Automated Backups and Restores

12.1. Overview

Automated backups and restores are one of the most powerful features of FDR/UPSTREAM. What they allow you to do include:

- Guarantee that PCs get backed up without the user having to worry about it.
- Support Software Distribution and other Data Distribution
- Support Data Sharing

Automated backups and restores require careful planning. When you create your plan we recommend that you coordinate this with your mainframe FDR/UPSTREAM administrator to assure that it meets your PC needs.

This chapter includes worksheets to help you plan your automated backup or restore scheme. We recommend that you use them to assure that all issues have been addressed.

Even if your automated plan is to have all actions controlled from the mainframe, you should read this chapter to understand the concepts and to set up your workstation correctly.

12.2. Concepts

In FDR/UPSTREAM, an automated backup or restore can either be run by starting a batch or script file, or by starting FDR/UPSTREAM directly. We generally recommend starting a batch or script file as this provides maximum control.

In particular, this allows you to prepare for the backup and clean up afterwards if necessary. For example, you may need to shut down databases before a backup and start them up afterwards. Or you may wish to perform certain cleanup activities, such as run USLOGCLR to keep the log from growing excessively.

The USSTART program (the FDR/UPSTREAM automated scheduling program, discussed further in this chapter) can be configured (using the FDR/UPSTREAM configurator) to run any type of program, including FDR/UPSTREAM. However USSTART handles command line parameters to the program it starts somewhat differently depending upon the operating system.

- ***(OS/2, UNIX)*** It is assumed that you will always use a starting batch or script file to start FDR/UPSTREAM. The command line is:

```
<program> <parameter file name> <config file name>
```

Thus, if USSTART was starting FDR/UPSTREAM in OS/2 with the parameter file SERVER1F.DAT and the config file UPSTREAM.CFG, the command line would be:

```
US SERVER1F.DAT UPSTREAM.CFG
```

The sample below shows USLOAD.CMD which is provided with the OS/2 version of FDR/UPSTREAM, used to start backups on a schedule.

```
@Echo off
c:
cd\upstream
US PARAMETER=%1 CONFIGFILE=%2 ATTENDED=N
```

- ***(Windows)*** Designed to allow you to directly start FDR/UPSTREAM or a batch job, the command line is:

```
<program> parameter=<parameters file name> <config file name>
```

Thus, if USSTART was starting FDR/UPSTREAM in Windows NT, with the parameter file SERVER1F.DAT and the config file UPSTREAM.CFG, the command line would be:

```
US PARAMETER=SERVER1F.DAT CONFIGFILE=UPSTREAM.CFG
```

The sample below shows a sample batch file USLOAD.BAT which can be use used to start backups on a schedule.

```
C:
cd\upstream
US %1 %2 ATTENDED=N
```

A **Schedule** is a timed event. UPSTREAM supports 6 types of schedules: daily, weekly, weekdays, monthly, quarterly and yearly. Each of these events can start an automated FDR/UPSTREAM function. There can be up to 255 schedules per configuration file. To allow you maximum flexibility, each schedule can be defined to start a different shell or batch file and a different parameter file, allowing you to mix backups, with software distribution or other functions.

There are a variety of unattended FDR/UPSTREAM functions. To build an unattended FDR/UPSTREAM function within FDR/UPSTREAM, merely fill out the dialog of the function you wish to perform, and uncheck the attended box. There are several functions for which there are no dialogs for. In those cases, you have to set up the parameters by hand. The primary parameter used to determine the function to be performed is the parameter ACTION (except for requesting a function on a remote workstation/server). See the Advanced FDR/UPSTREAM chapter for a more thorough description of these functions and a list of parameter file values.

The unattended functions that can be performed through scheduled or host control are:

- Backups (ACTION = 1)
- Restores (ACTION = 0)
- As of...Restores (ACTION = 2)
- Restart a failed backup only (ACTION = 4)
- Run a program or batch file, optionally on a workstation (ACTION = 5)
- Kill a pending failed backup restart (ACTION = 6)
- Run a host report (ACTION = 7)
- Restart a failed restore only (ACTION=8)
- Kill a pending failed restore restart (ACTION=9)
- Submit a host job (ACTION=10)
- File migration backup (ACTION=11)
- Performance test (ACTION=13)
- Physical disk/FDRSOS restore (ACTION=14)
- Physical disk backup (ACTION=15)
- Delete a backup (ACTION=16)
- Registration (ACTION=17)
- File inquiry (ACTION=18)
- Request a remote function be run on another workstation/server (REMOTEREQUEST = Y)

USSTART.EXE (the FDR/UPSTREAM Automated Start icon) is the schedule execution program. It is a separate program and is intended to be as unobtrusive as possible, fit into your environment, and run FDR/UPSTREAM (and other) functions on a scheduled basis.

12.3. Guidelines for Automated Backups and Restores

Worksheet 12.1 is a blank form for you to fill out to help you plan for your automated backups and restores for the mainframe and PC configurations. Worksheet 12.2 helps you plan your parameter files used for the backups and restores. It allows room for only one file set, but you can copy the worksheet for additional file sets. Later in this section we will fill out several to give you the idea of how it works.

Sch. #	Count or Ret. Period	Backup or Restore	Batch/Script File	Parameter File	Sched. Type	Date/Time

Worksheet 12.1
Automated Backup or Restore Plan

Parameter	File #1	File #2	File #3
Parameter File Name			
Storage Type (backups)			
Restart Type (backups)			
Novell Profile			
LAN WS Name			
Compression			
Latest Version or Version Date (restores)			
Number of File Specs			
File Spec #1			
File name			
Destination (restores)			
Exclusion			
Incremental (backups)			
Subdirectories			
Hidden Files (backups)			
Latest Version or Version Date (restores)			
Skip Newer/Existing Files (restores)			
Grooming			

Worksheet 12.2
Planning Parameter Files for Automated Backups and Restores

12.3.1. Automated Backups

Automated backups require different planning from automated restores because they are generally used for different purposes. Automated backups meet the primary needs of preserving your PC disk data for later recovery, either as a disaster recovery tool, or for archiving purposes.

Planning for automated backups requires that you consider some of the following issues:

- Avoiding conflicting with users whom need to use the machine.
- Determining how long you want to preserve data.
- Determining at what point you wish the intervals between data saved to increase (if any).
- Assuring that the important files really get backed up.
- Conserving mainframe disk space.
- Making sure that the more important event is scheduled first.

Figures 12.3 and 12.4 show worksheets completely filled out and are examples of an automated backup scheme.

The assumptions are:

- The PC is available for use for automated facilities at night only.
- Data must be preserved for a maximum of one year.
- All files on the C: drive must be preserved.
- Logarithmic increase in the age of backups is acceptable.
- Long term backups must be archived to tape.

The scheme works as follows:

- ☐ Monday through Thursday we wish to perform incremental backups. These backups are keyed allowing fast retrieval. Each day (Monday, Tuesday, etc.) is managed as one weekday schedule.
- ☐ Each Friday a complete disk backup is done. This assures that ALL data files are saved. These backups are archived and are rolled off on a 5 week schedule.
- ☐ Each month, on the first day, a complete backup is done. These backups are archived and the roll off interval is 12, thus maintaining backups for a year.

Sched. #	Count or Ret. Period	Backup or Restore	Batch/Script File	Parameter File	Sched. Type	Date/Time
1	5 (GDG)	B	USLOAD.CMD	WEEKLY.DAT	Week	Fri. 00:00:00
2	7 days	B	USLOAD.CMD	DAILY.DAT	Weekday	00:00:00

Figure 12.3
Sample Worksheet for Schedules

Parameter	File #1	File #2	File #3
Parameter File Name	DAILY.DAT	WEEKLY.DAT	
Storage Type (backups)	Seq. Disk	Seq. Tape	
Restart Type (backups)	None	Not Complete	
Novell Profile	SERVER1	SERVER1	
LAN WS Name			
Compression	Fast	Fast	
Latest Version or Version Date (restores)			
Number of File Specs	1	1	
File Spec #1			
File name	F:*.*	F:*.*	
Destination (restores)			
Exclusion	N	N	
Incremental (backups)	Y	N	
Subdirectories	Y	Y	
Hidden Files (backups)	Y	Y	
Latest Version or Version Date (restores)			
Skip Newer/Existing Files (restores)			
Grooming	N	N	

Worksheet 12.4
Sample Worksheet for Parameter Files

12.3.2. Automated Restores

Automated restores are primarily used for software and other data distribution and most users need to use it in a significantly different way than automated backups.

Some of the significant issues to be considered in planning for automated restores are:

- Is there both global (all workstations) and private data (one workstation) to be distributed?
- Do the files need to be staged through a temporary directory?
- Are there special installation issues to be considered?
- How often does data need to be distributed?

The scheme we recommend for distribution of files involves the setting up of a public backup profile and a private backup profile. All PCs should plan to extract data from the public backup profile on a regular basis. The private backup profile is used to allow users or administrators to send files destined for a particular workstation.

For safety, we recommend that for a public backup profile files be carefully prepared by an administrator, and built to be staged through a temporary directory and be compiled with a batch file for installation. The name of this batch file should be put by all workstations into their unattended options batch file started by USSTART.

For example, for a global distribution, a backup profile is defined (GLOBAL). The administrator wishing to distribute files will copy these files to a temporary directory on his disk (C:\TEMP), build a batch file to install these (C:\INSTALL.BAT), and back up the entire distribution directory and the installation batch job.

The workstations will periodically perform an automated restore. They will restore all the files in the latest version (which can be compacted or ZIPed, but don't have to be). When the administrator is confident that the data has been transmitted to the correct locations, the batch job can be run remotely to install the data.

Worksheets 12.5 and 12.6 describe the configuration for this process.

Sched #	Backup Profile	Roll-off Count	Back/ Rest	Batch File	Parameter File	Sched. Type	Date/Time
1	GLOBAL	1	R	GLOBAL.CMD	GLOBAL.DAT	Week	Sun. 00:00:00
2	PC1	1	R	GLOBAL.CMD	PRIVATE.DAT	Daily	00:00:00

Worksheet 12.5
Schedules for Automated Restores

Parameter	File #1	File #2	File #3
Parameter File Name	GLOBAL	PRIVATE	
Backup Profile	GLOBAL	PC1	
Compression	Y	Y	
Storage Type (backups)			
Restartable (backups)			
Latest Version or Version Date (restores)	Latest	Latest	
Number of File Specs	1	1	
File Set #1			
Reset Archive Bit (backups)			
Incremental (backups)			
Date Limit (backups)			
Subdirectories	Y	Y	
Hidden Files (backups)			
Latest Version or Version Date (restores)	Latest	Latest	
Skip Newer/Existing Files (restores)	N	N	
File name	C:*.*	C:*.*	
Destination (restores)			

Worksheet 12.6
Parameter Files for Automated Restores

12.4. Specifying Schedules in the Configurator

Schedules for unattended backups and restores are specified in the configurator. This section will walk you through the process of building an unattended backup or restore. Remember that it is better to pre-plan, so fill out a worksheet.

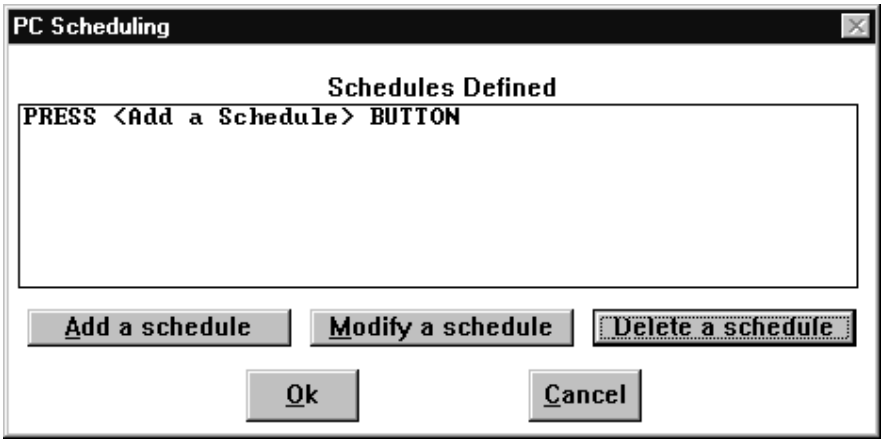
You start the configurator by entering:

```
[C:\UPSTREAM] USCFG
```

or by selecting the **Configurator** icon from the FDR/UPSTREAM program group.

(Windows) Press the **Advanced** button to enter the advanced options dialog. Press the **Miscellaneous** tab. Press the **Scheduler Configuration...** button.

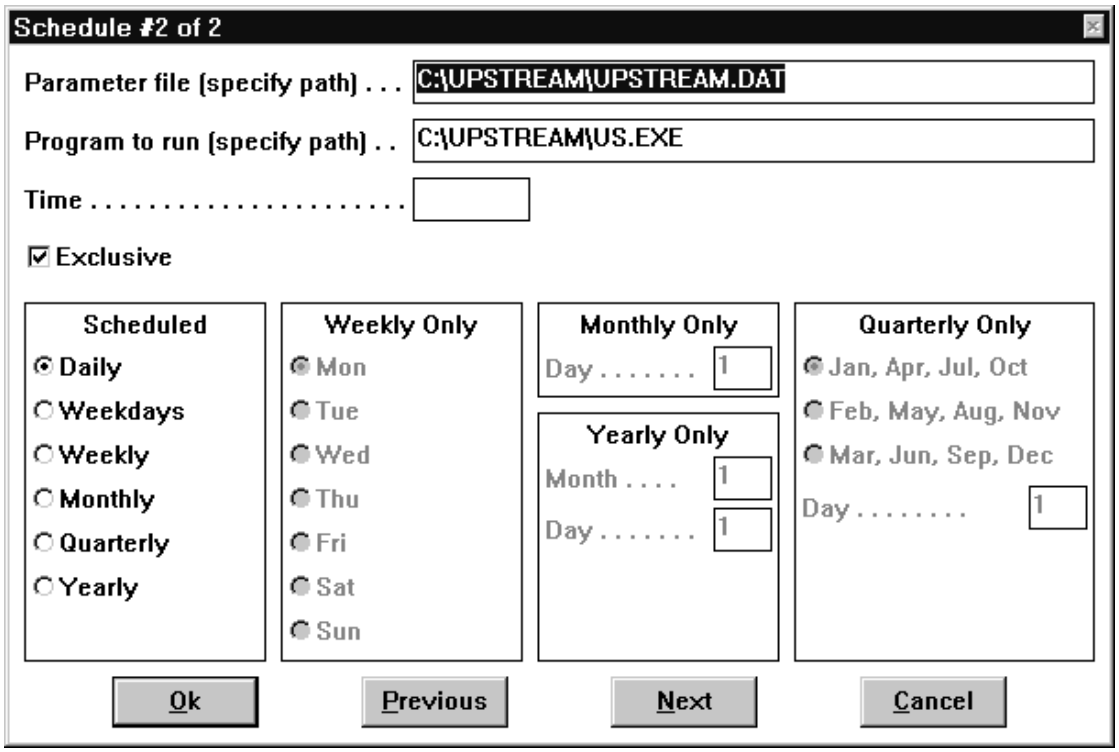
(All others) This will display the main configuration dialog. Press [ESC] or the <Cancel> button to go to the configuration main screen. Pull down the **Action** menu and select **PC Schedule** (you can also use the [ALT]P accelerator). You will then see the main schedules dialog.



There is a list box and 5 push buttons in this dialog:

- **Schedules Defined:** This list box contains all the schedules that you define. When you use a new configuration file, the box prompts you to add the first schedule. When you have schedules defined, you can edit a specific schedule by highlighting it in the list box and pressing the <Modify a schedule> button, or double-click the schedule with the mouse.
- **Add a schedule:** This push button allows you to add and define a new schedule.
- **Modify a schedule:** This push button allows you to edit the schedule currently highlighted in this list box. You can perform the same function by double-clicking the entry in the list box you wish to modify with the mouse.
- **Delete a schedule:** Press this button to delete the schedule currently highlighted in the list box.
- **Ok:** Press this button when you have completed editing the schedules and wish to save them to a configuration file.
- **Cancel:** Press this button if you wish to abandon the changes that you have made.

If you press the <Add a schedule> or <Modify a schedule> button, then you will see the Schedules dialog. In this dialog you specify parameters relevant to all types of schedules.



The parameters on this dialog include:

- **Parameter File:** This is the name of the parameter file to be used in the automated backup or restore if you use the standard conventions. However, what this field really identifies is the first parameter to the program automatically started. So you can use it as you choose. We recommend that you enter the complete file specification (including drive and directory). It has a maximum of 128 characters, the default is upstream.dat and it is a required field.

- **Program to Run:** This is the name of the program or batch file to be started automatically by USSTART. The .CMD, .BAT, or .EXE extension is suggested but not required. We recommend that you enter the complete file specification (including drive and path). It has a maximum of 128 characters, the default is the FDR/UPSTREAM program and it is required.

- **Time:** This is the time you wish the event to occur. The format is HH:MM:SS using a 24 hour clock. Thus 7:00 PM would be 19:00:00. This is an 8 character field with no default and it is required.

- **Exclusive:** This is a check box. If you specify two schedules which are to occur within 1 hour of each other, this flag determines if the second one should be done. For example, if you specify one schedule for 2:00 AM weekly, and a second for 2:01 AM, and you check this box only the first will be done. This is why you should specify the more important or less frequent schedules before the less important or less frequent ones. If you do not check the box, then ALL schedules scheduled will be performed.

- **Scheduled:** This is a set of radio buttons. Select Daily for a timed schedule that will occur every day. Daily schedules are not often used as they will occur on weekends as well. Weekday schedules only run Monday through Friday (excluding Saturday and Sunday). Weekly schedules occur on a given day of the week. Monthly schedules occur

on one day each month. Quarterly schedules occur one day each quarter. Yearly schedules occur one day each year. There is no default and one button must be pressed.

The frames consist of options that are specific for certain schedule types. Daily and Weekday schedules require no additional parameters. Each frame is grayed unless you have pressed the schedule radio button applicable for those parameters.

Weekly options:

- **Day of the week:** This is a series of 7 radio buttons representing the day of the week you wish the unattended operation to occur. The default is Monday and this field is required.

Monthly options:

- **Day:** This is the day of the month that you wish the unattended operation to occur. Legal values are from 1 to 31. Dates after the last day of the month will be run on the last day of the month. This field is required.

Quarterly options:

- **Month:** Select one of the three radio buttons representing which set of months you wish the event to occur: January, April, July, October, or February, May, August, November, or March, June, September, December. One option must be selected.

- **Day:** This is the day of the month that you wish the unattended operation to occur. Legal values are from 1 to 31. This field is required.

Yearly options:

- **Month:** Enter the month (1=January, 2 = February, etc.) of the year you wish the unattended operation to occur. This field is required.

- **Day:** This is the day of the month that you wish the unattended operation to occur. Legal values are from 1 to 31. This field is required.

Push buttons:

- **Ok:** This button acknowledges that you have completed the configuration and you will be asked if you wish to save the configuration. Pressing this button has the same effect as pressing the ENTER key.

- **Previous:** This button allows you to go to the previously specified schedule.

- **Next:** This button allows you to go to the next specified schedule.

- **Cancel:** This button allows you to abandon the changes you have made. Pressing this button has the same effect as pressing the ESC key.

12.5. Running USSTART (Auto Start)

USSTART is a presentation manager application (OS/2), Windows program (Windows and Windows NT), or a standard command line utility (UNIX). It is used to start unattended workstation initiated unattended FDR/UPSTREAM functions. You do not need to use USSTART if you intend to control FDR/UPSTREAM from the mainframe or another workstation.

USSTART performs the following functions:

- When it is loaded it reads the configuration file that you specified and remembers the schedules, parameter files and batch files that were specified.
- Calculates the exact date and time for the next schedule to run.
- Continually checks the clock for the next schedule to run.
- When the date and time is matched, it maximizes itself, beeps, displays a window in the screen informing you that an unattended event is about to occur, and gives you an opportunity to not perform it (by displaying a CANCEL button).
- It runs the specified batch or executable file passing the parameter file as the first parameter and the configuration file as the second parameter (see page 12-2 for a description of the USSTART command line).
- When the program returns, it reads the return code file and displays whether FDR/UPSTREAM was run, and whether the any FDR/UPSTREAM functions were performed.
- Calculates the next schedule and continues.
- While it is waiting for the next schedule, a status window is available to let you see that USSTART is loaded and when the next schedule is about to occur.

(OS/2 only) When USSTART begins, it starts minimized. You can display the status by double-clicking the icon, or by selecting the Maximize menu option.

USSTART can be run at any time, however, we recommend that once you have tested your environment, that you run USSTART in your AUTOEXEC.BAT, STARTUP.CMD, INITTAB, or Startup program group.

There are command line parameters to USSTART. Specify them on the command line when you run USSTART. These parameters are separated by spaces and are not positional. They include:

- ☐ **CONFIGFILE=<file name>** Specifying a configuration file allows you to use a different one than the default. Most environments will not need more than one configuration file. The default is UPSTREAM.CFG.

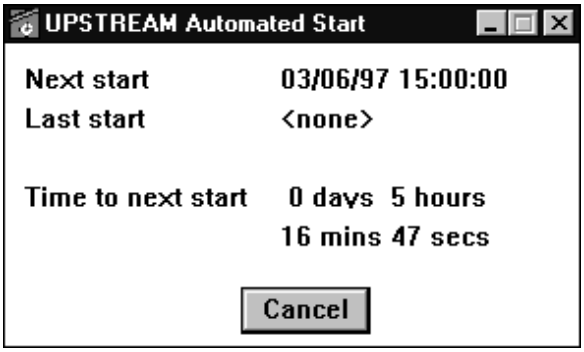
- ☐ **/T** This switch toggles tracing on and should be used only under the guidance of FDR/UPSTREAM technical support.

- ☐ **/D<number>** This switch allows you to specify the delay used to allow you to skip an event before it is actually run. The default is 10 seconds. For example, to specify a 60 second delay, run USSTART as follows:

```
USSTART /D60
```

12.5.1. The USSTART Status Display

When USSTART is running, a status display is continually updated.



- **Next Start**. This is the date and time of the next automatic start.
- **Last Start**. This is the date and time of the last automatic start.
- **Time to next start**. This is a continuously updated display of the number of days, hours, minutes and seconds until the next automatic start.
- **Any events in the last automatic start**. In the line below the time to next start, you will see a display of whether FDR/UPSTREAM was successful or not in the last operation or if there was an error in starting FDR/UPSTREAM.
- **Cancel**. This button is only available when it is about ready to begin an operation. If you press this button, the operation that was to begin will be skipped. In UNIX, press the [ESC] key to skip an operation.

When USSTART has calculated that the automatic start should be performed, the display is cleared and a ten second countdown is displayed. If you press the CANCEL button (or [ESC] key) during this time, the automatic start is aborted and the normal display replaces it. Otherwise, after 10 seconds the program requested is automatically started.

While the program requested is running, the USSTART display will show the program running. The program requested to be run will run in a newly created screen group, visible in the Task List display.

When the program that you requested is complete, USSTART will return to its normal monitoring function.

12.5.2. Problems with USSTART

Since USSTART runs in its own screen group it can be difficult isolating problems running the batch file when it is time for an automatic operation. We recommend that you test USSTART by setting up your schedules and then modifying the system clock to be the time for each automatic start, and then running USSTART.

USSTART maintains a log, **USSTART.LOG** which contains a list of attempts to start programs, when the next event is scheduled to run, any auto-start errors, etc. Any problem determination should begin by checking USSTART.LOG

If the screen just flashes and USSTART begins its timer for the next automatic operation, check the following:

- Verify that you have specified the COMPLETE path name of the batch file to run (like C:\UPSTREAM\USLOAD.CMD, not just USLOAD.CMD.
- Check to make sure that the batch file is correct by placing PAUSE statements at strategic locations in the file.
- Verify that Attended is NOT checked.

- Verify that the communications manager is running at the time of the automatic operations.

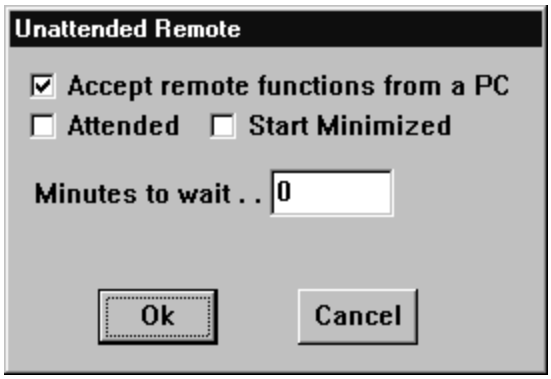
If USSTART just hangs, you may have a pending message waiting for user intervention. Verify that you have specified a Messages Time Out in the configurator with a value other than 0 (a positive number for a message timeout, or -1 if you do not wish messages displayed at all).

12.6. Unattended Remote Functions

If all your unattended functions will be controlled by MVS batch jobs or a central PC, you must have your PC listening for these remote requests. If you specified in your APPC that FDR/UPSTREAM is Attach Manager started, then the APPC will start FDR/UPSTREAM. In that case, you must have a parameter file specified which supports remotely initiated requests, specified on the command line. The Unattended Remote Functions option described below creates parameter files that meet this need. The sample RMTPARM.DAT provided was created with the facility described below.

If you specified in your APPC configuration that FDR/UPSTREAM would be operator started, then you must have USSTART or a user start FDR/UPSTREAM and define a parameter file which will wait for a longer period of time.

To define a parameter file to only wait for remote initiates, run FDR/UPSTREAM, pull down the Remote menu and select Unattended Remote Functions. You will see the Unattended Remote dialog.



This dialog allows you to set parameters which are used to create a parameter file that can be used to process remote requests in an unattended fashion. The parameters are:

- **Accept remote functions from a PC:** Check this box is you are willing to have your PC accept remote backup or restore requests from a PC. Do not check this box if you only are willing to accept remote requests from a mainframe batch job. The state of this box affects whether remote requests are serviced even if FDR/UPSTREAM is attended. (it can be used with the “Accept Remote Functions” check). The default is checked. In RMTPARM.DAT it is checked.

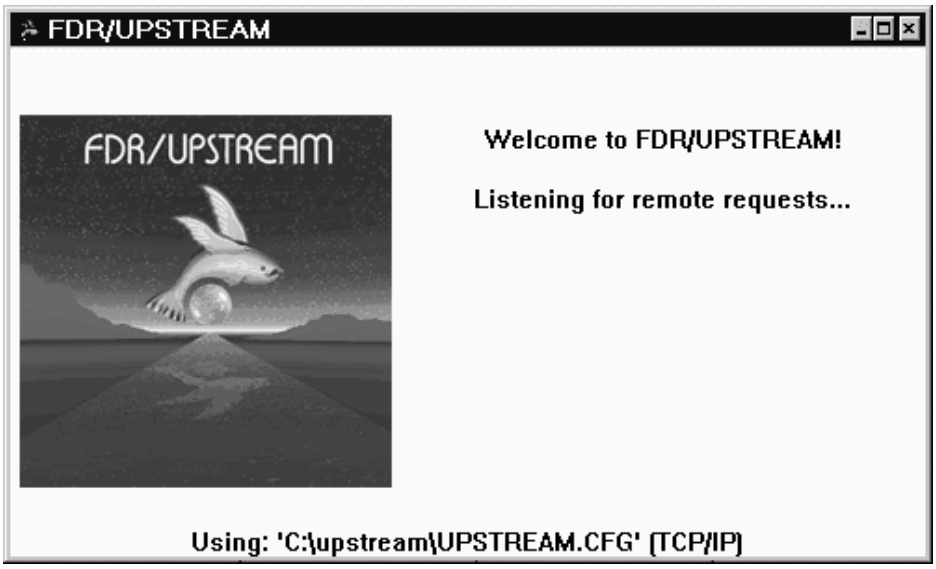
- **Attended:** Do not check this box if you are building a parameter file for unattended operation. The default is checked. In RMTPARM.DAT it is not checked.

- **Start Minimized:** (Windows and OS/2 only) If checked, FDR/UPSTREAM will start minimized.

- **Minutes to wait:** Enter the number of minutes that FDR/UPSTREAM will wait in unattended mode for a remote request. You can specify up to 65536 minutes. 0 indicates to wait until a key is pressed. The default is 0. RMTPARM.DAT waits for 1 minute as it is intended to be started from the attach manager, and 1 minute is enough time to begin to service the request.

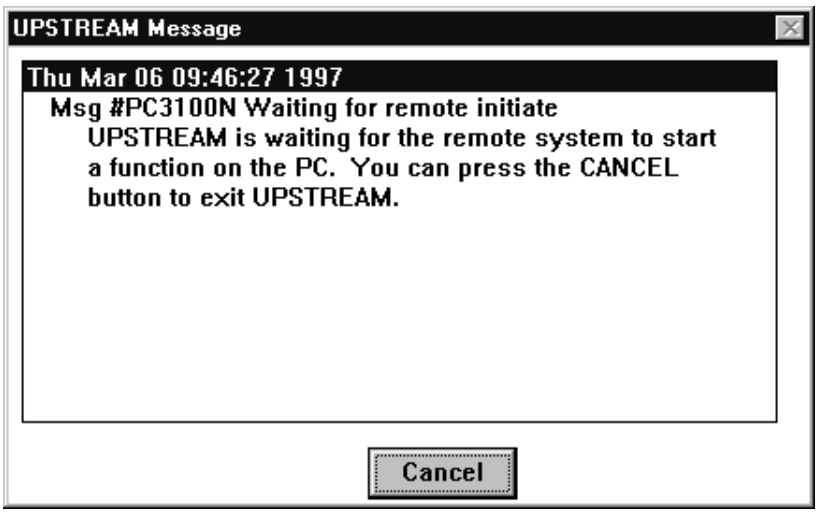
Press the <Ok> button or the [ENTER] key to be prompted to save your changes to a parameter file, or the <Cancel> button or the [ESC] key to abandon your changes.

When FDR/UPSTREAM is started in unattended mode waiting for a remote initiate in Windows you will see the screen below.



Press the mini-icons in the upper right corner to minimize, maximize or close; otherwise FDR/UPSTREAM will terminate automatically after the given number of minutes has expired.

For all other platforms, you'll see the screen below:



You can press the <Cancel> button to exit FDR/UPSTREAM; otherwise FDR/UPSTREAM will terminate automatically after the given number of minutes has expired.

13 Windows NT/2000/2003/XP

FDR/UPSTREAM provides a complete backup, restore and disaster recover solution for Windows NT/2000/2003/XP servers and workstations (referred to simply as Windows systems in the following sections). Only the Windows version of FDR/UPSTREAM has the capability of backing up and restoring the various features of a Windows system. Adequate planning is required to ensure that the specific requirements of your installation are addressed. This planning starts by addressing the following considerations:

- What Needs to be Backed Up and Restored. Refer to section 13.1.
- Planning the Backup/Restore Process. Refer to section 13.2.
- Backing Up a Windows Machine. Refer to section 13.3.
- Restoring a Windows Machine. Refer to section 13.4.
- Recovering a Windows Machine. Refer to section 13.5.

13.1. What Needs to be Backed Up and Restored

Windows system use a number of file system that have varying characteristics. These file systems are:

- FAT
- FAT32 (not supported by Windows NT)
- NTFS

The FAT file system provides no advanced features beyond simple storage for files and directories. The FAT32 file system supports a larger storage capacity than the FAT file system, but it too provides no advanced features. The NTFS file system is a state-of-the-art file system providing many advanced features. Most Windows systems utilize NTFS.

The NTFS file system currently has two versions, which are version 4 (NTFS4) and version 5 (NTFS5). NTFS4 is used only in Windows NT systems prior to Service Pack 4 (SP4). PostSP4 Windows NT, Windows 2000, Windows Server 2003 and Windows XP systems use NTFS5. Although NTFS5 is used in postSP4 Windows NT systems, Windows NT does not make use of most of the NTFS5 features.

The file system features supported by all Windows systems, regardless of the file system, are:

- Universal Naming Convention (UNC) names.
- Long file and directory names

The features provided by NTFS4 and NTFS5 are:

- Access Control Lists (ACLs)
- Extended Attributes (EAs)
- Alternate data streams
- Compression
- Hard links
- Unicode file and directory names
- Time-stamp adjustment

The features provided by NTFS5 (supported by Windows 2000, 2003 and Windows XP only) are:

- Sparse files
- Encryption
- Reparse Points (RPs)
- File replication
- User quotas

The system volume (what Microsoft refers to as the boot volume) of a Windows system is where its main installation directory (%SystemRoot%) resides. The system volume of a Windows NT system may be formatted with either the FAT file system, NTFS4 or NTFS5. The system volume of a Windows 2000, 2003 and Windows XP system must be formatted with NTFS5. There are a number of operating system components that reside on the system volume. These are:

- Boot files (not necessarily on the system volume)

- System files
- Registry (composed of individual subcomponent files called hives)
- Event logs (composed of individual subcomponent log files)
- The COM+ Class Registration database (non-Windows NT systems)

The server versions of Windows 2000, 2003 and Windows XP may also use a number of other operating system components. These are:

- Active Directory (AD) (for Domain Controllers (DCs) only)
- SYSVOL (for DCs only)
- Certificate Server database (when Certificate Services is installed)
- Cluster database (for clustered system only)
- Terminal services Licensing Server (TLS) database.
- Internet Information Services (IIS) metabase.
- Windows Management Instrumentation (WMI) repository.
- Removable Storage Manager database.

A concept first introduced in Windows 2000 is that of the "System State". Microsoft defines the system state as being a combination of all of the main operating system components listed above with the exception of the event logs, Terminal services Licensing Server database, Windows Management Instrumentation repository and the Removable Storage Manager database..

Another advanced feature of a Windows system is clustering. Section 13.12. contains specific guidelines for installing FDR/UPSTREAM in a cluster system.

FDR/UPSTREAM provides full backup and restore support for all of these file system features and operating system components. A special FDR/UPSTREAM component called the SysState PlugIn handles the Windows 2000 and Windows XP system state.

FDR/UPSTREAM has special handling for a number of file and directory characteristics. These characteristics are:

- Last access dates
- Modified directories
- Protected files
- Open files

13.1.1. Universal Naming Convention (UNC) Names

Files that reside on a system other than the local Windows system can be referenced via Universal Naming Convention (UNC) names. Referencing files via their UNC names has the advantage of:

- Referencing a file by a single name regardless of its location in the network
- Not having to use a drive letter mapped to a disk

UNC names can be used in virtually any Windows command (TYPE, DEL, COPY, etc.), as well as the network oriented (NET) commands. A UNC name has the form:

```
\\<Machine name>\<Share name>\<directory specification>
```

FDR/UPSTREAM has full support for UNC names. Thus, you can specify in a backup, restore, view or just about any FDR/UPSTREAM function the UNC name of a resource, freeing you from any drive dependencies.

For example, to back up all the files on machine RON in the share name CDRIVE, you would specify:

```
\\RON\CDRIVE\*.*
```

The use of UNC names requires that you be logged under a Windows account with the appropriate permissions to access the resource.

UPSTREAM has a special UNC naming convention for backing up a full Windows system, which consists of all local drives on the system along with whatever additional system information would be necessary for a disaster recovery. To use the Full-System method all you need to do is specify the a single file specification to be backed up. The format of this file specification is one of the following:

- \\. For a local Windows system
- \\machinename For a remote Windows system

See section 13.3.1. for a complete description of full system backups.

UNC name specifications can also be used for named pipes. This is particularly useful for MS SQL Server backups (see the *Databases* chapter). The form is:

```
\\<Machine name>\PIPE\<pipe name>
```

Using UNC names to back up local drives is slower than using their drive letters. It also lengthens the file names that are stored on the host, which may lead to some problems in rare circumstances. When backing up local drives it is recommended that you use a drive letter specification rather than a UNC name specification.

13.1.2. Long File And Directory Names

The support for long file and directory names in FDR/UPSTREAM is automatic.

There is an issue with some legacy applications that cannot natively handle long file names, however. These applications deal with files (and directories) that have file names that do not fit the old 8.3 DOS standard by using the file's alternate name that the file system creates based on the file's real name. Whenever FDR/UPSTREAM restores a file that has a long file name, the file system will recreate an alternate file name for that file that may be different than the alternate file name that was created when the file was originally created. This change in alternate file names may cause a problem for these legacy applications.

NOTE: Care should be taken when restoring files for applications that use the old 8.3 DOS file names.

13.1.3. Access Control Lists (ACLs)

FDR/UPSTREAM allows you to include the Access Control Lists (ACLs) of files and directories or exclude them. The processing of ACLs for files and directories is configured through a single specification parameter. Files cannot be processed differently than directories. The default is for FDR/UPSTREAM to include the ACLs, but you may exclude them if you have a special need to do so. FDR/UPSTREAM uses a special method of backing up the ACLs for the root directory of a volume through the creation of a fake file name "<Volume Information>". The selection of ACLs for backup is discussed in section 13.3.2.

13.1.4. Extended Attributes (EAs) and Alternate Data Streams

FDR/UPSTREAM processes alternate data streams as though they are Extended Attributes (EAs). The processing of EAs (and alternate data streams) for files and directories is configured through separate file specification parameters. Files may be processed differently than directories. The default is for FDR/UPSTREAM to include EAs and alternate data streams, but you may exclude them if you have a special need to do so. The selection of EAs for a backup is discussed in section 13.3.2.

13.1.5. Compression

FDR/UPSTREAM handles compressed files automatically. No user configuration is required to use this feature. Files that are compressed at the time of the backup are compressed after they are restored. Files that are uncompressed at the time of the backup may be compressed after they are restored if they are restored into a directory that is compressed.

13.1.6. Hard Links

Hard links are a feature of NTFS that cause two or more separate file entries to point to a single set of data on the disk. FDR/UPSTREAM has the capability of backing up the data for hard linked files only once to reduce the size of the backup. But, the processing for had link files is time consuming so the default for the processing of hard linked files is turned off by default. If the size of your backup is more important than the time it takes to create the backup, you may enable the processing hard linked files on an individual file specification basis. The selection of hard links for a backup is discussed in section 13.3.2.

13.1.7. Unicode File and Directory Names

In NTFS, file names are stored in Unicode - a 2 byte character format which allows virtually all characters from all languages to be displayed. The first byte of Unicode essentially is the same as the ASCII character set and most characters in file names map into this. FDR/UPSTREAM uses single byte character encoding to take advantage of the space and performance gains from using single byte encoding, and yet fully supports Unicode file names through the use of a number of techniques to map Unicode characters into single bytes. This is covered further in section 13.17.

13.1.8. Time-Stamp Adjustment

Every file and directory stored in a NTFS file system is assigned three time-stamps. These are:

- Creation date and time
- Last update date and time
- Last access date and time

Each of these three time stamps is recorded in the file system based on Greenwich Mean Time (GMT). When an application references any file or directory and gets one of its time-stamps, the date and time information is modified into its local time based on the time zone settings of the local operating system. This causes an interesting effect for FDR/UPSTREAM merge backups. This is discussed in section 13.15.

13.1.9. Sparse Files

Sparse files are a feature of NTFS5 that allow large files that might not normally fit on a single disk volume to be stored by writing only those parts of the file which contain actual data that is not binary zeroes. Any ranges within a sparse file that are filled entirely with binary zeroes will not have disk space allocated for them. Instead, NTFS5 maintains a table for the sparse file that indicates which ranges within the file are actually allocated disk space. Using this method, a sparse file will in most cases contain large sections of binary zeroes.

FDR/UPSTREAM takes advantage of this feature to backup only those ranges of each file that actually have disk space allocated to them. When FDR/UPSTREAM restores a sparse file to an NTFS5 file system, it creates the allocated range table for the file just as it was at the time of the backup. When FDR/UPSTREAM restores a sparse file to a system that does not support sparse files, FDR/UPSTREAM will write the entire file and fill in binary zeroes for the unallocated ranges of the file.

No user configuration is required to use this feature. FDR/UPSTREAM does this automatically.

NOTE: Any sparse files that are backed up with FDR/UPSTREAM version 3.1.2 or above must be restored with version 3.1.2 or above. Previous versions will not be able to properly restore these files, leading to corrupted data.

13.1.10. Encryption

A file that is encrypted has its data scrambled by the Encryption File System (EFS) that is built into NTFS5. EFS encrypts a file only once by creating a unique random File Encryption Key (FEK) for the file. This FEK is further uniquely encrypted for each user that is given access to the file so that each user has a unique set of public and private encryption keys that can be used by that user only to access the file.

It should be noted that file encryption is not the same thing as access control. In order for a user to be able to open an encrypted file, the user must have the appropriate access permissions and must also hold a FEK with which they can decrypt the file.

FDR/UPSTREAM does not decrypt files while backing them up, but instead backs up the file data in its raw encrypted form. As such, the file data that is stored on the host is kept in its encrypted form, therefore protecting the backup data from unauthorized access.

In previous versions, FDR/UPSTREAM handled encrypted files using a special component called the WinCrypt PlugIn. The handling of encrypted files has since been incorporated into the main FDR/UPSTREAM processing making the use of the WinCrypt PlugIn unnecessary.

The WinCrypt PlugIn is still shipped on the FDR/UPSTREAM for Windows CD for those users who already use it in their backups and restores.

NOTE: It is recommended that you not use the WinCrypt PlugIn.

13.1.11. Reparse Points (RPs)

Windows 2000 introduced the concept of Reparse Points (RPs). A RP is a tag that can be applied to files and directories to cause them to be processed in a special manner by the NTFS5 file system under the control of a RP File System Filter Driver (FSFD). Third-party software vendors may create RPs that perform special processing for files and directories. Microsoft has already created a number of RPs that are incorporated into Windows 2000, 2003 and Windows XP. One of these RPs handles directory Mount Points.

A mount point RP is applied to a directory to cause NTFS5 to branch to another part of the file system or another local disk volume. There are actually two different types of mount points: Volume Mount Points and Directory Junctions. Volume Mount Points cause NTFS5 to treat a completely separate volume as though it were part of the directory on which the volume is mounted. Directory Junctions cause NTFS5 to treat another directory (either on the same volume or a different local volume) as though it were part of the directory on which it is joined. Given the nature of these two types of mount points, its is possible to create a circular mount point scenario. A circular mount point is one in which a volume/directory contains a subdirectory that is the very same directory to which it is mounted/joined. For example: Directory C:\A when joined to directory C:\A\B\C would create a directory tree of C:\A\B\C\B\C\B\C\B\C\B\C\B\...

FDR/UPSTREAM has special support for each of these two types of mount points.

Another type of RP handles files that have been moved to Remote Storage and are referred to as being “offline”. An offline RP is applied to a file that no longer resides on disk, but has instead been moved to some other type of storage medium. It is the responsibility of the Remote Storage subsystem to recall the file back to disk if it is needed by an application that wants to open it.

FDR/UPSTREAM has special support for files that have been moved offline.

Refer to section 13.3.2. for further information about specifying how RPs are to be handled.

13.1.12. File Replication

The replication of directories is handled by the File Replication Service (FRS) in Windows 2000, 2003 and Windows XP. File replication is used to replicate the contents of one or more directories between two or more Windows systems. It is used by DCs to replicate the SYSVOL among the other DCs in a domain and is also used by the Distributed File System (DFS) subsystem.

There are no special requirements for backing up a replicated directory (also referred to as a replica set). FDR/UPSTREAM has special support to ensure that replicated directories are properly restored.

13.1.13. User Quotas

User quotas allow administrators to control how much disk space individual users may consume on an individual volume basis. FDR/UPSTREAM supports the backup and restore of user quota information through the use of the WinQuota PlugIn component. The WinQuota PlugIn is discussed in section 13.14.

13.1.14. Boot and System Files

Boot files reside on the volume that Windows boots from (referred to by Microsoft as the system volume) and control the boot process. These files have no special characteristics from any other file in the file system other than their inclusion in the system state.

System files reside on the volume that Windows is installed on (referred to by Microsoft as the boot volume). These are the files that comprise the operating system itself. Windows 2000, 2003 and Windows XP have a special safeguard mechanism to protect these files from inadvertent modification. These files are also included in the system state.

FDR/UPSTREAM has special handling for these files as individual files and as part of the overall system state. The system state is discussed further in section 13.8.

13.1.15. Registry

The registry is the single most important component of any Windows system. If it is missing or corrupt, Windows will not boot. The registry is included in the system state. FDR/UPSTREAM handles the registry properly on backup and restore and even has special processing to facilitate certain disaster recovery processing. The system state is discussed further in section 13.8. FDR/UPSTREAM's special registry restore processing is discussed in section 13.13.

For manually specified file specifications, the registry can be included or excluded in backups and restores. This is discussed further in section 13.3.2.

13.1.16. Event Logs

The Windows event logs contain the logging information for the various Windows components and other third party software. FDR/UPSTREAM handles the event logs properly on backup and will restore them to temporary files on a restore. The use of temporary files on a restore is so that current log information is not overlaid, which may still be needed.

For manually specified file specifications, the event logs can be included or excluded in backups and restores. This is discussed further in section 13.3.2.

13.1.17. COM+ Class Registration Database

The COM+ Class Registration Database contains information for the new COM+ components found in more recent applications. The information for the older COM components is still contained in the registry. The COM+ Class Registration database is stored on disk in files maintained in the **%SystemRoot%\Registration** directory. These files have the following extensions:

- .clg
- .crmlog

These files are not directly backed up by FDR/UPSTREAM. Instead FDR/UPSTREAM treats the COM+ Class Registration database as it does the individual hive files that make up the registry and uses a special API function to back it up as a file named **%SystemRoot%\system32\config\COM+**. The COM+ Class Registration database is part of the system state. The system state is discussed further in section 13.8.

Of course, the COM+ file is not a real file. It does not exist on the disk before or after a backup or restore. This file is created as needed by FDR/UPSTREAM during a backup or restore. After the file is backed up or restored, the temporary COM+ file is deleted.

13.1.18. Active Directory (AD)

The Active Directory (AD) is a component of a Windows 2000, 2003 and Windows XP domain. The AD is actually a shared database that is replicated among the DCs of a domain. Without the AD a Windows 2000, 2003 or Windows XP domain cannot function. The AD is a part of the system state. The system state is discussed further in section 13.8.

FDR/UPSTREAM has legacy support for the AD that is independent of the system state. This legacy support is handled by the WinAD PlugIn component of FDR/UPSTREAM and is discussed in section 13.9.

NOTE: We recommend that you do not use the WinAD PlugIn. Use the SysState PlugIn instead.

13.1.19. SYSVOL

The SYSVOL is another component of a Windows 2000, 2003 and Windows XP domain. The SYSVOL is actually a shared directory structure that is replicated among DCs of a domain using the services of the File Replication Service (FRS). The SYSVOL is where the DCs store the policy information and logon scripts for the domain. The SYSVOL is part of the system state. The system state is discussed further in section 13.8.

13.1.20. Certificate Server Database

The Certificate Server database is the database maintained by Windows 2000, 2003 and Windows XP servers that have the Certificate Services component installed on them. This database is part of the system state. The system state is discussed further in section 13.8.

FDR/UPSTREAM has legacy support for the Certificate Server database that is independent of the system state. This legacy support is handled by the CertServ PlugIn component of FDR/UPSTREAM and is discussed in section 13.10.

NOTE: We recommend that you do not use the CertServ PlugIn. Use the SysState PlugIn instead.

13.1.21. Cluster Database

The Cluster database is a database that is replicated between the individual nodes of a cluster system. This database is a part of the system state. The system state is discussed further in section 13.8.

FDR/UPSTREAM has legacy support for the Cluster database that is independent of the system state. This legacy support is handled by the Cluster PlugIn component of FDR/UPSTREAM and is discussed in section 13.11.

NOTE: We recommend that you do not use the Cluster PlugIn. Use the SysState PlugIn instead.

13.1.22. Terminal Services Licensing Database

The Terminal Services Licensing Server database will be backed up, whenever you backup the **%SystemRoot%\system32\LServer\Export** directory, as a single file named **TLSLic.edb**. The database is restored whenever you include this file in the restore. The database directory may vary from system to system, but can be found in the registry in the key HKLM\SYSTEM\CurrentControlSet\Services\TermServLicensing\Parameters.

13.1.23. Internet Information Services Metabase

The Internet Information Services metabase will be backed up, whenever you backup the system state, as a file named **UPSTREAM_IIS_Metabase_Backup.MD1**. The metabase is restored whenever you include this file in the restore.

13.1.24. Windows Management Instrumentation Repository

The Windows Management Instrumentation repository will be backed up whenever you backup the **%SystemRoot%\system32\WBEM** directory, as a single file named **UPSTREAM_WMI_Repository_Backup.bin**. The repository is restored whenever you include this file in the restore.

13.1.25. Removable Storage Manager Database

The Removable Storage manager database will be backed up, whenever you backup the **%SystemRoot%\system32\NtmsData\Export** directory, as two files named **NtmsData** and **NtmsReg**. The database is restored whenever you include these files in the restore.

13.1.26. Last Access Dates

Every file and directory in a NTFS file system has a last access time-stamp which records the last time the file was accessed by any application. Certain applications such as FDR/UPSTREAM use this last access date as a selection criteria to locate files. If FDR/UPSTREAM is allowed to access a file and not reset its last access time-stamp to what it was before it accessed the file, FDR/UPSTREAM will modify the last access time-stamp and break the selection criteria processing of any application that uses it, including FDR/UPSTREAM itself. To prevent this from happening, the default processing for NTFS files is such that FDR/UPSTREAM will reset the last access time-stamp for all files that it backs up. You may change this behavior if you wish.

The specification as to whether last access dates are to be reset or not is discussed in section 13.3.2.

13.1.27. Modified Directories

Every file and directory in a NTFS file system has a set of attribute flags associated with it. One of these is a flag to indicate that the file or directory has changed. FDR/UPSTREAM uses this flag as selection criteria for incremental backups so as to back up only those files and directories that have been modified. FDR/UPSTREAM has special processing of directories when performing incremental backups, which is discussed in section 13.16.

13.1.28. Protected Files

It is recommended that FDR/UPSTREAM be run under a Windows account that is a member of the Administrators group or under the Local System account if it is run as a service. These accounts give FDR/UPSTREAM the authority it needs to access the entire file system. However, it is still possible to set the Access Control List (ACL) information for a file or directory in such a way as to deny these accounts access. To prevent itself from being denied access to these files, FDR/UPSTREAM has the capability of modifying the ACL information for these files as it encounters them. This feature is enabled by default via a file specification parameter and can be disabled if you need to do so.

The discussion as to whether FDR/UPSTREAM should modify the permissions for files that it is denied access is discussed in section 13.3.2.

13.1.29. Open Files

During a backup, one or more files may be open for use by other applications running on the local system or a remote system. If this is the case, FDR/UPSTREAM may encounter sharing violation errors for these files that will prevent FDR/UPSTREAM from opening them.

A FDR/UPSTREAM repeating parameter (specified for each file specification) named **FILESOPENFORUPDAT** can be set to Y to allow FDR/UPSTREAM to open those files that its is not prevented from reading. There is no user interface for setting the **FILESOPENFORUPDAT** parameter. If you want to enable this feature, contact FDR/UPSTREAM Tech Support.

FDR/UPSTREAM has also been certified to work with St. Bernard Software's Open File Manager (OFM). When using this product you must disable the **Reset Last Access Date** option for every file specification. You should also add FDR/UPSTREAM's installation and work directories to OFM's list of files to be ignored.

Refer to section 13.3.2. for a description of the Reset Last Access Date option.

NOTE: This method of accessing files may involve some risk to the integrity of the data being backed up. Use this option cautiously.

13.2. Planning the Backup/Restore Process

FDR/UPSTREAM is an application that supports a rather large number of computing platforms, one of which is Windows (NT, 2000, 2003 and XP). The Windows version of FDR/UPSTREAM provides two basic groups of functionality:

- The core functions, which perform the actual backup and restore (and other) operations.
- The Graphical User Interface (GUI) provides you with user-friendly dialogs for specifying and initiating these backup and restore operations.

Two separate programs provide this functionality:

- US.exe contains both the core functions and GUI functionality.
- USCmd.exe contains only the core functions.

Another FDR/UPSTREAM component is called the Director. The FDR/UPSTREAM Directory is a platform independent Java based application that contains an advanced GUI that can be used for specifying and initiating backup and restore operations on any of the platforms that FDR/UPSTREAM supports. Chapter 8 describes the FDR/UPSTREAM Directory and how to use it.

Only the Windows version of FDR/UPSTREAM (US.exe and USCmd.exe) provides the core functionality that can adequately perform the backup, restore and recovery operations for a Windows system.

13.2.1. Local versus remote management

Maximum performance is achieved by installing and running FDR/UPSTREAM on each Windows system to be managed, although certain scenarios may call for managing a Windows system remotely. FDR/UPSTREAM has full support for both local and remote management of Windows systems.

The advantages of installing and running FDR/UPSTREAM locally on the machine to be managed are:

- Operations are faster, as the extra overhead of LAN communications is eliminated.

The advantages of installing and running FDR/UPSTREAM on a Windows system to manage other Windows systems remotely are:

- The number of FDR/UPSTREAM installations is reduced, thereby easing your FDR/UPSTREAM management tasks.
- the use of FDR/UPSTREAM/SOS, which provides the capability of backing up through a SCSI attached SAN device, may limit the number of Windows systems that can be attached to the SAN device. FDR/UPSTREAM can be installed on the few machines that are attached to the SAN device.

It is possible to perform a single backup or restore operation on two or more Windows systems simultaneously, although this is not recommended. We suggest that you manage each Windows system independently, creating for each a single backup profile on the FDR/UPSTREAM host. The advantages of managing your Windows system separately are:

- Operations can be performed in parallel.
- Operations can achieve much higher performance.
- The duration of each operation is kept to a minimum.

The advantages of grouping multiple Windows systems into a single operation are:

- The number of operations that need to be managed is reduced.
- Tape resources can be utilized more efficiently.
- the number of FDR/UPSTREAM systems that need to be managed and upgraded is limited.

13.2.2. Windows version differences

FDR/UPSTREAM does not manage a server installation of a Windows operating system differently than a workstation installation of the same operating system. But the various Windows system versions (Windows NT, Windows 2000, Windows Server 2003 and Windows XP) are managed differently. In other words, Windows NT Server is managed the same as Windows NT Workstation, Windows 2000 Server is managed the same as Windows 2000 Professional, but Windows NT Server and Windows 2000 Server are managed differently.

To manage a Windows NT system, FDR/UPSTREAM may be installed on that Windows NT system to manage it locally or another Windows system (either Windows NT, Windows 2000, Windows Server 2003 or Windows XP) to manage it remotely. The requirement for remote management of a Windows NT system is that the system's administrative shares (C$ for the C: drive, D$ for the D: drive, etc.) or user defined shares must be accessible to the Windows account that FDR/UPSTREAM is run under on the remote system.

To manage a Windows 2000, 2003 or Windows XP system, FDR/UPSTREAM may be installed on that Windows 2000/2003/XP system to manage it locally or another Windows 2000/2003/XP system to manage it remotely. A Windows NT system cannot be used to manage a Windows 2000/2003/XP system remotely. Again, the requirement for remote management of a Windows 2000/2003/XP system is that the system's administrative shares (C$ for the C: drive, D$ for the D: drive, etc.) be accessible to the Windows 2000/2003/XP account that FDR/UPSTREAM is run under on the remote Windows 2000/2003/XP system. In either scenario, local or remote, the FDR/UPSTREAM Windows 2000 Agent service must be installed on the Windows 2000/2003/XP system to be managed. Refer to section 13.7. for the discussion of the Windows 2000 Agent service.

Another option for the management of remote Windows NT systems is the use of the ULTra component of FDR/UPSTREAM. ULTra is not an option for Windows 2000, 2003 and Windows XP systems, as ULTra is not supported for these systems.

13.2.3. How to specify a backup/restore operation

FDR/UPSTREAM supports a large and rich set of parameters that allow you to have as much control of the backup and restore process as you need. The shortcomings of using such a large set of parameters is that you need to be familiar with most if not all of them to use them effectively. To take full control of your backup and restore operations, you need to specify a set of parameters that effect the entire operation (these are referred to as non-repeating parameters) and one or more sets of file specification parameters (referred to as repeating parameters). A set of file specification parameters needs to be specified for each individual disk drive, directory, file or other resource (such as the Windows 2000/2003/XP system state or individual volume user quotas).

The alternative, to dealing with the nitty-gritty details of determining how to specify the parameters for all of your various file specifications, is to let FDR/UPSTREAM do it for you. This is where the full-system file specification comes in. A full-system file specification allows you to specify only a single parameter, which is either "\\." or "\\machinename". You will still need to specify the non-repeating parameters as your needs dictate, but the specification of the repeating parameters is greatly reduced, as FDR/UPSTREAM will determine the details for you.

The "\\." file specification causes FDR/UPSTREAM to operate on the local Windows system, while the "\\machinename" file specification causes FDR/UPSTREAM to operate on the remote Windows system whose name is supplied in the file specification. Full-system file specifications are discussed in section 13.3. and section 13.4.

13.2.4. Backup/restore initiation

FDR/UPSTREAM backup and restore operations can be initiated from a number of sources:

- The FDR/UPSTREAM host
- The FDR/UPSTREAM Director
- FDR/UPSTREAM running on the Windows system that is to perform the operation
- FDR/UPSTREAM running on another Windows system (rarely used)

The large majority of FDR/UPSTREAM customers find that host initiation of their backup operations is best. If your backups are adequately planned, you can set up a few backup jobs on the host and automate their initiation through a scheduling package. If you want to initiate your backups from a Windows system, the scheduling features built into your Windows system should be able to handle your requirements.

Restore operations are commonly initiated from FDR/UPSTREAM running on the Windows system, as there are likely to be manual operations that need to be performed on the Windows system in order to prepare for the restore. The reasoning here is that if there is at least on manual Windows system operation that needs to be performed, the entire process may as well be performed from that Windows system. Another reason for not host initiating restores is that restores are so infrequent and tend to be unpredictable as to make each restore setup unique.

The FDR/UPSTREAM Directory is particularly useful in initiating restore operations. Its advanced GUI provides a great tool for Help Desk operation where users may come to have individual files restored.

Regardless of how the operations are initiated, one of the FDR/UPSTREAM programs (US.exe or USCmd.exe) must be running on the Windows system on which the operation is to be performed. If you are initiating the operation from FDR/UPSTREAM running on the same Windows system, the program that will actually perform the operation will be US.exe and it will be running as an application. For the other types of initiation you will probably want to have either US.exe or USCmd.exe set up to run as a Windows service. Section 3.4.6., 3.16.5. describes how to run FDR/UPSTREAM as a service.

13.2.5. Planning what and when to backup

There is no single "right" way to manage your backups. Every environment is unique. Careful planning is necessary to meet your unique requirements.

Planning your backups will probably require far more consideration than planning restores, as most restores tend to be performed only on an ad hoc basis that do not follow a set schedule. Your backup planning should consider the following issues:

- Will your backups be performed locally or remotely?
- Will you group your Windows systems together or back them up individually?
- What is the amount of data that needs to be backed up in a single backup operation?
- What is the available time "window" for performing the backup operation?

- What is the overall performance that can be achieved by FDR/UPSTREAM and your LAN topology? Chapter 10 can help you increase your overall performance.
- How often will you need to perform full backups versus incremental backups?
- How will your backups be initiated?

13.3. Backing up a Windows System

FDR/UPSTREAM provides two methods for backing up a Windows system. These are:

- Full-System method (recommended)
- Manual method

13.3.1. Full-System Backups

The Full-System method is the easiest to use, as FDR/UPSTREAM will determine what needs to be backed up and handles all of the nitty-gritty details for you. This is the recommended method for performing your backups. The manual method puts you in control of the entire backup process, determining which files, directories and components should be backed up and even which characteristics should be include or excluded.

To use the Full-System method all you need to do is specify the a single file specification to be backed up. The format of this file specification is one of the following:

- \\. For a local Windows system
- \\machinename For a remote Windows system

When FDR/UPSTREAM encounters one of these file specifications it will scan the Windows system (either the local system or the remote system) to determine what its local disk drives are and also what operating system components it contains. It then creates individual file specifications for each of these drives and components along with the specific set of parameters to ensure that the entire Windows system is backed up as a coherent whole. One of the components that is included in the backup for Windows 2000, 2003 and Windows XP systems is the system state.

For example, a Windows 2000 system named RON2K1 with a C: drive formatted with NTFS and a D: drive formatted with FAT would have the following file specifications generated automatically by FDR/UPSTREAM:

- \\RON2K1\SysState*.*
- C:*.*
- C:\WinQuota.bin
- D:*.*

Notice that among these file specifications are one for the system state and one for the user quota information for the NTFS formatted C: drive.

The system state is backed up using the SysState PlugIn component as discussed in section 13.8. The user quota information is backed up using the WinQuota PlugIn component as discussed in section 13.14.

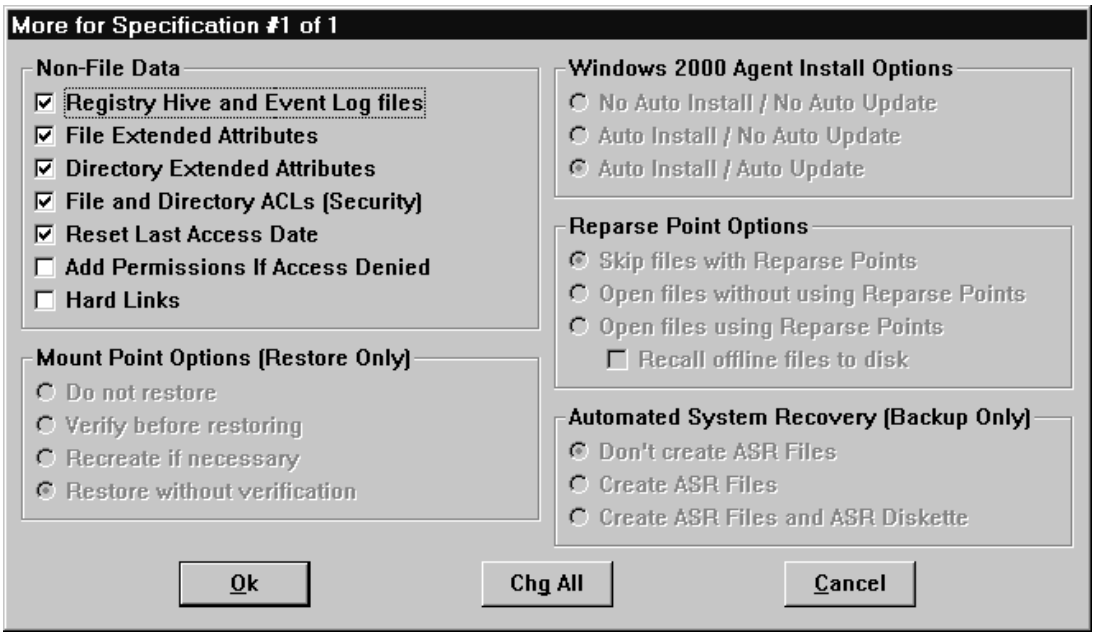
Multiple full-system file specifications may be combined in a single backup to backup multiple Windows systems simultaneously. Full-system file specifications may also be combined with other non-full-system and non-PlugIn file specifications.

NOTE: Full-system file specifications may not be combined with PlugIn file specifications used for backing up databases.

13.3.2. Manual Backup Specifications

The Manual method of specifying what to backup is useful in situation that require specific processing that is different than the FDR/UPSTREAM defaults. Using this method, FDR/UPSTREAM allows you to specify the types of information that are to be backed up on an individual file specification (disk, directory or file) basis. For each separate file specification that you define, you may specify which types of data you want included with the following procedure:

- On the **Backup Parameters** dialog enter a file specification for the disk, directory or file to be backed up.
- Press the **Spec Detail** button to display the **File Specification #n of m** dialog.
- Press the **More...** button to display the first **More for Specification #n of m** dialog.
- Press the **Windows NT/2K/XP...** button to display the second **More for Specification #n of m** dialog:



The **Non-File Data** options are related to the **NONFILEDATABITMAP** repeating parameter in the parameter file. The types of Non-File Data that can be selected are:

- **Registry Hive & Event Log Files**: By selecting this option, FDR/UPSTREAM will back up the registry and event logs whose files are included in the file specification. Most of these files reside in the **%SystemRoot%\system32\config** directory. **WARNING:** If the file specification is such that only a subset of the registry files are included in the backup, this could lead to an inconsistent system state after they are restored. For this reason it is strongly recommended that registry hives be backed up only for file specifications that include the entire Windows system drive (typically C:*.*). This option is enabled by default. Refer to section 13.13. for a description of enhanced registry restores.
- **File Extended Attributes**: By selecting this option, FDR/UPSTREAM will backup the EAs and alternate data streams for the files included in the file specification. This option is enabled by default.

- **Directory Extended Attributes**: By selecting this option, FDR/UPSTREAM will back up the EAs and alternate data streams for the directories included in the file specification. This option is enabled by default.
- **File and Directory ACLs (Security)**: By selecting this option, FDR/UPSTREAM will back up the ACLs for every file and directory included in the file specification. This option is enabled by default. FDR/UPSTREAM has a method of backing up the ACLs for the root directory of a volume. To do this, a fake file named "**<Volume Information>**" is included in the backup if the **ROOTENTRY** repeating parameter is set to Y in the parameter file, which is the default. There is no way of setting the value of the **ROOTENTRY** parameter from the FDR/UPSTREAM GUI. If you need to do this, contact FDR/UPSTREAM Tech Support.
- **Reset Last Access Date**: By selecting this option, FDR/UPSTREAM will give the account that it is running under permission to back up files that it has been denied access to. This option is disabled by default. The use of this option will probably be necessary only for Windows NT systems.
- **Hard Links**: By selecting this option, FDR/UPSTREAM will ensure that two or more files (specified by all of the file specifications) that reference the same data on disk will have only one set of their data backed up. This option is disabled by default. Its use is recommended only when you know you have hard linked files, as it will degrade performance. Refer to page 26-18 for a more complete description of FDR/UPSTREAM's handling of hard link files.

The **Windows 2000 Agent Install Options** are related to the **INSTALLWIN2KAGENT** repeating parameter in the parameter file. Refer to section 13.7. for more information about the FDR/UPSTREAM Windows 2000 Agent.

The **Reparse Point Options** are related to the **BACKUPREPARSEFILES** repeating parameter in the parameter file. The Reparse Point Options are:

- **Skip files with Reparse Points**: By selecting this option, FDR/UPSTREAM will exclude any file or directory that has a Reparse Point (RP) from the backup.
- **Open files without using Reparse Points**: By selecting this option, FDR/UPSTREAM will process any file or directory that has a RP by opening it without the aid of its associated RP File System Filter Driver (FSFD). This means that whatever special processing that the RP may have performed during the opening of the file, will not be performed. This allows FDR/UPSTREAM to get the raw RP information and back it up. When the file is restored it will again be properly associated with its RP FSFD. This is the default.
- **Open files using Reparse Points**: By selecting this option, FDR/UPSTREAM will process any file or directory that has a RP by allowing the RP FSFD to process the file as it normally would. The data that FDR/UPSTREAM gets from the file will not include the raw RP information and it will therefore not be backed up. When the file is restored, it will not have its original RP information and will not be properly associated with its previous RP FSFD. One reason for selecting this option is for the purpose of backing up all of the files on a disk regardless of whether they are offline or not. When this option is selected, the **Recall offline files to disk** option is then enabled for selection.

As discussed in section 13.1.11., one type of RP handles mount points. There are two types of mount points: Volume Mount Points (VMPs) and Directory Junctions (DJs). FDR/UPSTREAM handles these type types of mount points differently, under the control of a few repeating parameters. The BACKUPREPARSEFILES is one of these, the other is the **MOUNTPOINTS** parameter, which can be set with the **Backup Mount Points** checkbox on the **File Specification #n of m** dialog (not shown here). Based on these two parameters FDR/UPSTREAM handles directories as follows:

- When FDR/UPSTREAM encounters a directory with a RP (whether it is a mount point RP or some other type of RP) and BACKUPREPARSEFILES is set to 0 (Skip files with Reparse

Points), the entire directory is excluded from the backup regardless of how the MOUNTPOINTS parameter is set.

- When a directory is a DJ and BACKUPREPARSEFILES is set to 1 (Open files without using Reparse Points), the directory is included in the backup but all of its subdirectories and files are excluded. The directory's raw RP information is backed up.
- When a directory is a DJ and BACKUPREPARSEFILES is set to 2 (Open files using Reparse Points), the directory is included in the backup along with its subdirectories and files. The directories raw RP information is not backed up.
- When a directory is a VMP and MOUNTPOINTS is set to N, the directory is included in the backup but all of its subdirectories and files are excluded. The directories raw RP information is backed up.
- When a directory is a VMP, MOUNTPOINTS is set to Y and the VMP is circular, the directory is included in the backup, but all of its subdirectories and files are excluded. The directory's raw RP is backed up.
- When a directory is a VMP, MOUNTPOINTS is set to Y and the VPM is not circular, FDR/UPSTREAM determines if the file specification to which the directory belongs was generated manually or generated by FDR/UPSTREAM as part of a full-system file specification (\\.). This scenario is handled as follows:
  - If the directory belongs to a manually generated file specification, then the directory is included in the backup along with its subdirectories and files. The directory's raw RP information is backed up.
  - If the directory belongs to a FDR/UPSTREAM generated file specification, then the other file specifications are checked to determine if they reference the volume that is mounted to this directory. This scenario is handled as follows:
    - ✓ If the volume mounted via this VMP is already being backed up with another file specification, then the directory is included in the backup, but its subdirectories and files are excluded. The directory's raw RP information is backed up.
    - ✓ If the volume mounted via this VMP is not backed up with another file specification, then the directory is included in the backup along with its subdirectories and files. The directory's raw RP information is backed up.

If **Open files using Reparse Points** is checked and **Recall offline files** is also checked, FDR/UPSTREAM will cause the Remote Storage RP FSFD to copy the files and directories back to disk (local storage) as it is reading their data from the remote storage media. **Recall offline files** is related to the **RECALLOFFLINEFILES** repeating parameter in the parameter file. The default for this option is disabled, as it is very time consuming and possibly dangerous to have the files recalled to disk.

NOTE: Using this option requires that any remote storage media, to which files have been moved, be available at the time of the backup.

The **Automated System Recovery (Backup Only)** options are related to the **ASRBACKUP** non-repeating parameter in the parameter file. Refer to section 13.6. for a description of FDR/UPSTREAM's support for the Windows 2003/XP Automated System Recovery (ASR) feature.

13.4. Restoring a Windows System

Like backups, FDR/UPSTREAM provides a number of methods for performing a restore. These are:

- Full-System method (\\. or \\machinename)
- Manual method

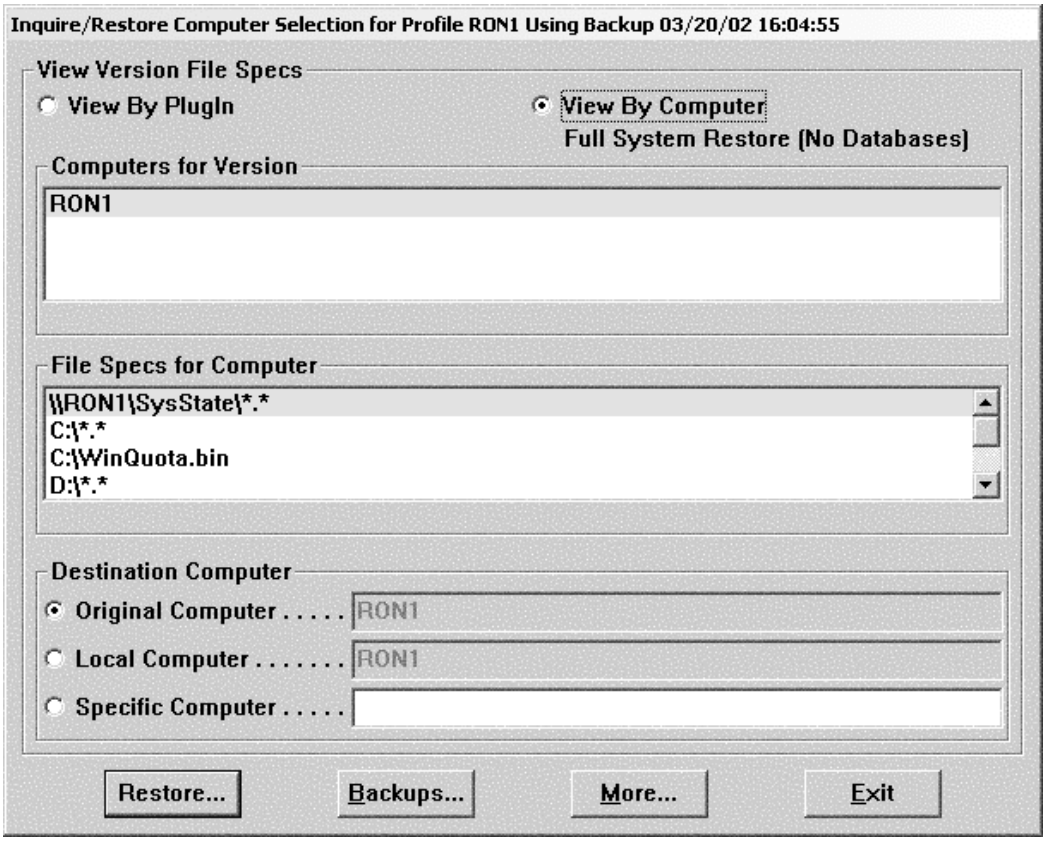
The Full-System method is useful for performing disaster recovery restores, as it ensures that the entire Windows system is restored in the correct order. This is discussed further in section 13.5.

The manual method is recommended when you need to restore only a part of a Windows system such as an individual directory or file.

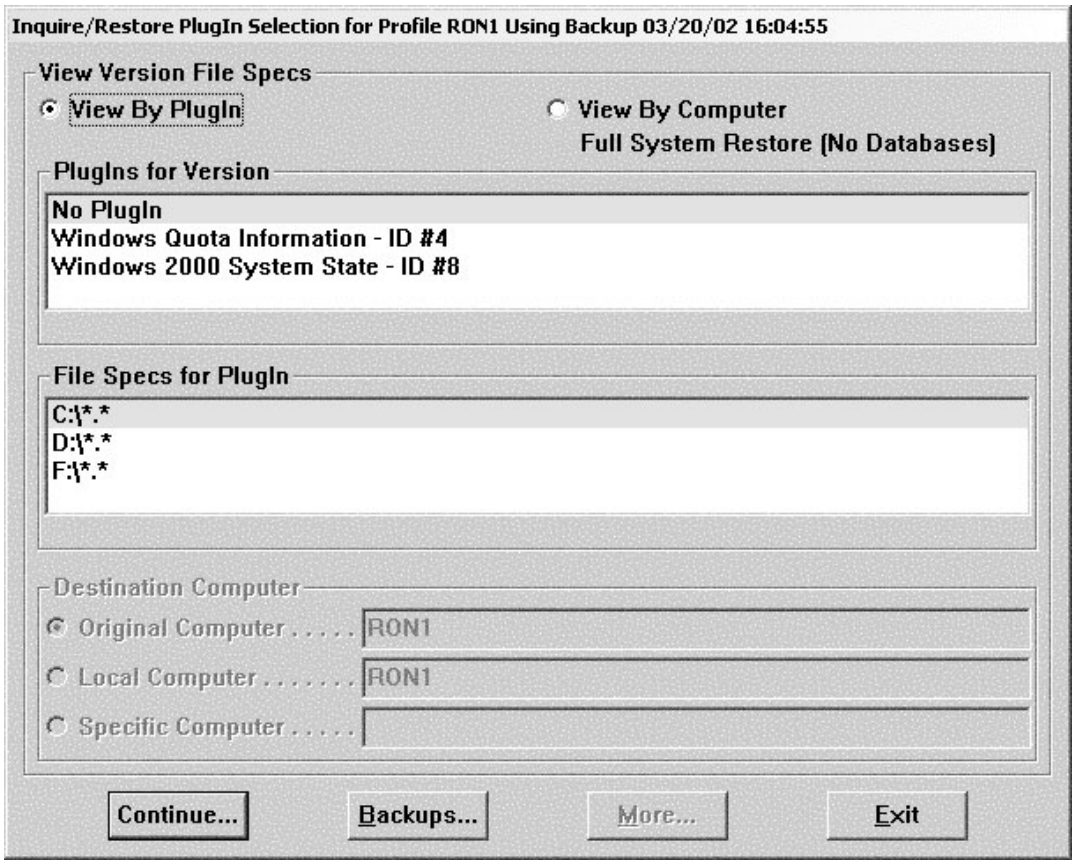
When you select the List and Restore item from the Action menu, you are presented with on of the following dialogs (after the **Host Security Validation** dialog, if this is the first action):

- **Inquire/Restore Computer Selection for Profile … Using Backup mm/dd/yy hh:mm:ss**
- **Inquire/Restore PlugIn Selection for Profile … Using Backup mm/dd/yy hh:mm:ss**
- **Inquire/Restore for Profile … From mm/dd/yy hh:mm:ss**

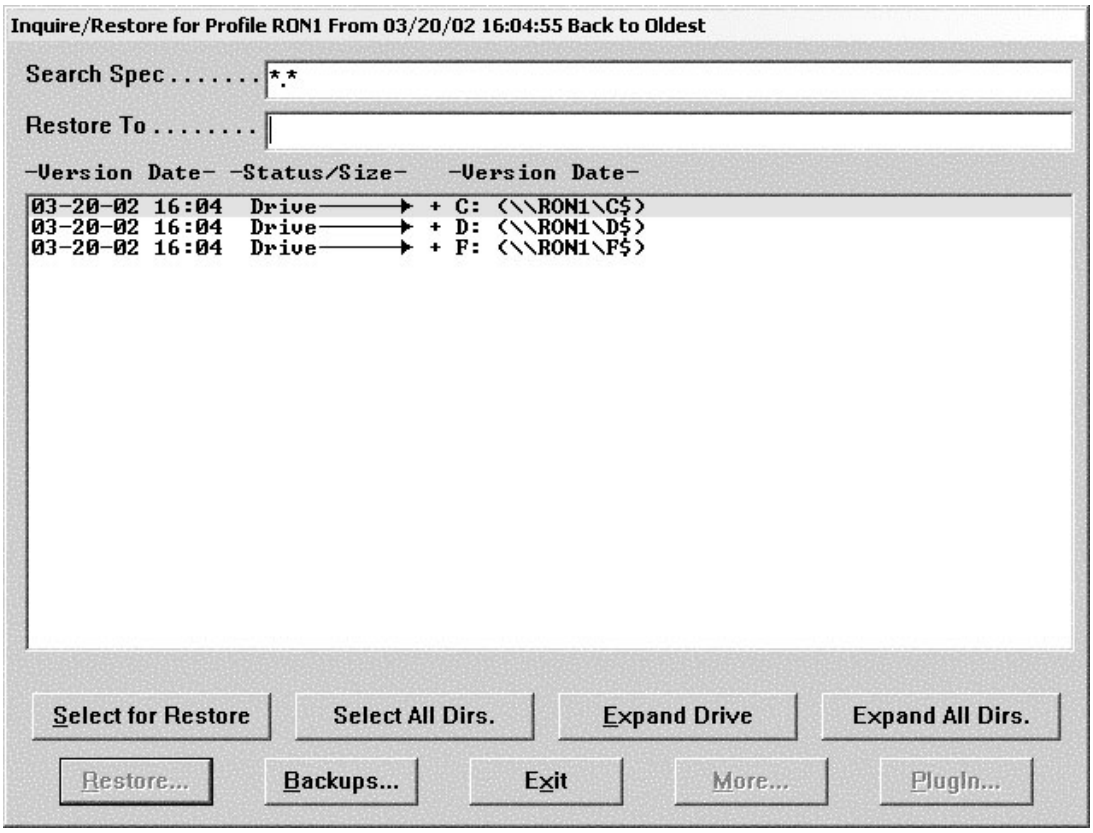
If the full-system method was used for the backup, the **Inquire/Restore Computer Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** dialog will be displayed. For example:



If the full-system method was not used for the backup, but the backup contains two or more file specification that use different PlugIns, the **Inquire/Restore PlugIn Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** dialog is displayed. For example:



If the full-system method was not used for the backup and all of the file specification in the backup used the same PlugIn (or no PlugIn at all), the **Inquire/Restore for Profile … From mm/dd/yy hh:mm:ss** dialog is displayed. For example:



You may notice that the **Inquire/Restore Computer Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** and **Inquire/Restore PlugIn Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** dialogs are very similar. This is because they are really the same dialog. The dialog title changes depending on whether the **View By Computer** radio button is checked or the **View By PlugIn** radio button is checked.

13.4.1. Restoring an entire Windows system

The **Inquire/Restore Computer Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** dialog can be used for specifying the recovery of a single entire Windows system. If the backup version displayed in the title is not the version you want to restore from, click the **BACKUPS...** button to display the **Restore Parameters** dialog to select the version you want. If you want to set additional file specification parameters for the single full-system file specification (\\. or \\machinename), click the **More...** button to display the **More for Specification #n of m** dialog.

Once the Windows system's computer name has been selected from the **Computers for Version** list and you indicate what the **Destination Computer** should be, you can click the **Restore...** button to have the **Save Restore Parameters** dialog displayed.

Since the main purpose for this type of restore is for disaster recovery purposes, it will be discussed further in section 13.5.

13.4.2. Restoring individual directories or files

If what you want to restore is something short of an entire Windows system and the backup contains two or more file specifications for different PlugIns, you will need to first select the PlugIn you want to use to perform the restore. FDR/UPSTREAM does not allow you to perform a restore using two or more different PlugIns at the same time. If you need to do this you will have to perform multiple individual restores. If the backup version displayed in the title is not the version you want to restore from, click the **BACKUPS...** button to display the **Restore Parameters** dialog to select the version you want.

Start by selecting the PlugIn you want to use from the **PlugIns for Version** list. Once the PlugIn is selected you can click the **Continue...** button to have the **Inquire/Restore for Profile … From mm/dd/yy hh:mm:ss** dialog displayed.

Once the **Inquire/Restore Computer Selection for Profile … Using Backup mm/dd/yy hh:mm:ss** dialog is displayed, you may select one or more directories and/or files to be restored. If the backup version displayed in the title is not the version you want to restore from, click the **Backups...** button to display the **Restore Parameters** dialog to select the version you want. Use the **Expand Drive**, **Expand All Dirs.**, **Collapse Drive** and **Collapse All Dirs.** buttons to navigate through the directory trees of the backup.

If the directory or file you want to restore is to be restored to a destination that is different than the original location, be sure to enter the desired destination in the **Restore To** field before you click either the **Select for Restore** or **Select all Dirs.** buttons.

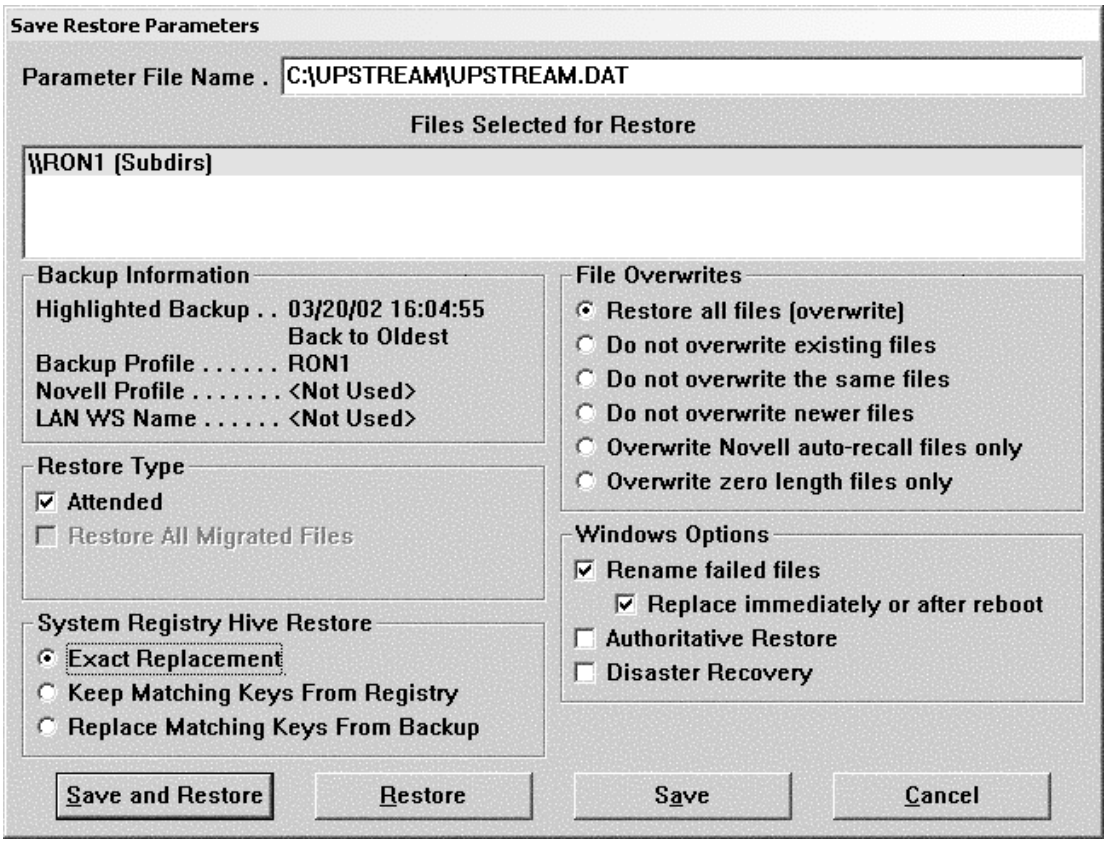
For each directory or file selected for restore, you may click the **More...** And **PlugIn...** buttons (if they are enabled) to specify additional file specification parameters. In the case of a PlugIn restore, you may be required to click the **PlugIn...** button for each file specification before being allowed to start the restore. If the **More...** button is clicked, the **More for Specification #n of m** dialog will be displayed (refer to the dialog in section 13.3.2.), which will allow you to select the types of non-file data that is to be restored, as follows:

- **Registry Hive & Event Log files**
- **File Extended Attributes**
- **Directory Extended Attributes**
- **File and Directory ACLs (Security)**

WARNING: When restoring the registry files of a Windows NT system, it is strongly recommended that the full set of registry files be restored to prevent an inconsistent system state from occurring.

WARNING: When restoring the system state of a Windows 2000, 2003 and Windows XP system, it is strongly recommended (by Microsoft) that the entire system state be restored to prevent an inconsistent system state from occurring. Given the interdependencies of the system state components, it is your responsibility to know which components you might safely restore individually.

Once you have finished selecting the directories and/or files you want to restore, click the **Restore...** button to display the **Save Restore Parameters** dialog. For example:



The **Parameter File Name** field is where you enter the name of a parameter file that will be created with the current set of parameters, if you click the **Save and Restore** or **Save** buttons. If you click the **Restore** or **Cancel** buttons the parameters will not be saved in the specified file.

The **System Registry Hive Restore** options are related to the **NTREGRESTORE** non-repeating parameter in the parameter file. These options allow you to perform special registry restore processing and are discussed in section 13.13.

The **File Overwrite** options are related to the **SKIP** non-repeating parameter in the parameter file. The options are:

- **Restore all files (overwrite)**: Selecting this option causes FDR/UPSTREAM to restore all of the selected files regardless of whether they already exist or not.
- **Do not overwrite existing files**: Selecting this option causes FDR/UPSTREAM to skip the restore of any selected file which already exists.
- **Do not overwrite the same files**: Selecting this option causes FDR/UPSTREAM to skip the restore of any selected file which already exists with the same time-stamp as the one on the backup.
- **Do not overwrite newer files**: Selecting this option causes FDR/UPSTREAM to skip the restore of any selected file which already exists and has a time-stamp later than the one on the backup.
- **Overwrite Novell auto-recall files only**: Selecting this option causes FDR/UPSTREAM to restore only those files which have been migrated off of a Novell file server and are being restored back to their original locations.

- **Overwrite zero length files only**: Selecting this option causes FDR/UPSTREAM to restore only those files that already exist and have a length of zero bytes. This is useful for recovering from certain virus attacks that set the file lengths of certain files to zero.

The **Windows Options** are meant for disaster recovery scenarios and are discussed in section 13.5.

13.5. Recovering a Windows System

A disaster is something that we all want to avoid, but when a disaster occurs it helps to be prepared. FDR/UPSTREAM was designed with the idea of disaster recovery in mind. The various Windows versions have varying degrees of disaster recovery support.

If the system to be recovered is a Windows 2003 or XP system, refer to description of the Windows 2003/XP Automated System Recovery in section 13.6. If the system is a Windows 2000, 2003 or Windows XP system, refer to the discussion about Recovering a Windows 2000/2003/XP System in section 13.8.9. The procedure outlined in this section are more appropriate for recovering Windows NT systems.

NOTE: If you are restoring a backup of a single processor Windows system to a multi-processor Windows system or vice-versa, there are system file issues. See Microsoft KnowlegeBase article #Q156358 for more information.

NOTE: The procedures described in this section have been tested in a number of hardware and software environments. However, they differ substantially from the ones suggested by Microsoft. If you have problems with recovery see Microsoft KnowlegeBase article #Q139822 for a description of their procedures

Refer to section 13.13. for a description of enhanced registry restores.

13.5.1. Preparing a Windows NT Disaster Recovery Package

When you first install a Windows NT system (both Server and Workstation) the installation procedure creates, by default (when the /b parameter is not used when starting the NT installation program; WINNT.EXE for non-NT systems and WINNT32.EXE for NT systems), three NT boot diskettes for you. Also during the installation procedure, you are asked if you want to create an Emergency Repair Disk (ERD). It is strongly suggested that you do so. The ERD contains your current system configuration. The three boot diskettes, the ERD and your Windows NT Server/Workstation CD are your tools for recovering from a disaster.

As your system configuration is modified it is important to periodically create a new ERD and store it with the rest of your disaster recovery package. To create a new ERD you can use the RDISK.EXE program found in the %SystemRoot%\system32 directory (in most cases C:\WINNT\system32). For example:

```
C:\WINNT\system32\RDISK.EXE
```

RDISK.EXE is easy to run and takes only a few minutes.

Microsoft periodically releases services packs to apply fixes and minor enhancements to Windows NT. If you decide to apply one of these service packs to your Windows NT system we recommend that you perform a backup in case there are problems applying it. You will have to also include the service pack in your disaster recovery plans. After applying a service pack:

- Note that the contents of the service pack will be included in your next FDR/UPSTREAM backup (as the archive bits are on).
- Create another Emergency Repair Disk and save it with your disaster recovery package.
- Copy the files that make up the service pack to diskettes (the recommended method). You can also place the service pack on one or more other machines on the network (if you have network access on recovered machines), or back up the contents of the service pack using FDR/UPSTREAM (if you have FDR/UPSTREAM access on recovered machines). Which ever method you use, the service pack must be available with your disaster recovery package.

FDR/UPSTREAM requires a communications package through which it can communicate with the mainframe. This communications package is either TCP/IP which is built into Windows NT or one of the separately installed SNA products. If your installation uses one of these SNA products in conjunction with FDR/UPSTREAM to do its back ups and restores then the SNA product installation disk(s) or CD should also be included in you disaster recover package. You should also include a copy of the current configuration for the SNA product.

The last item to include in your disaster recovery package is a copy of the FDR/UPSTREAM installation CD. Your FDR/UPSTREAM license permits you to make as many copies of the CD as you need. You may want to include a FDR/UPSTREAM manual in your disaster recovery package.

This disaster recovery package should be stored in a safe place and be readily available in the event of a disaster.

13.5.2. Procedure for Recovering a Windows NT Machine

During this discussion of the disaster recovery procedure the term **Target System** will be used to refer to the machine that is to be recovered and the term **Source System** will be used to refer to the machine on which FDR/UPSTREAM is run.

The very first step in any disaster recovery procedure is restoring the basic Windows NT system on the target system. This is accomplished by performing a normal Windows NT installation (really a reinstallation) which uses the three Windows NT boot diskettes you created during the initial installation.

If you are installing Windows NT Server, during the Windows NT installation process there are two stages in which you have to identify the type of Windows NT system you are installing. The first of these two stages asks you if you want the system to be a Primary Domain Controller (PDC), a Backup Domain Controller (BDC) or Stand Alone Server (member server). You should respond that the system will be a **Stand Alone Server** (regardless of the original server type).

In the second of these two installation stages you will be asked if the new machine will be part of a Workgroup or a Domain. Initially you should respond that the system will be part of a **Workgroup**. The FDR/UPSTREAM restoration of the Windows NT registry to this target system will cause the system to resume the role it had prior to the disaster.

If you have an Emergency Repair Disk (ERD) and it contains configuration information for one or more device drivers that are required for the restore, then perform the Windows NT Emergency Repair process. This is accomplished by rebooting the system with the three Windows NT boot diskettes, specifying that the system is to be repaired and then supplying the ERD when prompted. The Windows NT registry is the only component that you should need to repair in order to reapply the configuration information for one or more device drivers.

WARNING: You must select the *Rename failed files* and *Replace immediately or after reboot* FDR/UPSTREAM restore options or apply all service packs before the restore.

The rest of the disaster recovery procedure depends on whether TCP/IP is the communication protocol that FDR/UPSTREAM uses to communicate with the mainframe. If TCP/IP is used by FDR/UPSTREAM (TCP/IP must be installed on the mainframe) then continue with section 13.5.3., otherwise continue with section 13.5.4.

13.5.3. Using TCP/IP to Recover the Windows NT Target System

This is the easiest of the disaster recovery scenarios. Since TCP/IP is built into Windows NT it is immediately available to perform the rest of your disaster recover process. Proceed as follows:

- 1. Install FDR/UPSTREAM on the target system.
- 2. Use FDR/UPSTREAM on the target system to restore all of its disks.

To complete your recovery, proceed to section 13.5.5.

13.5.4. Using a SNA Product to Recover the Windows NT Target System

If FDR/UPSTREAM uses a SNA connection to communicate with the mainframe then you must either install a SNA product that FDR/UPSTREAM can use on the target system or use a second Windows NT machine that has a SNA product that FDR/UPSTREAM can use already installed on it. If the SNA product installed on the second Windows NT machine is the SNA Server Client and the target system is the SNA Server gateway, the second machine cannot be used for SNA communications until the target system is recovered.

Is a second Windows NT machine available on the same LAN as the target system and has a SNA package that FDR/UPSTREAM can use installed on it (not SNA Server Client)? If yes, this machine will be referred to as the Source System, then use the following procedure:

- 1. If the source system does not have FDR/UPSTREAM installed on it, install it.
- 2. Create a share on the target system for each disk that is to be recovered. By default Windows NT creates a share named C$ for the C: drive.
- 3. Make sure that the source system has authority to access the share on the target system.
- 4. On the source system attach to the share of the target system. This can be done using the NET USE command.
- 5. Use FDR/UPSTREAM on the source system to recover each of the disks (via shares) of the target system.

If a second Windows NT machine is either not available or does not have a SNA product that FDR/UPSTREAM can use installed on it, then use the following procedure:

- 1. Install the SNA product on the target system.
- 2. Install FDR/UPSTREAM on the target system.
- 3. Use FDR/UPSTREAM on the target system to restore all of its disks.

To complete your recovery, proceed to section 13.5.5..

13.5.5. After restoring a Windows NT Server

If the Windows NT system just recovered is a Windows NT Primary Domain Controller or a Backup Domain Controller the system may be out of sync with the other Domain Controllers in the domain. This situation occurs when the NETLOGON service writes one of the following entries to the System Event Log on any of the Domain Controllers in the domain:

- Event ID 3210: Failed to authenticate with <primary domain controller>, a Windows NT domain controller for domain <domain>
- Event ID 5722: The session setup from the computer <backup domain controller> failed to authenticate. The name of the account referenced in the security database is <account name>. The following error occurred: <error>.

The System Event Log entries will be written the first time the recovered server is rebooted.

To rectify this situation you will need to follow the instructions in the Windows NT Server documentation for resynchronizing the domain controllers.

13.6. Windows 2003/XP Automated System Recovery

One of the great features in the Windows 2003/XP operating system (and later) is called Automated System Recovery (ASR). With ASR Microsoft has finally provided true disaster recovery support built into the operating system. In prior operating systems (Windows 2000 and earlier), disaster recovery could only be performed by first reinstalling the OS before attempting to recover the system state of the OS from a backup. Now when you boot Windows 2003/XP from the Windows 2003/XP installation CD, you are given the opportunity to boot Windows 2003/XP into ASR mode.

When Windows 2003/XP is booted into ASR mode and the necessary disaster recovery planning steps have been followed, Windows 2003/XP will perform only as much of its installation as necessary to support the execution of a backup application to perform a system state restore. FDR/UPSTREAM has the capability of helping you prepare to recover your Windows 2003/XP system from within this new ASR mode.

The following sections describe the functionality and requirements of running FDR/UPSTREAM in ASR mode.

13.6.1. How ASR Works

Before you boot your system into ASR mode you need to have the following items available:

- The Windows 2003/XP Installation CD
- The FDR/UPSTREAM 3.1.6 (or above) Installation CD
- The ASR diskette

The machine to be recovered can be a totally new machine with a disk that has not even been formatted. The only requirement is that it has the same number of physical disk drives as the original system, at least one CD Rom drive and at least one Network Interface Card (NIC). Also, the physical disk drives must be as large or larger than those in the original system.

Before starting the ASR process you should first perform a few computer system configuration steps, as follows:

- If possible, configure the system to boot from the CD Rom drive first. At the very least, the diskette drive should not be first as this causes a minor problem during the Windows installation process when the computer reboots. If during the Windows installation process' reboot step, the system stops to inform you that the diskette does not contain a NTLDR file, briefly remove the diskette from the diskette drive, reboot the computer manually and then reinsert the diskette after the reboot process has started.
- Configure the physical network interface card with settings that are optimal for your network. Most NICs allow you to change the default configuration on the card itself. An example of the NIC configuration settings that may need to be changed are the duplex mode and media type for ethernet NICs.

To start the ASR process you need to boot the machine from the Windows 2003/XP installation CD. When the boot process starts, Windows Setup first issues the following message:

```
Setup is inspecting your computer's hardware configuration...
```

Windows Setup then gives you a short amount of time to press the F6 key to provide it with any third party SCSI or RAID drivers by displaying the following message at the bottom of the screen:

```
Press F6 if you need to install a third party SCSI or RAID
driver...
```

After you take advantage of this opportunity or let it pass, Windows Setup then gives you another brief time period to press the F2 key to perform an Automated System Recovery by displaying this message at the bottom of the screen:

```
Press F2 to run Automated System Recovery (ASR)...
```

To enter ASR mode, you must be ready to press the F2 key when prompted. After you press the F2 key, Windows Setup displays the following screen:

```
Windows Setup
===============



Please insert the disk labeled:

Windows Automated System Recovery Disk

Into the floppy drive.


Press any key when ready.
```

At this point you must insert the ASR diskette previously created by FDR/UPSTREAM into the A: drive. This diskette is crucial since the entire ASR process is dependent upon it. The **Creating the ASR Diskette** section below describes how to create this diskette. For now we will assume that the ASR diskette is available so that you can answer the Windows Setup prompt.

Once you insert the ASR diskette in the A: drive and press a key, Windows Setup reads the following files from the ASR diskette to start a minimal installation of Windows:

- ASR.sif
- ASRPNP.sif

- Setup.log

The ASR.sif file provides Windows Setup with information about the disk partitions from the original system, their sizes, disk position and drive letters. ASRPNP.sif provides information about the Plug and Play devices in the original system. And Setup.log provides a list of OS files that need to be installed to create the minimal OS environment adequate for running FDR/UPSTREAM.

Using these three files, Windows Setup performs the following steps:

- Loads the drivers and other utilities needed to prepare the physical disks for the new system.
- Ensures that the physical disks are properly partitioned.
- Formats the critical disk partitions.
- Installs the OS files detailed in Setup.log onto the appropriate partition(s).
- Invokes the A:\USASR.exe program.

Windows setup knows that it should execute A:\USASR.exe because of an entry in the ASR.sif file (more about this later).

13.6.2. USASR.exe

USASR.exe is a front-end program to US.exe (the main FDR/UPSTREAM program) that performs the following steps:

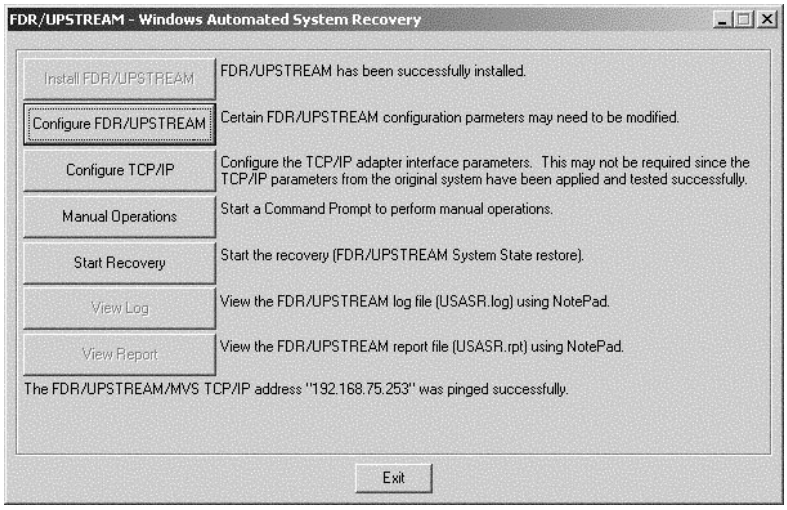
- Prompts you to insert the FDR/UPSTREAM Installation CD.
- Copies the FDR/UPSTREAM files from the CD back to their original disk location.
- Reestablishes the TCP/IP settings from the original system (if possible).
- Tests the TCP/IP connectivity to your FDR/UPSTREAM host system (if possible).
- Prompts you to start the FDR/UPSTREAM recovery process.

To perform these tasks, USASR.exe reads the following files from the ASR diskette:

- US.ser
- USASR.cfg
- USASR.dat
- USASR.key

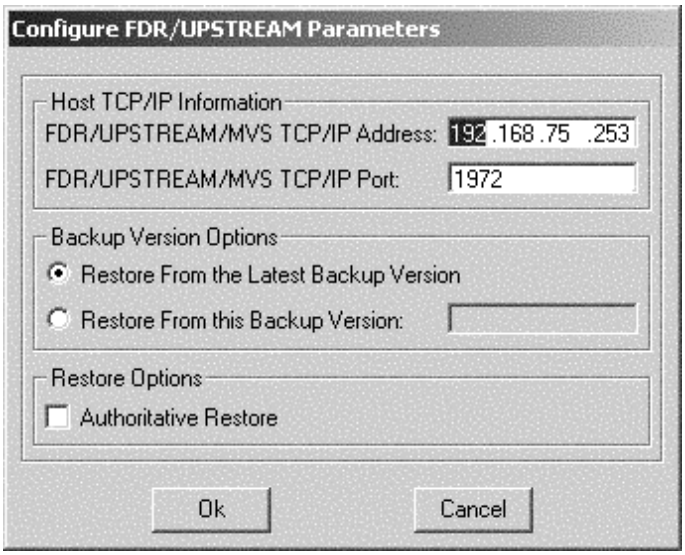
The first three files, US.ser, USASR.cfg and USASR.dat, are used by US.exe to perform the recovery. The USASR.key file contains the TCP/IP settings from the original system.

The first thing you will see from USASR.exe is a dialog prompting you to “Please insert the FDR/UPSTREAM Installation CD in the CDRom drive.” When you see this dialog, remove the Windows 2003/XP Installation CD from the CDRom drive and insert the FDR/UPSTREAM Installation CD. You do not have to click anything or press any key on the keyboard. USASR.exe will automatically detect when the CD is available and will then copy the FDR/UPSTREAM for Windows product files back to their original location on the appropriate disk. When this process is finished, USASR.exe will display the following dialog:



If the installation of the FDR/UPSTREAM for Windows product files was successful, the **Install FDR/UPSTREAM** button will be disabled.

In most cases, the FDR/UPSTREAM parameters contained in the USASR.cfg and USASR.dat files are appropriate for the recovery. However, one or more of these parameters may need to be modified. In this case, you can click the **Configure FDR/UPSTREAM** button to display the following dialog:



Use the *Configure FDR/UPSTREAM Parameters* dialog to change the TCP/IP Address and Port if they have changed from the time of the backup, to indicate the Version Date of the backup to be restored from, and to indicate if the restore is Authoritative or not. A restore should be authoritative if any of the following are true:

- This is a recovery of the first Domain Controller (DC) of a completely lost domain.
- This is a recovery of the first Distributed File System (DFS) Replica Partner (RP) of a completely lost DFS Replica Set (RS).
- This is a recovery of the first Cluster Node (CN) of a completely lost cluster system.

Do not restore this machine authoritatively if this is a recovery of a DC of a domain that already has another functioning DC, a DFS RP of a DFS RS that already has another functioning DFS RP, or a CN of a cluster that already has another functioning CN.

If you need to modify any FDR/UPSTREAM parameters that the *Configure FDR/UPSTREAM Parameters* dialog does not address, these parameters can be modified by clicking the **Manual Operations** button on the main USASR.exe dialog to start a Command Prompt window from which you can invoke Notepad.exe to modify the USASR.cfg and USASR.dat files manually. The USASR.cfg and USASR.dat files will have been copied to the FDR/UPSTREAM directory (C:\UPSTREAM by default) on the disk.

WARNING: Do not modify the files on the ASR diskette.

The Command Prompt window started by clicking the **Manual Operations** button can also be used to run any other program as long as the program does not require the Windows COM subsystem. The Windows COM subsystem is not available in ASR mode. This may come in handy in the event there are some additional setup steps that need to be performed before starting the FDR/UPSTREAM recovery. However, in the large majority of cases this will not be necessary.

If USASR.exe is unable to reconfigure your network adapter(s) to establish TCP/IP connectivity with the FDR/UPSTREAM host, you may need to click the **Configure TCP/IP** button to manually configure the network adapter(s) yourself. This is described in the **Configuring Network Adapters(s)** section.

Once you have made any necessary modifications to the FDR/UPSTREAM parameters (in USASR.cfg and USASR.dat), performed any necessary manual operations and successfully configured the network adapter(s), you are ready to perform the FDR/UPSTREAM recovery. Since these manual steps will not be necessary in most cases, you can simply click on the **Start Recovery** button to invoke US.exe to perform the FDR/UPSTREAM recovery. During the recovery process FDR/UPSTREAM may perform multiple restores (usually three, one for the regular file system restores of all the disks, one for the quota information for all of the NTFS formatted disks and one for the system state). After the FDR/UPSTREAM recovery is finished, the **View Log** and **View Report** buttons will be enabled to allow you to view the results of the FDR/UPSTREAM recovery process.

When the recovery is complete, click the **Exit** button. You will be prompted to "Please insert the Windows Installation CD in the CDRom drive." After USASR.exe detects that the Windows Installation CD has been inserted in the CDRom drive, it will terminate. At this point Windows Setup will complete the ASR process by rebooting the system. If the FDR/UPSTREAM recovery is successful, the new system will boot successfully with the system state from the original system.

There is one minor problem that may occur that can be easily fixed. The computer account for this new system may have to be recreated in the Active Directory database. To do this, log onto the system using the Administrator account for the local system, change the system to be a member of a Workgroup and then change it back to being a member of the domain. After another reboot, the system will be back to its original state.

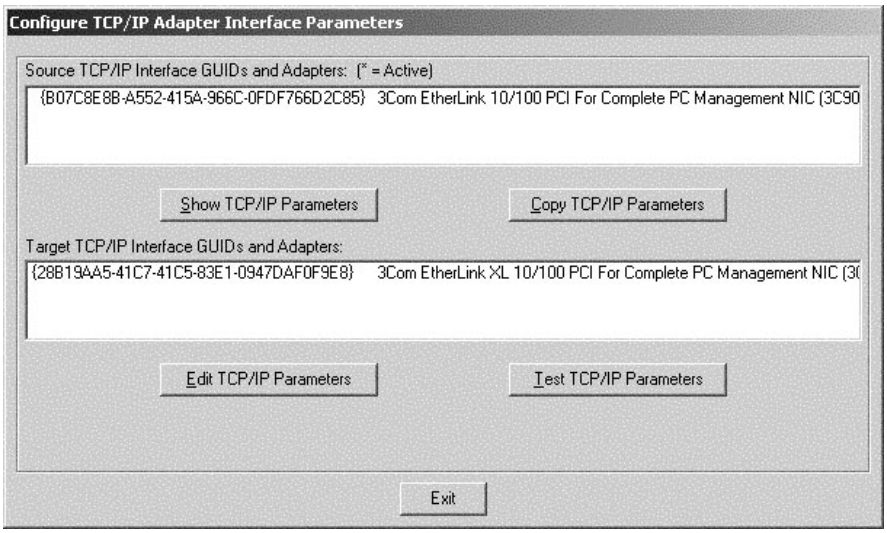
13.6.3. Configuring Network Adapter(s)

During Windows Setup's ASR OS installation, the networking subsystem is configured and started. The only problem here is that Microsoft neglected to include the original TCP/IP settings in the ASR.sif file. As a result, the network adapter(s) is/are configured with TCP/IP settings that are only appropriate for DHCP operations. In most cases, this is not how the original system was configured. It is therefore left to USASR.exe to reconfigure the adapter(s). The simple case, which is fortunately the most common, is that the original system had one

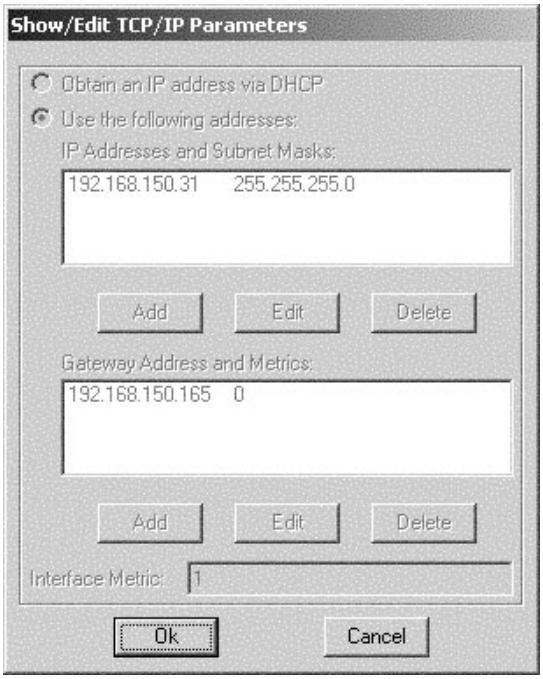
network adapter, the new system has one network adapter and the local subnet LAN topology is the same. In this case, USASR.exe can simply reconfigure the one adapter, successfully test the TCP/IP connectivity to the FDR/UPSTREAM host and not require you to manually reconfigure the network adapter. There may be other cases that will require you to reconfigure the network adapter(s) manually, as follows:

- The original system had more than one network adapter.
- The new system has more than one network adapter.
- The nature of the disaster that you are recovering from is such that the local subnet LAN topology is different than the original.

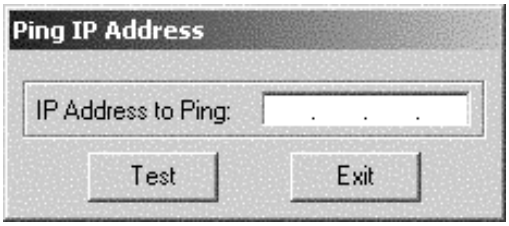
If you find yourself in any of these cases, click the **Configure TCP/IP** button on the main USASR.exe dialog to display the following dialog:



The top list on this dialog contains the GUID(s) of the adapter(s) in the original (source) system. The bottom list contains the GUID(s) of the adapter(s) in the new (target) system. In the case where the new system has more than one adapter you need to identify which adapter will be used to route the TCP/IP conversation to the FDR/UPSTREAM host and make sure that the adapter is reconfigured properly. You probably will not have to worry about any of the adapters that are not used for the TCP/IP conversation to the FDR/UPSTREAM host. To determine which source adapter contains the TCP/IP parameters needed to reconfigure the target adapter, select the source adapter from the list and click the **Show TCP/IP Parameters** button to display the following dialog:



This dialog shows the TCP/IP parameters for the chosen source adapter. To copy a set of TCP/IP parameters from one of the source adapters to one of the target adapters, select the source and target adapters and click the **Copy TCP/IP Parameters button**. If you are not sure which source adapter needs to be reconfigured, copy the identified target adapter TCP/IP parameters to all of the source adapters. To test the TCP/IP parameters for a source adapter select the source adapter and click the **Test TCP/IP Parameters** button to display the following dialog:



This dialog is used for supplying the FDR/UPSTREAM host TCP/IP address. When the Test button is clicked, USASR.exe will ping the supplied address. The results of the ping are then displayed.

In the case where the local subnet LAN topology of the new system has changed from that of the original system, it may be necessary to configure the target adapter with a completely new set of TCP/IP parameters. In this case, select the target adapter and click the **Edit TCP/IP Parameters** button to display the *Show/Edit TCP/IP Parameters* dialog as shown above. This time, all of the fields will be enabled allowing you to add, edit and delete, the IP Addresses, Subnet Masks, Gateway Addresses, and Metrics.

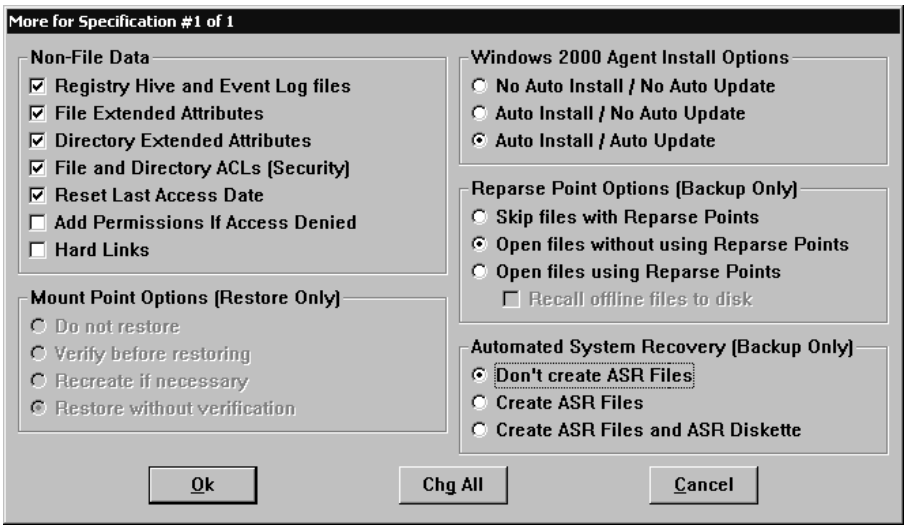
13.6.4. Creating the ASR Diskette

As mentioned above, the ASR diskette is crucial to the ASR process. US.exe has the capability of creating this diskette during a full-system backup of the original system. A new FDR/UPSTREAM parameter named

ASRBACKUP controls the creation of the files that are placed on the ASR diskette. The ASRBACKUP parameter has the following values.

- 0: Don't create the ASR files (the default).
- 1: Create the ASR files but not the ASR diskette.
- 2: Create the ASR files and the ASR diskette.

The ASRBACKUP parameter can be set from the following US.exe dialog:



US.exe will only create the ASR files if one or more full-system file specs are specified. A full-system file spec is either "\\." or "\\machinename". It is possible to have US.exe create the ASR files for multiple Windows 2003/XP machines within a single backup. Each set of ASR files is unique to the machine for which it is created. When the ASR files are created, they are written to a directory named as follows:

- *workpath*\ASR*machinename*

Where: "workpath" is the directory specified by the WORKPATH parameter in the FDR/UPSTREAM configuration file (UPSTREAM.CFG by default) and "machinename" is the name of the machine to which the ASR files belong.

So, if the WORKPATH configuration parameter is set to "C:\UPSTREAM", the backup specifies file specs of "\\." and "\\RONXP2", and the name of the machine on which the backup is run is named "RONXP1", then the following directories will be created:

- C:\UPSTREAM\ASR\RONXP1
- C:\UPSTREAM\ASR\RONXP2

These directories will have the following files created in them:

- ASR.sif
- ASRPNP.sif
- Setup.log
- US.ser
- USASR.cfg

- USASR.dat
- USASR.exe
- USASR.key

These are the files that get written to the ASR diskette. These files are created before the actual backup starts so they can be included in the backup. To have US.exe create an ASR diskette containing these files, the following criteria must be met:

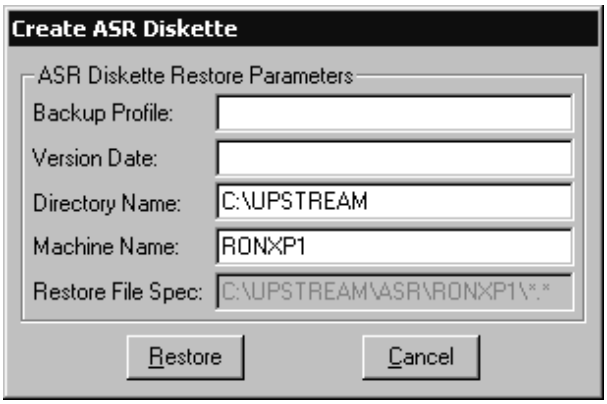
- The ASRBACKUP parameter must be set to a value of 2.
- One, and only one, full-system file spec must be specified in the backup.
- A blank formatted diskette must be present in the A: drive.

If all of these criteria are met at the time of the backup, US.exe will automatically copy the ASR Files to the ASR diskette.

But wait a minute, how does the ASR diskette get created if my backup specifies multiple full-system file specs or I do not have a blank formatted diskette in the A: drive at the time of the backup? The answer to this question is that US.exe will not create the ASR diskette. So, to provide a way to create an ASR diskette when it cannot be created during the backup, an additional utility program named ASRDisk.exe has been provided to create an ASR diskette from a backup that contains the ASR files.

ASRDisk.exe is a front-end program to US.exe that will invoke US.exe to perform a restore of the ASR files to a diskette in the A: drive. ASRDisk.exe must be invoked manually .

When ASRDisk.exe is run with no parameters from a machine named “RONXP1”, it will display the following dialog:



The fields on this dialog are:

- **Backup Profile:** The backup profile used in the original backup.
- **Version Date:** The FDR/UPSTREAM version date of the backup. The format of this field must be 12 characters: YYMMDDHHMMSS. If this field is left blank, the latest version is used.
- **Directory Name:** The WORKPATH used in the original backup
- **Machine Name:** The Windows machine name of this machine.

When all of the required parameters are specified and the **Restore** button is clicked, you will be prompted to insert a blank diskette in the A: drive. Once the diskette is inserted, ASRDisk.exe will invoke US.exe to perform a

restore of the ASR files from the directory specified by the *Restore File Spec* field to the root directory of the diskette in the A: drive (A:*.*).

ASRDisk can accept command line parameters to related to the fields above:

- BACKUPPROFILE=backupprofilename : The BACKUPPROFILE of the backup
- VERSIONDATE=[yymmddhhmmss] : The VERSIONDATE of the backup
- DIRECTORYNAME=directoryname: The WORKPATH for the backup
- MACHINENAME=machinename : The name of the machine

You may be wondering how often you need to (re)create the ASR files. The answer to this question is, not that often. Once created the ASR files will not change unless one of the following changes:

- The partitioning of one of the physical disks for a machine changes.
- The drive letter assignments for the physical disk partition for a machine changes.
- Something about the PNP subsystem of a machine changes.
- You add or remove network adapters to/from a machine.
- You change the TCP/IP configuration for any of the network adapters of a machine.
- You modify your FDR/UPSTREAM configuration parameters (UPSTREAM.CFG).
- You modify your FDR/UPSTREAM personalization settings (US.ser).

If none of these changes occur, the contents of the ASR files will not change. Since the ASR files remain on the disk in a subdirectory of the directory that is used as the FDR/UPSTREAM WORKPATH, these files will continue to be backed up. On the other hand, the amount of time it takes FDR/UPSTREAM to create the ASR files adds only a few seconds to the backup, so you may want to set the ASRBACKUP parameter to a value of 1 for all of your backups so you will never have to worry about it again. A happy medium here is to have the ASR backups created only on your full backups and not on your incrementals.

13.6.5. The ASR Diskette Files

Some of the ASR files created during an FDR/UPSTREAM backup are created by a Windows 2003/XP API function call. These are:

- Setup.log
- ASR.sif
- ASRPNP.sif

The rest of the ASR files are created by FDR/UPSTREAM itself. When FDR/UPSTREAM directs Windows 2003/XP to create its set of ASR files it supplies to the API a number of parameters as follows:

- The name of the program (USASR.exe) to be invoked by Windows Setup when booted into ASR mode.
- The list of critical disk partitions in the system.
- A set of additional parameters to be read by USASR.exe.

The list of critical disk partitions is:

- The partition that the boot files are on (Microsoft calls this the system partition)
- The partition that the system files are on (Microsoft calls this the boot partition)
- The partitions that contain the Active Directory database files.

During the Windows Setup initialization steps, all of the critical partitions are formatted, whether they need to be or not. All of the other partitions are not formatted if Windows Setup finds that their file systems are healthy.

These parameters are included in the ASR.sif file. A sample ASR.sif file for a machine named RONXP1 follows:

```
;
; Microsoft Windows Automated System Recovery State Information
; File
;
[VERSION]
Signature="$Windows NT$"
ASR-Version="1.0"
Provider="FDR/UPSTREAM"

[SYSTEMS]

1="RONXP1","x86","5.1","C:\WINDOWS",0,0x00010100,"300 0 -60 0-10-0-5 2:00:00.0 0-4-0-1
2:00:00.0","Eastern Standard Time","Eastern Daylight Time"

[BUSES]
1=1,3

[DISKS.MBR]
1=1,1,1,0xaae9aae9,512,63,255,80043264

[DISKS.GPT]

[PARTITIONS.MBR]
1=1,0,3,"\??\Vol-
ume{54aadf2e-d37c-11d5-968c-806d6172696f}",0x80,0x07,0x07,63,20964762,0x1000
2=1,1,0,"\??\Vol-
ume{54aadf2f-d37c-11d5-968c-806d6172696f}",0x00,0x07,0x07,20964825,12578895,0x0
3=1,2,0,"\??\Volume{0ede127c-d94d-11d5-823a-0050da74e57c}",0x00,0x07,0x07,33543720,464
92110,0x0

[PARTITIONS.GPT]

[COMMANDS]
1=1,3000,0,"%SystemRoot%\system32\asr_fmt.exe","/restore"
2=1,2000,1,"%SystemRoot%\system32\asr_ldm.exe","/restore"
3=1,4000,1,"A:\USASR.exe","-r"

[ASRFMT.FIXEDVOLUMES]
1=1,"\??\Volume{54aadf2f-d37c-11d5-968c-806d6172696f}","\DosDevices\D:",NTFS,"Page
File",0x1000
2=1,"\??\Vol-
ume{0ede127c-d94d-11d5-823a-0050da74e57c}","\DosDevices\F:",NTFS,"Backup",0x1000
3=1,"\??\Volume{54aadf2e-d37c-11d5-968c-806d6172696f}","\DosDevices\C:",NTFS,"",0x1000

[ASRFMT.REMOVABLEMEDIA]
1=1,"\Device\CdRom0","\??\Vol-
ume{54aadf2d-d37c-11d5-968c-806d6172696f}","\DosDevices\E:"
2=1,"\Device\Floppy0","\??\Volume{54aadf2c-d37c-11d5-968c-806d6172696f}","\DosDevices\
A:"

[ASRLDM.VOLUMESTATE]
0,      34,   1, 125,"LDM Configuration","Microsoft0"
```

```
[USASR.PARAMETERS]
"RONXP1","C:\UPSTREAM"
```

The contents of the ASR.sif file must not be modified with the possible exception of the last line:

```
"RONXP1","C:\UPSTREAM"
```

This line contains two parameters. The first is the name of the original system and the second is the name of the FDR/UPSTREAM directory. The name of the machine must not be changed, but the FDR/UPSTREAM directory may be changed if you want to have FDR/UPSTREAM installed to a different directory during ASR mode.

The contents of Setup.log and ASRPNP.sif must not be modified.

The ASR files that FDR/UPSTREAM creates are:

- US.ser
- USASR.cfg
- USASR.dat
- USASR.exe
- USASR.key

The US.ser is copied as-is from the FDR/UPSTREAM directory. The USASR.cfg contains a copy of the configuration parameters active at the time of the backup. The USASR.dat file contains a specific set of parameters needed to perform the ASR recovery. USASR.exe is the program that drives the FDR/UPSTREAM recovery. USASR.key is a set of saved registry information for the TCP/IP parameters for the network adapters in the original system.

The USASR.cfg and USASR.dat files may be modified before starting the FDR/UPSTREAM recovery, but this should not be done without first checking with FDR/UPSTREAM tech support. The other three files must not be modified.

13.7. FDR/UPSTREAM Windows 2000 Agent

There are a number of Windows 2000 specific features which require that the application run on the Windows 2000 system being accessed. To support remote backups and restores and to improve the performance of local backups and restores, FDR/UPSTREAM provides a small, automatically installed agent which will provide necessary backup/restore preprocessed information. For most users there are no required parameters or configuration changes.

The Windows 2000 features include:

- System Protected Files. Windows 2000 automatically protects against write access to all of it's operating system files. Since FDR/UPSTREAM needs to open these files for write, even for backups (to reset the last access date), specific support is required. Windows 2000 makes this list available, but only in system self-relative form.
- The FilesNotToBackup registry key. Windows 2000 contains a registry key with a number of values which list files which backup applications are not to access. Note that if you wish to include files in your backup which are specified in this registry key, simply delete them from the key. Again, this list is in self-relative form.

When you specify a file spec which FDR/UPSTREAM detects is on a remote Windows 2000 system, it will check the system's registry to see if the agent is running. If the agent is not running or is an old version, FDR/UPSTREAM will by default install or upgrade the agent. Thus, no parameter changes are necessary for normal operations.

The agent runs as a service and does contain a simple user interface. However, most FDR/UPSTREAM users will not need to modify or install it in any way. Thus the remainder of this section is for informational purposes only.

13.7.1. USW2KAGT.EXE

The FDR/UPSTREAM Windows 2000 non-local systems agent, USW2KAGT.EXE is designed to operate in three different modes:

- As a service program managed by the Service Control Manager
- As a command line service program installer/uninstaller
- As an interactive service program installer/uninstaller.

When the Service Control Manager (SCM) invokes USW2KAgt.exe, it starts it with the "-s" parameter. The "-s" parameter informs USW2KAgt.exe to run as a service and perform its intended functions. USW2Kagt.exe should be invoked with the "-s" parameter by the SCM only.

To install USW2Kagt.exe on one or more Windows 2000 machines in the local domain or a remote domain, start it manually with one of the following syntaxes:

- USW2KAgt
- USW2KAgt -c[[domainname\]machinename] [-q]
- USW2KAgt -i[[domainname\]machinename] [-q]
- USW2KAgt -r[[domainname\]machinename [-f]] [-q]
- USW2KAgt -u[[domainname\]machinename [-f]] [-q]

- USW2KAgt -h
- USW2KAgt -?

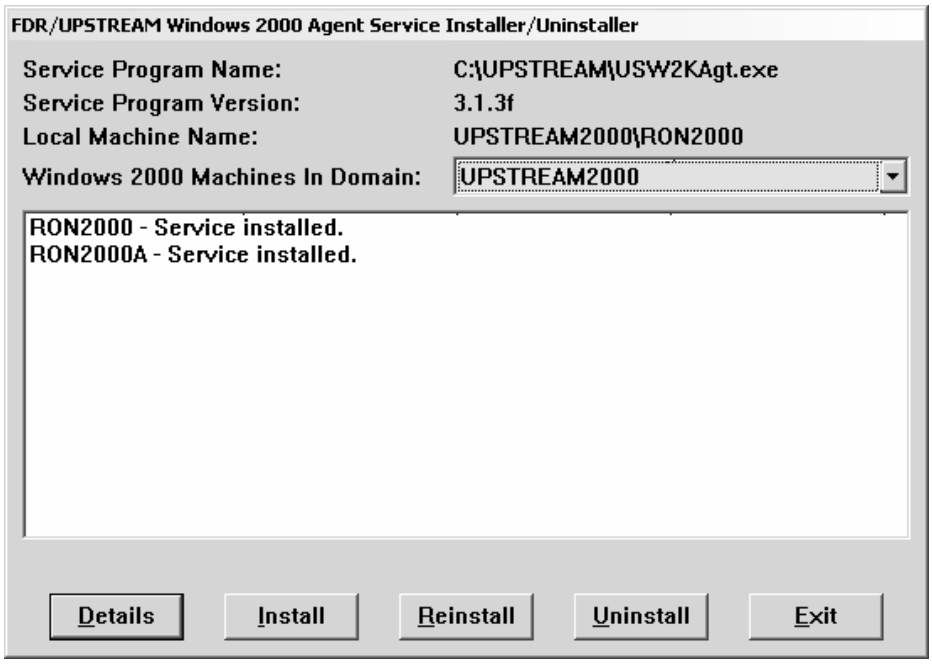
Where:

- -c is used to check the USW2KAgt service status on the specified machine(s).
- -i is used to install the USW2KAgt service on the specified machine(s).
- -r is used to reinstall the USW2KAgt service on the specified machine(s).
- -u is used to uninstall the USW2KAgt service on the specified machine(s).
- -f is used to force a reinstall or uninstall.
- -q is used to run in 'quiet' mode (no display output).
- -h is used to display this help text.
- -? is used to display this help text.

The optional sub parameter for the -c, -i, -r and -u parameters may be any of the following:

- **machinename** The specified machine in the local domain.
- * All machines in the local domain.
- **domainname\machinename** The specified machine in the specified domain.
- **domainname*** All machines in the specified domain.

If USW2KAgt.exe is executed with no parameters, the FDR/UPSTREAM Windows 2000 Agent Service Installer/Uninstaller dialog is displayed.



Using this dialog, an administrator can install, reinstall or uninstall the FDR/UPSTREAM Windows 2000 Agent service on one or more machines within the currently selected domain. By clicking the Details button, you can also check the status of the service on any machine. The machine names listed for the selected domain

are the Windows 2000 machines found in that domain. The machine list is a multi-select list that allows you to perform the chosen operation on multiple machines at one time. When you are finished with your installation/reinstallation/uninstallation tasks, click on the Exit button to exit.

13.7.2. FDR/UPSTREAM and USW2KAgt.exe

USW2KAgt.exe makes its information available to FDR/UPSTREAM by maintaining a number of keys in the registry of the machine on which it is installed. It creates a registry key: HKEY_LOCAL_MACHINE\SOFTWARE\Innovation Data Processing\FDR/UPSTREAM with the subkeys of:

- ExcludeSpecsbyShare and then further subkeys of A$, B$, C$ or whatever shares you have defined.
- SystemProtectedFiles
- USW2KAgt

Whenever FDR/UPSTREAM needs to get the information supplied by USW2KAgt.exe, it simply reads these registry keys. If for some reason, FDR/UPSTREAM cannot read any of these registry keys, it assumes that the USW2KAgt.exe service program is not installed on that machine and then will attempt to install it by invoking USW2KAgt.exe using the command line:

```
USW2KAgt.exe -rmachinename -f -q
```

By allowing FDR/UPSTREAM to operate with its default settings, it can insure that it always has access to the information provided by USW2KAgt.exe.

There is a file spec (repeating) parameter which controls FDR/UPSTREAM's ability to automatically install the USW2KAgt service as its needs require: **INSTALLWIN2KAGENT**. Its values are:

- 0 Do not automatically install the USW2KAgt service
- 1 Automatically install the USW2KAgt service if it is not installed
- 2 Automatically update the USW2KAgt service if it is not installed or if it has a back-leveled version number. This is the default.

13.7.3. How the FDR/UPSTREAM Windows 2000 Agent Uses PlugIns

The FDR/UPSTREAM Windows 2000 Agent service loads a number of PlugIn components depending on the characteristics of system it is installed on. The PlugIn components that it loads are:

- USW2KAgtWinAD.dll
- USW2KAgtCertServ.dll
- USW2KAgtCluster.dll

These PlugIn components provide the support for some of the individual components of the System State. The System State is described in section 13.8. They are related to a number of older PlugIn components that were loaded by earlier versions of the main FDR/UPSTREAM program (US.exe or USCmd.exe). Starting with version 3.1.6, it is no longer recommended that you reference these PlugIns individually, so the main FDR/UPSTREAM program no longer needs to load them (i.e. they do not need to be installed in the PlugIn subdirectory of the main FDR/UPSTREAM directory).

These PlugIn components are installed, along with the USW2KAgt.exe program, in the %SystemRoot\system32 directory. If, for any reason, USW2KAgt.exe determines that it needs to load one of these PlugIns and the PlugIn component is not available, USW2KAgt.exe will write an error message to the event log.

13.8. Windows System State

Starting with version 3.1.4e of FDR/UPSTREAM for Windows, FDR/UPSTREAM now has the capability of backing up and restoring the entire System State of a Windows 2000/2003/XP computer. The System State is a concept introduced in Windows 2000 and consists of the core set of files and database data which must be backed up as a whole to ensure that a consistent snap-shot of the system is captured. The System State, as defined by Microsoft, consists of:

- Boot and system files. These are the files in the root of the boot drive (what Microsoft calls the system drive), all of the files in the new System Protected Files (SPFs) list and a few others.
- The registry.
- The COM+ Class Registration database.
- The SYSVOL (for Domain Controllers only).
- The Active Directory database (for Domain Controllers only).
- The Certificate Server database (only if the computer is a Certificate Server).
- The Cluster database (only if the computer is a member node of a cluster).

To deal with all of these components as a whole (the System State), FDR/UPSTREAM for Windows version 3.1.5 debuts a new feature called the SysState PlugIn (SysState.dll). The SysState PlugIn works in conjunction with another FDR/UPSTREAM component called the FDR/UPSTREAM Windows 2000 Agent service (USW2KAgt.exe) that was introduced in version 3.1.4. The FDR/UPSTREAM Windows 2000 Agent is described in section 13.7.

This section assumes that you are familiar with the individual components of the Windows 2000 System State, the requisite terminology and how to manage them.

The SysState PlugIn combines the functionality of the individual components of the system state described in other sections of this manual. For more information about each component you can also see the following sections:

- Active Directory. WinAD PlugIn section 13.9.
- Certificate Server. CertServ PlugIn section 13.10.
- Cluster server. Cluster PlugIn section 13.11.

NOTE: You should not use the separate WinAD, CertServ and Cluster PlugIns, as the SysState PlugIn does it all.

NOTE: We recommend that you perform System State backups if you intend to use FDR/UPSTREAM for system recovery.

NOTE: Windows 2000 users should apply Service Pack 2 or later to Windows 2000 systems from which Active Directory backups and restores are performed. Refer to Microsoft KnowledgeBase article Q295932.

NOTE: There is no system state on a cluster virtual server, only on the individual nodes. For completeness, you should backup the system state on all nodes.

13.8.1. Upgrading FDR/UPSTREAM

The System State PlugIn is intended as a single collection of all the components in the system state which were collected separately in earlier versions of FDR/UPSTREAM. Your existing backup specifications will still work, however they will not be able to take advantage of the single collection nature of the System State PlugIn. So we recommend that you modify existing backup specifications to include this new feature. Note however, that your first full-merge backup will run longer as a number of files are renamed to indicate that they are in the "System State".

13.8.2. SysState PlugIn Backups

The SysState PlugIn can be used with FDR/UPSTREAM to backup any Windows 2000/2003/XP operating system machine. The only exception to this is that virtual servers defined in a cluster environment do not have their own system state, so you should only attempt to backup the system state of the cluster nodes. With FDR/UPSTREAM and the SysState PlugIn running on any Windows 2000/2003/XP computer in a domain, you can backup any number of Windows 2000/2003/XP computers within the same domain. The Windows 2000/2003/XP computers to be backed up can be the local machine (the one on which FDR/UPSTREAM is run) or a remote machine (another Windows 2000/2003/XP computer in the same domain). You can not use a Windows NT machine to back up the System State of a Windows 2000 or higher machine.

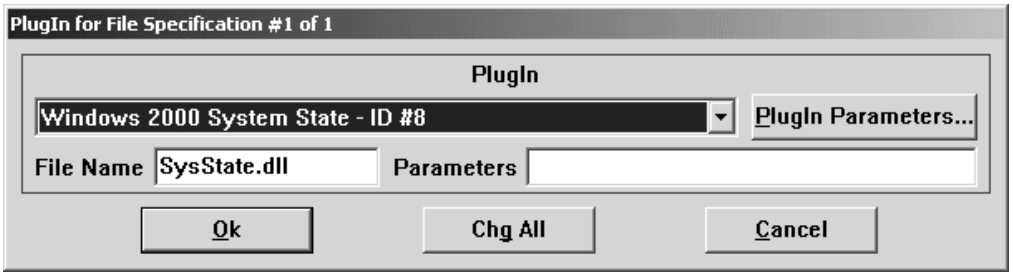
Some of the components of the Windows 2000/2003/XP System State are always backed up fully regardless of the FDR/UPSTREAM backup type selected when you specify the System State PlugIn. Even when you specify that the backup should be incremental (backup type Incremental merge, MERGE=2), the following components are backed up fully, as the Microsoft supplied APIs do not support incremental backups for these objects:

- The registry.
- The COM+ Class registration database.
- The Active Directory database.
- The Certificate Server database.
- The Cluster database.

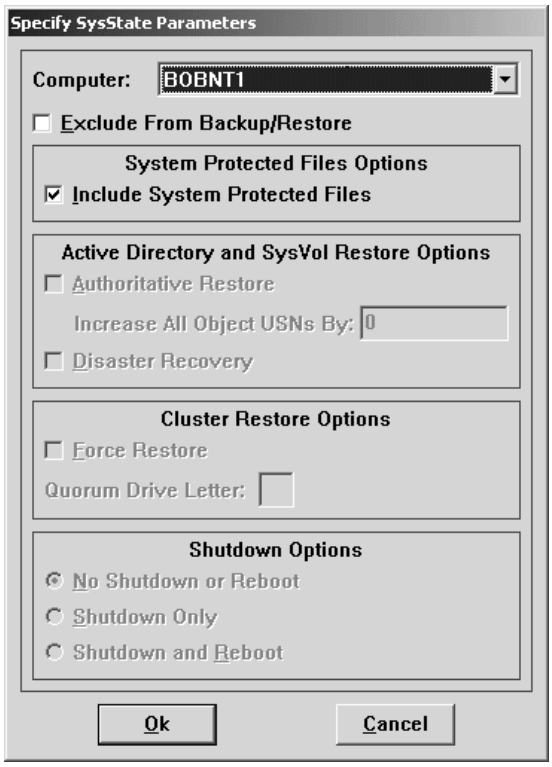
Because of the inter-dependencies between the various components of the System State, the SysState PlugIn backup will always include those components present on the computer being backed up. Although, the System State components can be restored individually, it is strongly suggested that the entire System State be restored as a whole so as not to break any of the inter-dependencies between the components. This is especially true when performing a disaster recovery restore as this can only be done by restoring the entire system state. System State components should be restored individually only when you are sure of what you are doing.

SysState PlugIn backups and restores can be restarted.

From the FDR/UPSTREAM program, to specify the use of the SysState PlugIn to back up the System State of a single Windows 2000/2003/XP computer, pull down the **Action** menu, select **Backup** from the main screen to display the *Backup Parameters* dialog. Press the **PlugIn...** button to display the *PlugIn for File Specification ...* dialog.



Pull down the combo box list of PlugIns and select **Windows 2000 System State**. To specify parameters specific to the PlugIn, press the **PlugIn Parameters...** button.



The parameters specific for backup include:

- **Computer:** This drop down list will be populated with the NETBIOS names of all of the computers in the local domain. In the above example, BOBNT1 is the name of a Domain Controller in the domain.
- **Include System Protected Files:** System Protected Files are operating system files which have been chosen by Microsoft to be key to operating system operations. These are considered part of the system state, but since they are operating system files, they can be recovered through other means (original media, service packs, etc.). Checking this option will increase the size of the backup substantially, but it is recommended whenever possible to aid in complete system recovery. The default is checked.
- **Exclude From Backup/Restore:** This checkbox is used for marking the file specification that uses the SysState PlugIn as an exclude file specification (SPECTYPE=1).

Press the **Ok** button to save your SysState PlugIn Parameters (the PLUGINPARAMETERS repeating parameters) and return to the *Backup Parameters* dialog.

SysState requires a specific set of file specification parameters that it sets automatically. As a result, once the SysState PlugIn is selected for a file specification, the **Backup Parameters** dialog will not allow you to modify the **Backup Specification** field or click the **Spec Detail…** button to alter the rest of the file specification parameters.

The SysState PlugIn may be used for multiple file specifications as long as the computer names are unique for each file specification. The SysState PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

Backups that include system state files will take a few seconds to display the initial backup status dialog. This is normal as FDR/UPSTREAM determines the contents of the system state.

13.8.3. Using SysState

The individual files that the SysState PlugIn passes to FDR/UPSTREAM to be backed up consist of a large number of real files along with a number of virtual files. The real files will be backed up with names that are similar to their real names, but slightly modified.

For example: the system state file \\computer\C$\WINNT\system32\NTDLL.dll will be backed up as \\computer\SysState\C$\WINNT\system32\NTDLL.dll.

The virtual files that are backed up by the SysState PlugIn are:

- \\computer\SysState\WinAD\WinAD.bin
- \\computer\SysState\CertServ\CertServ.bin
- \\computer\SysState\Cluster\Cluster.bin

However, if you are backing up remote machines, or your local drives by UNC name, we highly recommend that you backup your System State using the System State PlugIn in all backups.

If the System State PlugIn is not used, and your file spec includes system state files, FDR/UPSTREAM will still backup these files. However, they will be backed up by their actual file name, not grouped together with other components of the system state. This means that it may be difficult to restore the System State as a single entity in a disaster situation.

Although most users will want to backup up the C: drive along with the system state, it is now possible to create a backup that is only the system state. Such a backup can be used to perform a fast disaster recovery restore without having to restore the entire C: drive. This topic is discussed further in the *SysState Disaster Recovery* section.

NOTE: Active Directory backups (part of the System State for Windows 2000/2003/XP Servers) have a maximum amount of time that they can be used for restore (a tombstone lifetime). The NTDS Backup API requires that each SysState backup contain an expiry token which controls how long the backup of the Active Directory remains viable.

The default tombstone lifetime is 60 days. Setting a different value on the NTDS configuration object can change this. Microsoft Knowledge Base article Q216993 explains how to do this. Whether you use the default

tombstone lifetime or set a different value for it, you should plan on backing up your Windows 2000/2003/XP System State at more frequent intervals. Even though you may not be interested in changing your default tombstone lifetime, you should still read KB article Q216993 since it references other KB articles which contain other useful information such as the impact of performing authoritative restores on objects needed to synchronize with other domains.

13.8.4. SysState PlugIn Restores

WARNING: System State restores should only be performed if you have a thorough knowledge of Windows 2000/2003/XP. In particular, partial System State restores can be especially dangerous. We highly recommend you review the Microsoft documentation and contact FDR/UPSTREAM technical support for assistance before beginning a System State Restore.

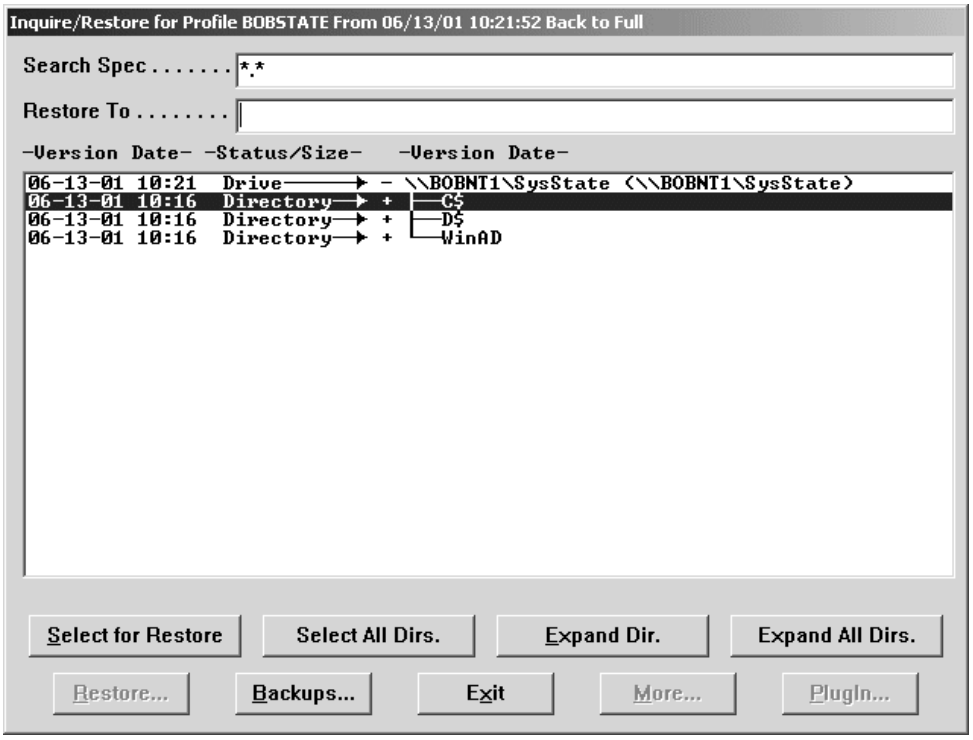
The SysState PlugIn does not allow you to restore the system state components to an alternate location. The location from which the real and virtual files were backed up will be the location to which they will be restored. Although the SysState PlugIn will allow you to restore the system state of one computer to another computer, this is discouraged with the exception being the replacement of one computer with another such as a disaster recovery

Another restriction that the SysState PlugIn checks for is that the Windows Active Directory server (Domain Controller) must be running in *Directory Services Restore Mode* (i.e. offline mode). To put the Active Directory server in this offline mode you need to reboot it and select the Directory Services Restore Mode from one of the Safe Mode options available at boot time, by pressing the F8 key during the boot process.

To start a restore from the computer to be restored or another Windows 2000/2003/XP computer in FDR/UPSTREAM, pull down the **Action** menu and select the **List and Restore**. If your backup consists only of the System State you will see the List and Display dialog.

If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the SysState PlugIn, the *Inquire/Restore PlugIn Selection for Profile ...* dialog will be displayed. From this dialog, highlight the **Windows 2000 System State** item and press the **Continue…** button to display the List and Restore dialog. Only the System State component of the backup will be displayed in List and Restore.

Refer to section 13.4. for a more detailed description of this process.



Refer to section 13.8.8. below before beginning any restores of the System State.

In the above example, the D drive is the boot drive. So if you expand the C drive's directory, you will only see the minimum number of files (boot.ini, ntdetect.com and ntldr) necessary for system boot up. If you expand the D drive's directory, you will see the bulk of the files and directories which include:

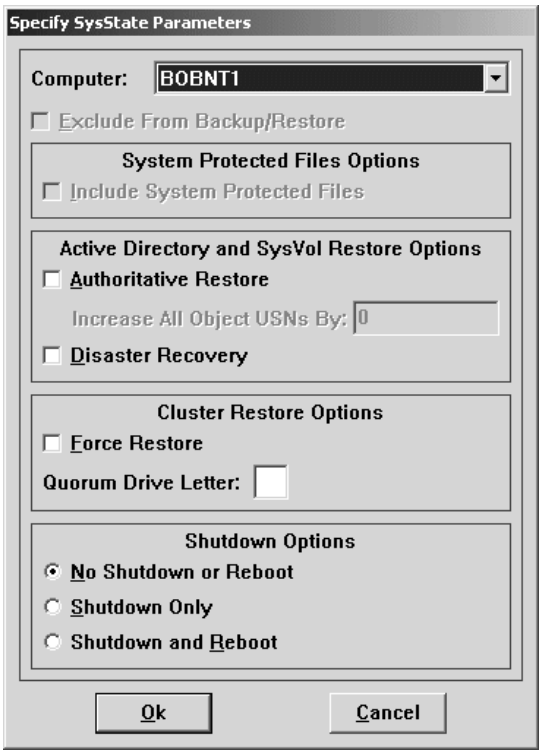
- The system protected files. This is the vast majority of the files. Many of these files are automatically updated when service packs are installed. But they are generally not updated otherwise.
- The registry. Generally stored in %SystemRoot%\system32\config, these 5 files (default, SAM, security, software and system) represent the core of the machine's configuration.
- The COM+ Class registration database. This is stored as a virtual file, COM+, in the same directory as the registry.
- The SYSVOL. Related to Active Directory, it is generally stored as files and directories in the \WINNT\SYSVOL directory. It should be restored at the same time as Active Directory.

Some other files displayed on this screen (in virtual directories) are:

- The Active Directory database (for Domain Controllers only). Displayed as the virtual file \WinAD\WinAD.bin
- Certificate Server database. (Not in the example above) Virtual file \CertServ\CertServ.bin
- Cluster server database. (Not in the example above) Virtual file \Cluster\Cluster.bin

In this dialog you will see all of the top-level file specifications that use the SysState PlugIn. Only the files for the file specifications that use the SysState PlugIn will be displayed. Find the file specification for the computer to be restored and select the drive specification (\\computer\SysState) to restore the entire system state or select one or more of the individual components to restore only a part of the system state. Then press either the **Select for Restore** button or the **Select All Dirs.** button to include these files (or virtual files) in the restore.

This will enable the **PlugIn…** button. The **More…** button will not be enabled since the SysState PlugIn requires complete control of the file specification parameters. Press the **PlugIn...** button to specify System State specific parameters. Press the **PlugIn Parameters...** button to display the System State dialog.



The restore specific parameters are:

- **Computer:** This drop down list will be populated with the NETBIOS names of all of the computers in the local domain. In the above example, BOBNT1 is the name of a Domain Controller in the domain.
- **Active Directory and SysVol Restore Options**:
  - **Authoritative Restore:** Refer to section 13.8.7. below for a description of Active Directory and SYSVOL authoritative restores. Check this box to perform an authoritative restore. The default is not checked.
  - **Increase all Object USNs By:** Enabled if you check Authoritative Restore above, specify how much to increase the restored Active Directory objects' USNs (Universal Serial Number) to assure that the restored objects don't get lost in replication. If enabled, the default is 0 meaning the USNs will not be increased.
  - **Disaster Recovery:** Check this box to allow the proper restore of Active Directory on a system that does not have it installed (i.e. a Windows 2000 Server that has not been promoted to a Domain Controller). Disaster Recovery restores are valid only when the entire System State is being restored. The default is not checked.
- **Cluster Restore Options**:
  - **Force Restore:** Check this box to force the restore of a Cluster Quorum database. The default is not checked.
  - **Quorum Drive Letter:** The drive letter of the quorum disk. This is **Q:** by default.

Refer to section 13.8.6. below before restoring a Cluster Server.

- **Shutdown Options**:
  - **No Shutdown or Reboot:** The restore will complete and the system will not be shutdown. This option is useful in situations where you need to perform an Authoritative restore of only certain Active Directory objects, since this will require a manual invocation of the NTDSUTIL.EXE utility to complete the Authoritative restore of only these objects. Select this option with care.
  - **Shutdown Only:** The system will be shutdown - you must manually restart it.
  - **Shutdown and Reboot:** The system will be shutdown and immediately restarted.

  The **Shutdown Options** control the rebooting of the machine after a restore. Most of the System State objects require a reboot after being restored. Note: If you are restoring to a remote Windows system, the system to be shutdown will be the one being restored to, not the system running FDR/UPSTREAM.

Once you have set the SysState PlugIn parameters to your liking, press the **Ok** button to return to the **PlugIn for File Specification …**dialog. You will now see the **Parameters** field (the **PLUGINPARAMETERS** repeating parameter) filled in with a set of parameters modified based on your selections in the SysState PlugIn dialog. Press the **Ok** button to return to the **Inquire/Restore ...** dialog.

13.8.5. Host Initiating System State Backups and Restores

Like all other FDR/UPSTREAM backups and restores, those that use the SysState PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e. after the SPECNUMBER parameter) for each file specification:

```
FILES \\computer\SysState\*.*
PLUGIN SysState.dll
PLUGINPARAMETERS COMPUTER=computer INCLUDESYSTEMPROTECTEDFILES=…
```

For backups, the correct format for the FILES parameter is not crucial since the SysState PlugIn will override it anyway and force it to be \\computer\SysState*.*. It does this by getting the real computer name from the PLUGINPARAMETERS value. For restores, the FILES parameter must be specified precisely for the system state components you want to restore. To restore the entire system state specify:

```
FILES \\computer\SysState\*.*
```

To restore only the real system state files, which are stored on the C drive, specify:

```
FILES \\computer\SysState\C$\*.*
```

To restore only the Active Directory specify:

```
FILES \\computer\SysState\WinAD\*.*
```

or:

```
FILES \\computer\SysState\WinAD\WinAD.bin
```

PLUGINPARAMETERS are space separated, TITLE=VALUE, all on one line:

Title	Value	Context	Description
COMPUTER	Computer name of the computer to be backed up or restored.	All	Required for all SysState backups and restores, the computer name of the system to be backed up or restored.
INCLUDESYSTEMPROTECTED FILES	Y or N	Backup	Whether system protected files should be included in the backup. The default is Y.
AUTHORITATIVERESTORE	Y or N	Active Directory and/or SYSVOL restores.	Whether Active Directory and/or SYSVOL restores should be authoritative. The default is N.
OBJECTUSNINCREASE	Number	Active Directory and/or SYSVOL restores	An optional parameter that specifies the increase of the USN (Universal Serial Number) for every object in the Active Directory being authoritatively restored. The default is 0, meaning that the USNs are not to be increased. This parameter causes the SysState PlugIn to execute the NTDSUTIL.exe utility to perform an Authoritative restore function with a subfunction of Restore database verinc (number).
DISASTERRECOVERY	Y or N	Full system state restores	An optional parameter that allows the proper restore of Active Directory in the case of a disaster recovery. The default is N.
FORCE	Y or N	Cluster Server restores	An optional parameter that indicates whether the restore of a Cluster Quorum database should be forced or not. The default is N.
QUORUMDRIVELETTER	Drive letter:	Cluster Server restores	An optional parameter indicating the cluster server quorum drive letter. The default is Q:.
SHUTDOWN	0 = No shutdown 1 = Shutdown without reboot. 2 = Shutdown with reboot.	Restores	An optional parameter that indicates whether the computer should be shutdown after a successful restore and whether the computer should then be restarted. The default is 0 (no shutdown).

An example of a complete set of parameters to backup the system state for the RON2000 computer would be specified as follows:

```
SPECNUMBER 1
FILES \\RON2000\SysState\*.*
PLUGIN SysState.dll
PLUGINPARAMETERS COMPUTER=RON2000 INCLUDESYSTEMPROTECTEDFILES=Y
```

An example of a complete set of parameters to perform an authoritative restore of the entire system state for the RON2000 computer and then reboot the system would be specified as follows:

```
SPECNUMBER 1
FILES \\RON2000\SysState\*.*
PLUGIN SysState.dll
PLUGINPARAMETERS COMPUTER=RON2000 AUTHORITATIVERESTORE=Y
OBJECTUSNINCREASE=400000
FORCE=N QUORUMDRIVELETTER= SHUTDOWN=2
```

Note that the values on the PLUGINPARAMETERS line must be on a single (continued) line in your FDR/UPSTREAM host USTBATCH job.

13.8.6. Cluster Server Restores

To perform a restore to a Cluster Server node, only the node that is being restored to can be running the Cluster service. All of the other cluster nodes in the cluster must be stopped (i.e. not running the Cluster service). For this reason, you must manually shut down the Cluster service on all the other nodes. The exception to this rule is when you specify FORCE=Y subparameter of the PLUGINPARAMETERS for the restore. In this case, the restore process will shut all of the other nodes in the cluster down.

Another requirement for a successful restore is that the quorum disk (Q: by default) must have the same partition layout (number of partitions and offsets to each partition) as the quorum disk described in the backup. If this is not the case, you must manually reconfigure the quorum disk to match the layout described in the backup. Again, the exception to this rule is when you specify FORCE=Y subparameter of the PLUGINPARAMETERS for the restore. In this case, the restore process will attempt to reconfigure the quorum disk to match the disk described in the backup.

In the case where the quorum database is now on a drive other than the default Q: drive, specify the QUORUMDRIVELETTER=?: subparameter of the PLUGINPARAMETERS for the restore. Use the form "?:", where ? is the drive letter of the quorum database drive.

In most cases you will not need to specify FORCE=Y or QUORUMDRIVELETTER=?: if you start the restore by manually stopping all of the cluster nodes for the cluster other than the node that you will be restoring to. Also, since the quorum database is shared between the various cluster nodes, it is not necessary to restore to all of the nodes of the cluster. Only one restore is required for an entire clustered system.

13.8.7. Authoritative Restore

A Windows Active Directory database (one of the components of the system state) is replicated between all of the Active Directory servers (Domain Controllers) in a given domain. When the Active Directory database is restored to any single Active Directory server, that database is as it was at the time it was backed up until the Active Directory server is started. At the time the Active Directory server is started, it undergoes a synchroniza-

tion process with all of the other Active Directory servers in the domain. The result of this synchronization is that all of the objects with the highest Universal Serial Number (USN) are replicated to the other servers. This means that if any database object was modified between the time of the backup and the time of the restore, the modified object has a higher USN than the unmodified object that was restored from the backup and as such, the modified object will be replicated back to the database that was just restored, thereby nullifying the restore.

To cause one or more of the objects in a restored database to not be overwritten by this replication process, they must be marked as being *Authoritatively Restored*. An object that is Authoritatively Restored has its USN increased so as to win the replication battle with other like named objects from the Active Directory databases of the other Active Directory servers.

To restore one or more objects authoritatively, two important steps must be performed:

- 1. The FDR/UPSTREAM restore using the SysState PlugIn must specify AUTHORITATIVERESTORE=Y
- 2. Either the restore must specify OBJECTUSNINCREASE=nn (where nn is the number by which the USNs of the Active Directory objects is increased) which will cause the SysState PlugIn (via USW2KAgt.exe) to automatically execute the NTDSUTIL.exe utility or the NTDSUTIL.exe utility must be executed manually after the FDR/UPSTREAM restore finishes, to mark the desired objects as being authoritatively restored.

NTDSUTIL.exe is a command line only utility program, installed as part of the operating system. NTDSUTIL.exe has many uses, one of which is to mark objects for authoritative restore. You must be booted in Directory Services repair mode to run NTDSUTIL.exe.

To start it, open a command line window and type NTDSUTIL at the command prompt. This will display the main ntdsutil prompt:

```
ntdsutil:
```

At the ntdsutil: prompt enter:

```
ntdsutil: authoritative restore
```

The prompt is now changed to:

```
authoritative restore:
```

At the authoritative restore: prompt enter:

```
authoritative restore: help
```

A list of available subcommands will be displayed. To authoritatively restore all of the objects in the database, use one of the following subcommands:

```
restore database
```

or:

```
restore database verinc %d
```

Where %d is some number.

To authoritatively restore only a subset of the objects in the database, use one of the following subcommands:

```
restore subtree %s
```

or:

```
restore subtree %s verinc %d
```

where %s is the fully qualified display name (DN) of either an end node object or a container object and %d is some number. For example, to authoritatively restore a user object for a user named “Test User 1” in the “UPSTREAM2000.com” domain, enter the following:

```
restore subtree “CN=Test User 1,CN=Users,DC=UPSTREAM2000,DC=com”
```

Note the use of double quotes(“) around the object name since it contains spaces.

The input to the NTDSUTIL.exe utility can be piped in from a file using the following command line syntax:

```
NTDSUTIL.exe <NTDSUTIL.IN
```

The manual execution of the NTDSUTIL.exe utility can be skipped if either of the following conditions is true:

- The PLUGINPARAMETERS does not contain AUTHORITATIVERESTORE=Y
- The PLUGINPARAMETERS contains AUTHORITATIVERESTORE=Y and OBJECTUSNINCREASE=nn with the value being something other than 0.

In the later case, the SysState PlugIn will execute the NTDSUTIL.exe utility for you. You should choose to execute the NTDSUTIL.exe utility yourself by specifying OBJECTUSNINCREASE=0 if you want to authoritatively restore only certain sub-trees of objects within the Active Directory database.

So, if the replication process effectively nullifies a restore, why would you ever want to perform a restore that was not an authoritative restore? A non-authoritative restore comes in handy when you are attempting to recover from a disaster in which you lost an entire Active Directory server. A non-authoritative restore of a server can be used to bring the server back up without necessarily causing any objects to revert back to the state they were in at the time of the backup.

13.8.8. SysState Disaster Recovery

In previous versions of FDR/UPSTREAM, if you wanted to restore just the operating system files, you had to restore all of the C: drive or know exactly which files needed to be restored and restore only those files. The use of the SysState PlugIn now gives you the ability to segregate the operating system files (the system state) from the other files that may reside on the C: drive. Furthermore, the SysState PlugIn groups all of the system state files together under one file spec even though the operating system files may reside one two or more drives (C: and D: for example). Because the system state files are grouped together, and do not include any files which are not system state files, it is easier and faster to perform a disaster recovery for a failed computer.

This method is somewhat dangerous as device drivers which are not part of the system state will not be restored. This technique is best used on a computer on which you wish to revert to a prior version of the system state. Use the procedures discussed in section 13.8.9. on page 13-59 if you are recreating a whole machine.

The disaster recovery procedure for a Windows 2000/2003/XP system is slightly different than it is for a Windows NT system. The recommended Windows 2000/2003/XP disaster recovery procedure is:

- 1. Reinstall the Windows 2000/2003/XP operating system on the computer to be recovered. Make sure this is the same version of the operating system as what is on the backup to be restored (i.e. don't attempt to restore a Windows 2000 Server backup to a Windows 2000 Professional system). During the installation process, give the computer a name that is <u>different</u> from the one it had previously and add it to the domain it was previously a member of.
- 2. If the computer had Certificate Services installed on it previously, reinstall it.
- 3. If the computer was a member of a Cluster group, reinstall Cluster Services.
- 4. Reinstall FDR/UPSTREAM if the restore is to be performed on this machine, otherwise make sure you have another Windows 2000/2003/XP machine in the same domain on which you can perform the restore.
- 5. If the computer to be restored to was a domain controller, reboot the computer into the Directory Services Repair Mode.
- 6. Start the FDR/UPSTREAM restore from either of the following:
  - a. The actual machine to be restored if FDR/UPSTREAM is installed on it
  - b. Another Windows 2000/2003/XP machine that has FDR/UPSTREAM installed on it
  - c. The FDR/UPSTREAM host via a USTBATCH job targeted to a Windows 2000/2003/XP machine on which FDR/UPSTREAM is installed
- 7. In the restore specification specify the PLUGINPARAMETERS with a COMPUTER subparameter of the name of the temporary computer name assigned to the computer in step #1. If the backup was from a Domain Controller, you should also specify the following PLUGINPARAMETERS subparameters:

```
AUTHORITATIVERESTORE=N
DISASTERRECOVERY=Y
```

WARNING: The restore of the Active Directory will fail if DISASTERRECOVERY=Y is not specified for domain controllers.

If you want to have the system rebooted immediately after the restore, specify the following PLUGINPARAMETERS subparameter:

`SHUTDOWN=1`

for a shutdown only

`SHUTDOWN=2`

for a shutdown and reboot

- 8. Reboot the computer. When it starts, it will have the same name and characteristics of the machine from which the backup was taken.
- 9. You may now perform whatever other restores are necessary to recover your applications and data.

The procedure outlined here assumes that the set of hardware in the computer to be restored is the same as the hardware that was in the original computer that was backed up. If this is not the case, the disaster recovery procedure becomes more complicated. You may need to modify the restore somewhat to specify either NTREGRESTORE=1 or NTREGRESTORE=2 to cause FDR/UPSTREAM to allow you to modify the registry before restoring it. Contact FDR/UPSTREAM Tech Support for further instructions.

13.8.9. Recovering a Windows 2000/2003/XP System

To recover a full system (operating system and all data) on Windows 2000/2003/XP which was backed up with a full-system backup, the recovery steps follow. These steps can also be used to migrate to completely new hardware.

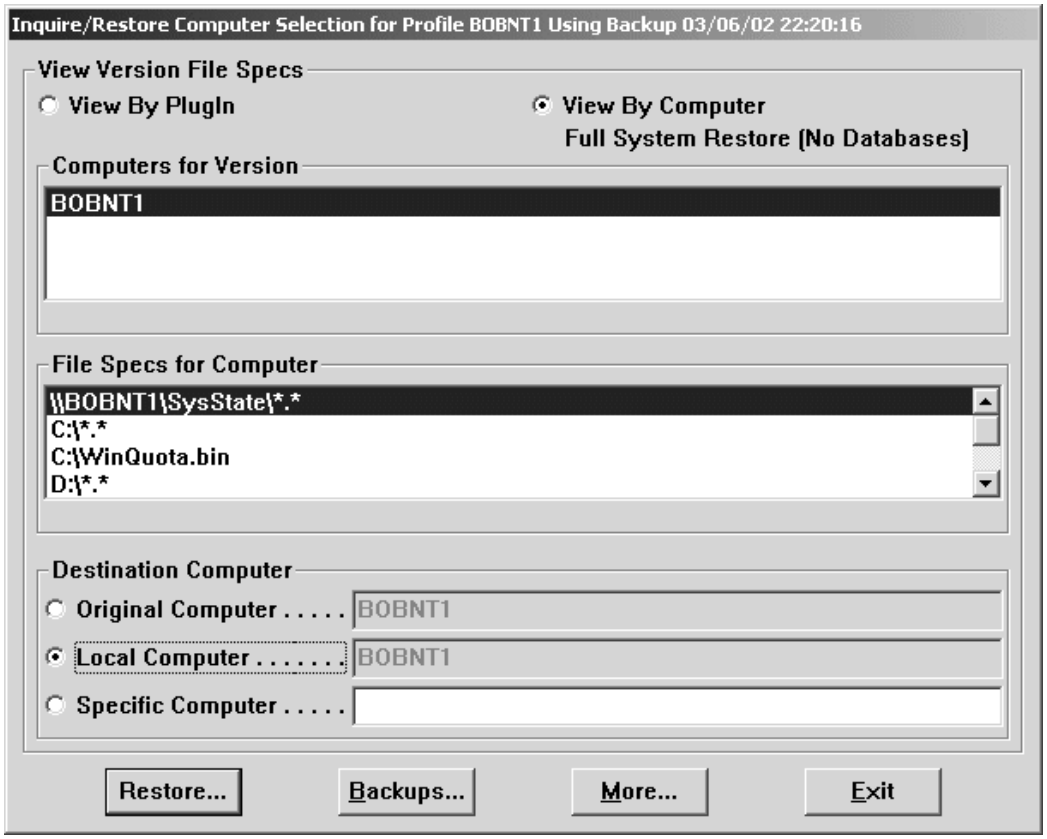
- 1. Install the Windows 2000/2003/XP operating system on the computer to be recovered. Make sure this is the same version of the operating system as what is on the backup to be restored (i.e. don't attempt to restore a Windows 2000 Server backup to a Windows 2000 Professional system). During the installation process, give the computer a name that is <u>different</u> from the one it had previously.

  Repartition the disks in such a way that the same number of disks exist as at the time of the backup and that the drive letters are the same.
- 2. Reinstall FDR/UPSTREAM if the restore is to be performed on this machine, otherwise make sure you have another Windows 2000/2003/XP machine in the same domain on which you can perform the restore. Configure FDR/UPSTREAM so that it can communicate with the FDR/UPSTREAM host.
- 3. If the computer to be restored to was a domain controller, reboot the computer into the Directory Services Repair Mode.
- 4. Start the FDR/UPSTREAM restore from either of the following:
  - The actual machine to be restored if FDR/UPSTREAM is installed on it
  - Another Windows 2000/2003/XP machine that has FDR/UPSTREAM installed on it
  - The FDR/UPSTREAM host via a USTBATCH job targeted to a Windows 2000/2003/XP machine on which FDR/UPSTREAM is installed

  It is recommended that you run restore using FDR/UPSTREAM on the PC that is being recovered since the restore is faster and you will need to reboot the machine when the restore is finished

anyway. Don't forget to have the machine booted in Directory Services Repair Mode before starting the restore.

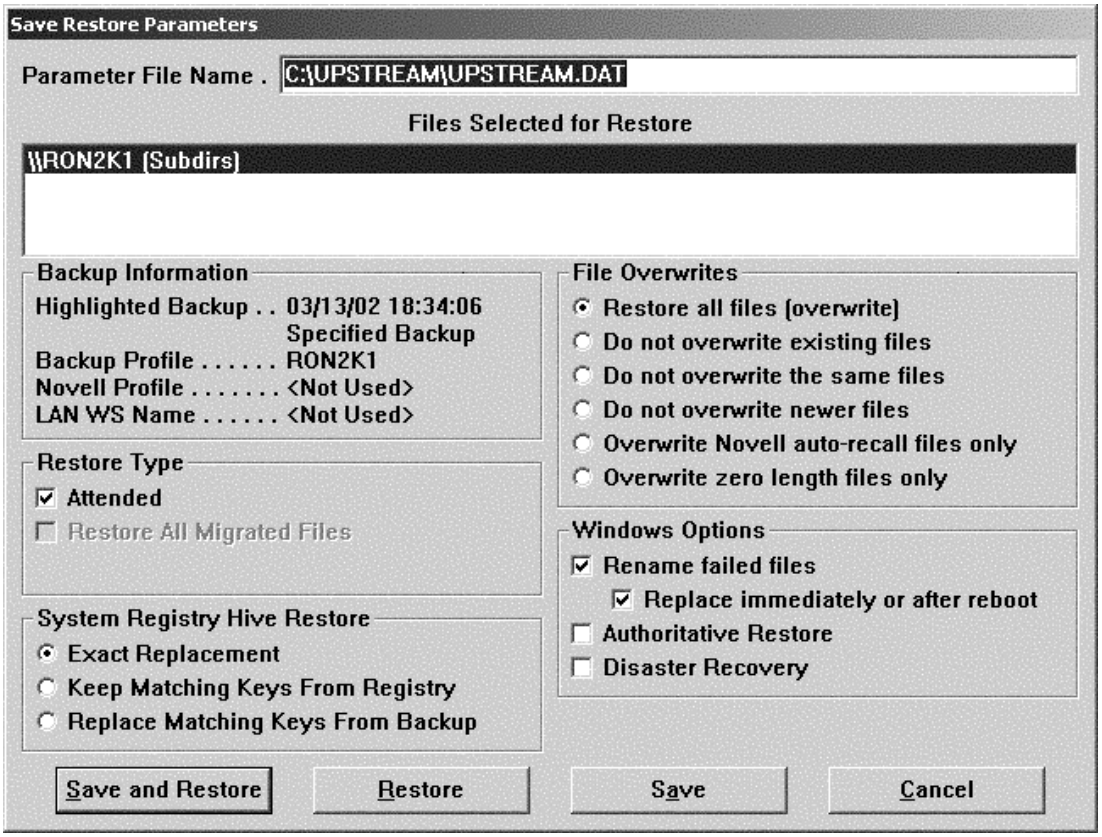
- 5. If you are running the client version of FDR/UPSTREAM, select the **List and Restore** item from the **Action** menu. If the **Host Security Validation** dialog is displayed, enter the backup profile that was used in the original backup and click the **Validate** button. You will see the following dialog:



For a full-system restore click the **View By Computer** radio button. Highlight the source computer in the **Computers for Version** list. In the **Destination Computer** group check:

* **Original Computer:** Allows you to restore to the machine where the data was backed up from. The edit field is always grayed. If you renamed the computer as recommended above, do not check this radio button.
* **Local Computer:** If you are restoring to the local machine, check this radio button. The edit field is always grayed.
* **Specific Computer:** If you are running FDR/UPSTREAM on a different computer than the one you are running on, check this radio button. You will then need to enter the name of the computer in the adjacent edit field.

When you click the **Restore...** button, the **Save Restore Parameters** dialog will be displayed as no file selections are allowed on a full-system restore, all files are restored to their original locations.



The FDR/UPSTREAM defaults of **Exact Replacement** in the **System Registry Hive Restore** group, **Restore all files** in the **File Overwrites** group and **Rename failed files** and **Replace immediately or after reboot** in the Windows **Options** should be checked and you should leave them checked..

Also in **Windows Options** group, are two checkboxes related to full system recovery, **Authoritative Restore** and **Disaster Recovery**. These two checkboxes relate to the following new parameters:

* **AUTHORITATIVE**. A non-repeating parameter that controls how a replicated resource such as a domain controller's Active Directory and SYSVOL or a cluster's database should be handled. Specify Y or N; the default is N.
* **DISASTERRECOVERY**. A non-repeating parameter that is used for specifying a restore of a completely dead system (possibly to different hardware). Specify Y or N; the default is N.

Check these checkboxes (or set the parameters) based on the following criteria:

* When recovering the first Domain Controller of a completely dead domain (i.e. all Domain Controllers need to be recovered) or the first node of a cluster (i.e. all cluster nodes need to be recovered), check **Authoritative Restore** (**AUTHORITATIVE=Y**) and check **Disaster Recovery** (**DISASTERRECOVERY=Y**).
* When recovering a secondary (2nd, 3rd, etc.) Domain Controller of a domain or a secondary cluster node, do not check **Authoritative Restore** (**AUTHORITATIVE=N**) and check **Disaster Recovery** (**DISASTERRECOVERY=Y**).

* When restoring part of a Domain Controller or cluster node for roll-back purposes, check **Authoritative Restore** (**AUTHORITATIVE=Y**) and do not check **Disaster Recovery** (**DISASTERRECOVERY=N**).
* When performing a restore that does not involve rolling-back a Domain Controller or cluster resource, do not check **Authoritative Restore** (**AUTHORITATIVE=N**) and do not check **Disaster Recovery** (**DISASTERRECOVERY=N**).

If you are performing this restore from the host, create a restore with a single file spec: **FILES \\.** or **FILES\\machine_name**. Note that if your system is a Domain Controller you must be booted in Directory Services Repair Mode.

The specification of a full-system restore does not provide you with an opportunity to set any of the sub-parameters of the **PLUGINPARAMETERS** for the SysState PlugIn. The **PLUGINPARAMETERS** sub-parameters will be set as follows:

* **COMPUTER**=*DestinationComputer* as specified by the **Destination Computer** setting.
* **INCLUDESYSTEMPROTECTEDFILES**=Y (meaningless on a restore)
* **AUTHORITATIVERESTORE**=*YorN* as specified by the AUTHORITATIVE non-repeating parameter.
* **OBJECTUSNINCREASE**=100000
* **DISASTERRECOVERY**=*YorN* as specified by the DISASTERRECOVERY non-repeating parameter.
* **FORCE**=N (the entire cluster must be down)
* **QUORUMDRIVELETTER**= (not set)
* **SHUTDOWN**=0 (no reboot will be performed, a manual reboot is required)

If you have a need to use a different value for the **OBJECTUSNINCREASE** sub-parameter you may set the **USADOBJECTUSNINCREASE** environment variable to override the default.

- 6. After the restore completes successfully, reboot the machine. After the reboot the system should be fully recovered. If there are errors during the restore, contact FDR/UPSTREAM Tech Support.

13.9. Windows Active Directory (AD)

NOTE: We recommend that Active Directory be backed up with the complete system state. See section 13.8. for a description of the SysState PlugIn.

NOTE: Windows 2000 users should apply Service Pack 2 to Windows 2000 systems from which Active Directory backups and restores are performed. Refer to Microsoft KnowledgeBase article Q295932.

One of Windows 2000 most significant features is Active Directory, a hierarchical, extensible network directory service. Domain controllers now use Active Directory in addition to the registry to hold their security and configuration information. One of its significant features is online backup; FDR/UPSTREAM now contains an agent which supports Active Directory fully.

Starting with version 3.1.4 of FDR/UPSTREAM, FDR/UPSTREAM now has the capability of backing up and restoring a Windows Active Directory database. This capability is made possible through the use of an FDR/UPSTREAM feature called PlugIns and a PlugIn module named WinAD.dll. The WinAD PlugIn (WinAD.dll) uses the NT Directory Services (NTDS) Backup API to perform online backups and offline restores of the Windows Active Directory. This section describes the specifics of the WinAD.dll PlugIn module. It is assumed that you are familiar with the Windows Active Directory, its terminology and how to manage it.

The WinAD PlugIn can be used with UPSTREAM on any Windows 2xxx operating system machine on which the following DLL files exist: NTDSBMSG.dll, NTDSBCLI.dll, NTDSAPI.dll, NETAPI32.dll; this is true for all Windows 2000 domain controllers. Active Directory backups cannot be performed from Windows NT v4.0 machines.

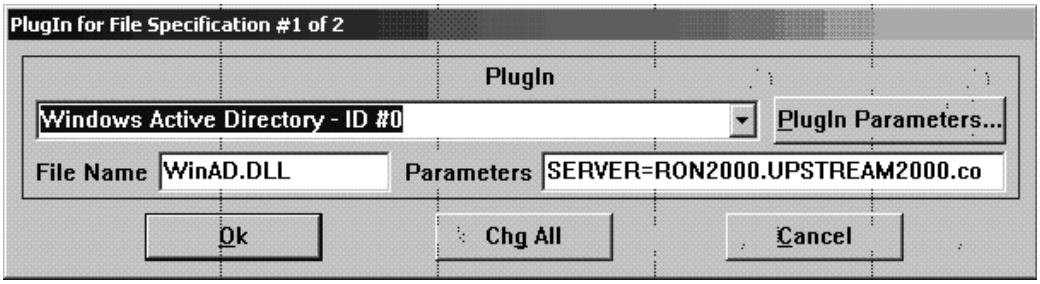
To backup the Active Directory, UPSTREAM can be run as an application under a user account that is a member of the Administrators group or as a service under the Local System account or a user account that is a member of the Administrators group. When run under an Administrator group account UPSTREAM can use the WinAD PlugIn to backup any number of Windows Active Directory servers as long as they reside in the same site as the machine on which UPSTREAM is run. The Windows Active Directory servers do not need to be members of the same Active Directory domain, only the same Active Directory site. When run under the Local System account UPSTREAM can use the WinAD PlugIn to backup the local Active Directory server only. The Local System account does not have the required authority to backup any other Active Directory server.

You will probably need to backup only one Active Directory server within each domain since the Active Directory database is replicated among all of the Active Directory servers (domain controllers) within the domain. The only requirement here is that you must restore the Active Directory back to the server that it was backed up from. So if there is a chance that a particular domain controller may be removed from the domain or demoted so that it is no longer a domain controller, you will want to make sure you have a backup from another server that will remain in the domain.

All WinAD PlugIn backups are full backups, even if you select Incremental merge as your backup type. The NTDS Backup API does not support incremental backup. Since a single Windows Active Directory may become quite large, you may decide to include the WinAD file specifications for your First-time full and Full merge backups only.

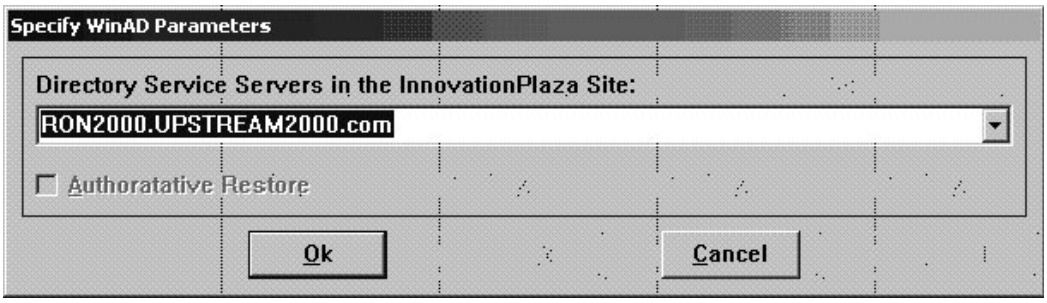
13.9.1. Backups

To specify the use of the WinAD PlugIn to back up a single Windows Active Directory server, pull down the **Action** menu and select **Backup**. The WinAD PlugIn will modify the file specification so it doesn't matter what you initially specify. Press the **PlugIn...** button to display the *PlugIn for File Specification* dialog.



The purpose of this dialog is to select the PlugIn you wish to use and enter the parameters specific to it. To select the Active Directory PlugIn, pull down the **PlugIn** combobox and select **Windows Active Directory - ID #0**. If this item is not available, note that you need WINAD.DLL in the PLUGIN directory directly beneath the UPSTREAM directory.

Press the **PlugIn Parameters...** button to specify the parameters specific to this PlugIn:



The Directory Service Servers combobox is populated with the DNS style names of all of the Active Directory servers in the local site. In the above example, **RON2000** is the name of an Active Directory server and **UPSTREAM2000.com** is the name of the domain in which it resides. Select the active directory server you wish to back up.

WinAD uses the NTDS Backup API to get the names of the individual NTDS files to be backed up and then packages these files together in a single virtual file spec named \\servername\WinAD\WinAD.bin. In the example above, the file name would be \\RON2000.UPSTREAM2000.com\WinAD\WinAD.bin. WinAD makes this virtual file appear as a real file to UPSTREAM which then backs it up in the normal manner.

When you press the **Ok** button to return to the PlugIn for File Specification dialog, the Parameters field is filled in with the values specified here.

The individual NTDS files should be excluded from your normal backups since they are locked by the operating system and cannot be backed up in the normal way. These files typically reside in the C:\WINNT\NTDS directory and can be excluded with an exclusion file specification of C:\WINNT\NTDS*.*. Or course this file specification will be different if the files reside elsewhere.

NOTE: You should exclude C:\WINNT\NTDS from all file level backups.

WinAD requires a specific set of file specification parameters which it sets automatically. As a result, once you specify the Active Directory PlugIn, the Backup Parameters dialog does not allow you to modify the Backup Specification field or press the Spec Detail… button to alter the rest of the file specification parameters.

The WinAD PlugIn may be used for multiple file specifications as long as the Active Directory server (DNS style) names are unique for each file specification. The WinAD PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

Due to the fact that Active Directory is an online database, it is not possible to get the exact size of the Active Directory backup in advance. So UPSTREAM gets the best estimate of its size in advance and doubles it. Thus the backup status display, DASD space allocation and FDRSOS local backup allocation will most likely be somewhat larger than the backup itself. If you find that this estimate is too large or small or you use the DASD Override parameter (DASDOVERRIDE) to adjust the overall backup size.

The NTDS Backup API requires that each WinAD backup contain an expiry token which controls how long the backup remains viable. Thus Active Directory may refuse to apply an old backup.

NOTE: Active Directory may refuse to apply an old backup.

The NTDS Backup API documentation states: "The token contains the backup date and time and the tombstone lifetime of the enterprise at the time the backup was created. At restore time, if the token is expired, the restore is denied. The token expires when the time elapsed since the backup exceeds the tombstone lifetime. Obviously backups will be taken at a more frequent interval than the tombstone lifetime."

The default tombstone lifetime is 60 days. This can be changed by setting a different value on the NTDS configuration object. Microsoft Knowledge Base article Q216993 explains how to do this. Whether you use the default tombstone lifetime or set a different value or it, you should plan on backing up your Windows Active Directory at more frequent intervals. Even though you may not be interested in changing your default tombstone lifetime, you should still read KB article Q216993 since it references other KB articles which contain other useful information such as the impact of performing authoritative restores on objects needed to synchronize with other domains.

13.9.2. Host Initiating Backups and Restores

For the Active Directory PlugIn, The UPSTREAM parameter, **PLUGIN** must be **WINAD.DLL**, and the PLUGINPARAMETERS is set as follows:

```
SERVER=servername [AUTHORITATIVERESTORE=yn]
```

where:

- **SERVER=servername** The DNS style name of an Active Directory server to be backed up or restored. DNS style server names are in the form:

  `servername.domainnamelvlN…domainnamelvl1`

- **AUTHORITATIVERESTORE=yn** An optional parameter that indicates whether restores should be authoritative or not. 'yn' is either Y or N. The default is N. This parameter is used only for restores.

Like all other UPSTREAM backups and restores, those that use the WinAD PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e., after the SPECNUMBER parameter):

```
FILES \\servername\WinAD\WinAD.bin
PLUGIN WinAD.dll
PLUGINPARAMETERS SERVER=servername AUTHORITATIVERESTORE=yn
```

Where SERVER=servername and AUTHORITATIVERESTORE=yn are as described above. The correct format for the FILES parameter is not crucial since the WinAD PlugIn will override it anyway and force it to be \\servername\WinAD\WinAD.bin. It does this by getting the real server name from the PLUGINPARAMETERS value.

13.9.3. Restores

Unlike backups, in order to use the WinAD PlugIn to perform a restore of a Windows Active Directory server, UPSTREAM must be run on the server to be restored. Further, the restore may not target any other Windows Active Directory server. The file specification from which the server is to be restored, must have used the WinAD PlugIn to backup this server.

Another restriction is that the Windows Active Directory server must be running in **Directory Services Restore Mode** (i.e., offline mode). To put the Active Directory server in this offline mode you need to reboot it and select the Directory Services Restore Mode from one of the Safe Mode options available at boot time, by pressing the F8 key during the boot process.

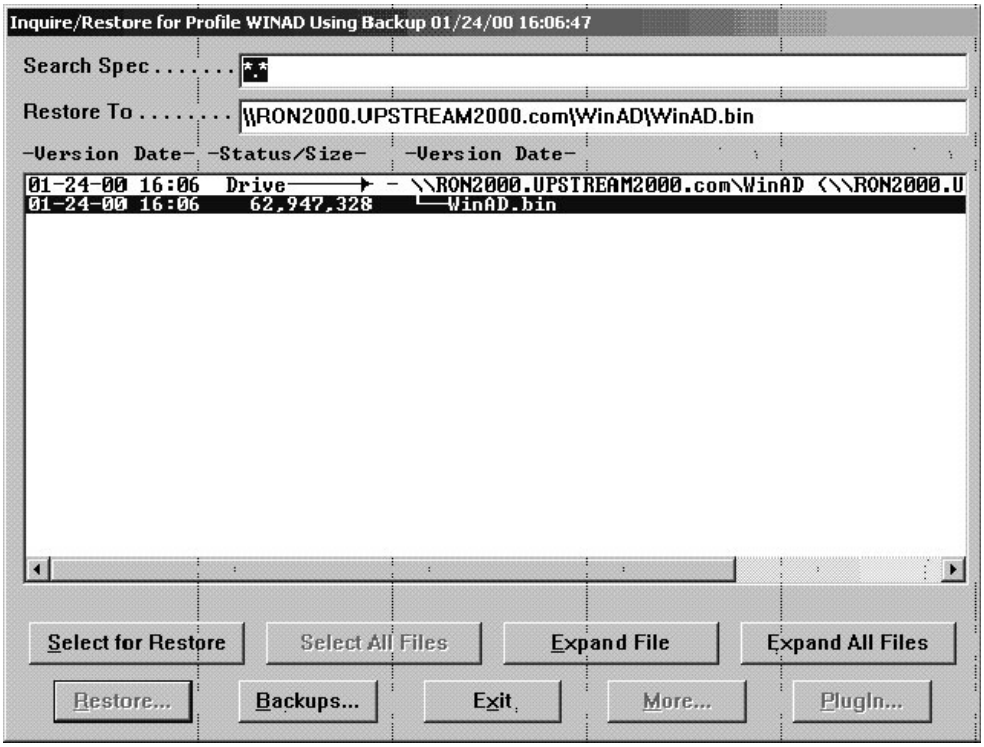
NOTE: You must be running in Directory Services Restore Mode to perform an Active Directory restore.

To start a restore from the server to be restored, pull down the **Action** menu and select **List and Restore**.

If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the WinAD PlugIn, the *Inquire/Restore PlugIn Selection for Profile ...*dialog will be displayed.

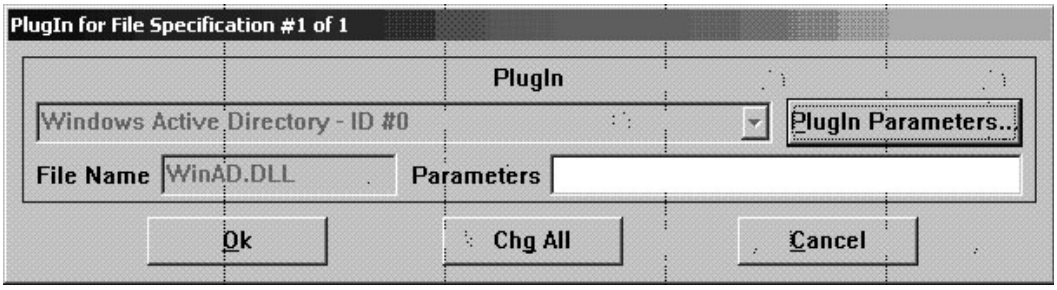
Press the **View by PlugIn** radio button, highlight the **Windows Active Directory - ID#0** item in the **PlugIns for Version** list and press the **Continue…** button.

If the backup version contains file specifications that all use the WinAD PlugIn or you press the Continue... button above, the standard list and restore dialog is displayed.

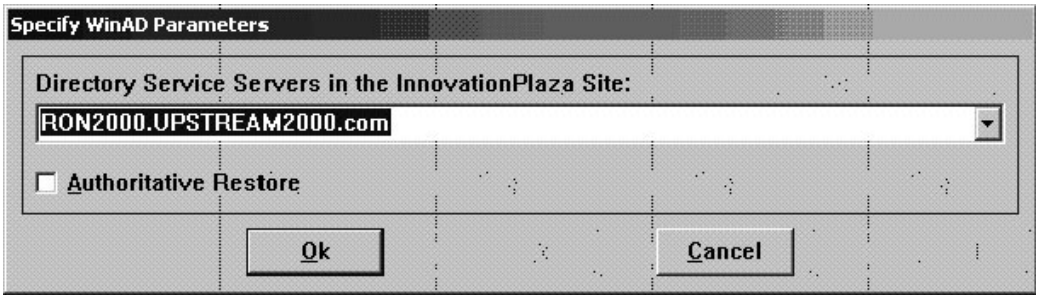


In this dialog you will see all of the top-level file specifications included in this backup version. Only files which use the active PlugIn will be displayed; since you specified the WinAD PlugIn when you entered. Files which used no PlugIn or other PlugIns will not be displayed without exiting and reentering.

Find the file specification for the Windows Active Directory server to be restored (i.e., the one that UPSTREAM should be running on now) and select the WinAD.bin file for that file specification. Press the **Select for Restore** button to have the PlugIn… button enabled. The More… button will not be enabled since the WinAD PlugIn requires complete control of the file specification parameters. Press the **PlugIn…** button to display the **PlugIn for File Specification …** dialog.



The PlugIn field is grayed and automatically selected to the Windows Active Directory PlugIn. Press the **PlugIn Parameters...** button to display the *Specify WinAD Parameters* dialog.



The server name drop down list will have only one entry, the DNS style name of the local Windows Active Directory server. You may either check or not check the Authoritative Restore check box depending on whether you want to have one or more objects in the Windows Active Directory restored authoritatively or not. This is discussed further in the **Authoritative Restore** section below.

Once you have set the WinAD PlugIn parameters to your liking, press the **Ok** button to return to the PlugIn for File Specification … dialog. The Parameters field is filled in with a set of parameters in the format SERVER=servername AUTHORITATIVERESTORE=yn. For example:

```
SERVER=RON2000.UPSTREAM2000.com AUTHORITATIVERESTORE=N
```

13.9.4. Authoritative Restore

A Windows Active Directory database is replicated among all of the Active Directory servers (domain controllers) in a given domain. When the Active Directory database is restored to any single Active Directory server, that database is as it was at the time it was backed up until the Active Directory server is started. At the time the Active Directory server is started, it undergoes a synchronization process with all of the other Active Directory servers in the domain. The result of this synchronization is that all of the objects with the highest Universal Serial Number (USN) are replicated to the other servers. This means that if any database object was modified between the time of the backup and the time of the restore, the modified object has a higher USN than the unmodified object that was restored from the backup and as such, the modified object will be replicated back to the database that was just restored, thereby nullifying the restore.

To cause one or more of the objects in a restored database to not be overwritten by this replication process, they must be marked as **Authoritatively Restored**. An object that is Authoritatively Restored has its USN increased (the default increase is 100,000) so as to win the replication battle with other like named objects from the Active Directory databases of the other Active Directory servers.

To restore one or more objects authoritatively, two important steps must be performed:

- 1. The FDR/UPSTREAM restore using the WinAD PlugIn must specify AUTHORITATIVERESTORE=Y
- 2. The NTDSUTIL.exe utility must be executed after the FDR/UPSTREAM restore finishes to mark the desired objects as authoritatively restored.

NTDSUTIL.exe is a command line only utility program, installed as part of the operating system. NTDSUTIL has many uses, one of which is to mark objects for authoritative restore. To start it, open a command line windows and type NTDSUTIL at the command prompt. The main **ntdsutil:** prompt will be displayed. At the ntdsutil: prompt enter **Authoritative Restore** and press ENTER. The prompt is changed to **authoritative restore**:. At the authoritative restore: prompt enter **Help** and press ENTER. A list of available subcommands will

be displayed. To authoritatively restore all of the objects in the database, use one of the following subcommands:

- Restore database
- Restore database verinc %d

where %d is some number.

To authoritatively restore only a subset of the objects in the database, use one of the following subcommands:

- Restore subtree %s
- Restore subtree %s verinc %d

where %s is the fully qualified display name (DN) of either an end node object or a container object and %d is some number.

By default, NTDSUTIL.exe increases the USNs of the objects to be authoritatively restored by 100000. This can be overridden through the use of the verinc %d option on the Restore database and Restore subtree commands. To specify a different USN increase, replace %d with the desired USN increase. In most cases, the default USN increase of 100000 will work, but there may be some instances where a larger increase may be required. Unfortunately, there is no easy way to determine when a larger USN increase may be needed or what the exact USN increase should be to properly perform an authoritative restore for one or more objects. And since all objects have their own USNs, the USN increase used may work for some objects and not for others.

For example, to authoritatively restore a user object for a user named “Test User 1” in the “UPSTREAM2000.com” domain, enter the following:

```
Restore subtree “CN=Test User 1,CN=Users,DC=UPSTREAM2000,DC=com”
```

Note the use of double quotes(“) around the object name since it contains spaces.

The input to NTDSUTIL can be piped in from a file using I/O redirection. You may want to do this if you have a large number of objects which you need to repetitively update. Use the following command line (assuming your input is in NTDSUTIL.IN):

```
NTDSUTIL.exe <NTDSUTIL.IN
```

The exact syntax rules for NTDSUTIL commands are unknown since very little documentation exists from Microsoft for this utility.

So, if the replication process effectively nullifies a restore, why would you ever want to perform a restore that was not an authoritative restore? A non-authoritative restore comes in handy when you are attempting to recover from a disaster in which you lost an entire Active Directory server. A non-authoritative restore of a server can be used to bring the server back up without necessarily causing any objects to revert back to the state they were in at the time of the backup.

13.10. Windows Certificate Server

UPSTREAM now has the capability of backing up and restoring a Windows 2000 Certificate Server database. This capability is made possible through the use of a FDR/UPSTREAM feature called PlugIns and a PlugIn module named CertServ.dll. The CertServ PlugIn (CertServ.dll) uses the Certificate Server (CertSrv) Backup API to perform online backups and offline restores of the Certificate Server. This document describes the specifics of the CertServ.dll PlugIn module. Refer to the *FDR/UPSTREAM PlugIns* section for more information about how UPSTREAM interacts with PlugIn modules. This document assumes that you are familiar with the Certificate Server, its terminology and how to manage it.

Section 13-19 is where CertServ is used.

Note that the Certificate Server database is included as part of the System State PlugIn backup (see above). We recommend that you use the System State PlugIn as part of your regular backup procedures, rather than backing up individual components with PlugIns such as CertServ.

13.10.1. CertServ PlugIn Backups

The CertServ PlugIn can be used with UPSTREAM on any Windows 2000 operating system machine on which the following DLL files exist:

- CertServ.dll
- NTDSBMSG.dll
- NTDSAPI.dll
- NETAPI32.dll

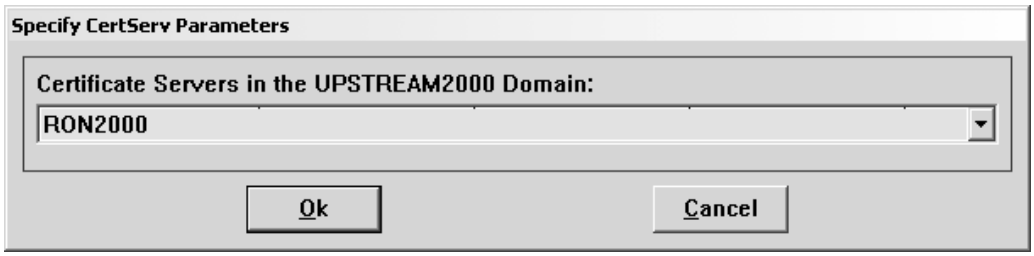
UPSTREAM running on this machine can use the CertServ PlugIn to backup any number of Certificate Server servers as long as they reside in the same domain as the machine on which UPSTREAM is run.

All CertServ PlugIn backups are full backups, even if you select Incremental merge as your backup type. The CertSrv Backup API does not support incremental backups. Since a single Certificate Server may become quite large, you may decide to include the CertServ file specifications for your First-time full and Full merge backups only.

From UPSTREAM on your Windows 2000 PC, to specify the use of the CertServ PlugIn to back up a single Certificate Server, use the Backup Parameters dialog to add a new file specification (or select a file specification that you want to alter) and then press the **PlugIn…** button. The file spec is not used by the PlugIn. The *PlugIn for File Specification…* dialog is then displayed.

CertServ has a unique PlugIn ID number of 6 and a descriptive name of **Windows Certificate Server**. The PlugIn ID number is used internally by UPSTREAM to uniquely identify PlugIn modules. The descriptive name is used on the *PlugIn for File Specification* ... dialog to select this PlugIn for use with a particular file spec.

If you press **PlugIn Parameters...** the dialog specific to Certificate Server is displayed:



The only option is a pull down to select the fully qualified DNS style name of the certificate server you wish to back up. In the above example, RON2000 is the name of a certificate server and UPSTREAM2000.com is the name of the domain in which it resides.

CertServ uses the CertSrv Backup API to get the names of the individual Certificate Server files to be backed up and then packages these files together in a single virtual file named *\\servername\CertServ\CertServ.bin*. For example, \\RON2000.UPSTREAM2000.com\CertServ\CertServ.bin. CertServ makes this virtual file appear as a real file to UPSTREAM, which then backs it up in the normal manner.

CertServ requires a specific set of file specification parameters that it sets automatically. As a result, the *Backup Parameters* dialog does not allow you to modify the Backup Specification field or press the *Spec Detail…* button to alter the rest of the file specification parameters.

The CertServ PlugIn may be used for multiple file specifications as long as the Certificate Server (DNS style) names are unique for each file specification. The CertServ PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

To backup a Certificate Server, the Certificate Services service must be started. The backup is then an on-line backup.

13.10.2. CertServ PlugIn Restores

To start a restore from the server to be restored, in UPSTREAM pull down the **Action** menu and select the **List and Restore**. If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the CertServ PlugIn, the *Inquire/Restore PlugIn Selection for Profile…* dialog will be displayed.

From this dialog, select the **Windows Certificate Server** item and press the **Continue…** button. When the Continue… button is pressed or if the backup version contains file specifications that all use the CertServ PlugIn, the *Inquire/Restore for Profile…* dialog is displayed.

On this dialog you will see all of the top-level file specifications included in this backup version. If you attempt to expand a file specification that does not use the CertServ PlugIn, the list of files for that file specification will not be displayed. Find the file specification for the Windows Certificate Server to be restored and highlight the **CertServ.bin** file for that file specification and press the **Select for Restore** button.

This will enable the **PlugIn…** button (the **More…** button will not be enabled since the CertServ PlugIn requires complete control of the file specification parameters). Press the **PlugIn…** button to display the *PlugIn for File Specification …* dialog. Press the **PlugIn Parameters...** button to display the *Specify CertServ Parameters* dialog (the same one described above for backups).

The server name drop down list will contain the names of all of the DNS style names of the Certificate Server servers in your local domain.

Once you have set the CertServ PlugIn parameters to your liking, press the **Ok** button to return to the *PlugIn for File Specification* ... dialog. You will now see the **Parameters** field filled in with a set of parameters in the format *SERVER=servername*. For example:

```
SERVER=RON2000
```

You can then proceed to start the restore.

To restore a Certificate Server, the Certificate Services service must be started. The CertServ PlugIn will stop the Certificate Services service after the restore is started. The Certificate Services service will remain stopped after the restore has finished.

13.10.3. Host Initiating CertServ Backups and Restores

Like all other UPSTREAM backups and restores, those that use the CertServ PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e. after the SPECNUMBER:

FILES \\servername\CertServ\CertServ.bin
PLUGIN CertServ.dll
PLUGINPARAMETERS SERVER=servername

Each PlugIn module has a specific set of PlugIn specific parameters (specified with the PLUGINPARAMETERS UPSTREAM parameter). The format for the PlugIn parameters for CertServ is:

```
SERVER=servername
```

Where:

- **SERVER=servername** The name of a Certificate Server.

Note that the file spec is not verified as it will be internally generated but must be specified.

13.11. Windows Cluster Server

A recent addition to the *Enterprise Edition of Windows NT Server* is the *Microsoft Cluster Server,* formerly known as *Wolf Pack*. Cluster Server is a fault tolerant system that incorporates two (more in the future) Windows NT servers into a common unified server that appears to the rest of the network as a single server. If either of the real Windows NT server computers should encounter a problem, the services that are running on that server are automatically "failed over" to the other real server to provide fault tolerance for these services as seen by the rest of the network.

FDR/UPSTREAM can be configured as a service and, due to FDR/UPSTREAM's preexisting capability to restart failed backups, FDR/UPSTREAM is a perfect candidate to be run on a Cluster Server installation. Actually, the restart capability of FDR/UPSTREAM allows it to be restarted in a number of scenarios unrelated to a Cluster Server as well.

This section details the FDR/UPSTREAM for Windows and the FDR/UPSTREAM host configuration options that allow failed backups and restores to be restarted automatically. It also discusses backups of the Windows 2000 Cluster Server Quorum database.

13.11.1. Whole System Backups (Windows 2000)

Backing up a Windows 2000 Cluster Server requires that you back up all the nodes as well as the virtual server. Note that only the nodes have a system state. To help in this process, you can use the UNC full system backup spec (\\<machine name>) for the nodes as well as the virtual server.

We recommend that you install UPSTREAM on the virtual server and backup the nodes in separate backups from the virtual server. This way, if a node is not operational, then the whole backup will not fail.

Thus, if you have two nodes (NODE1, and NOTE2) and a virtual server (VIRTUALSERVER), we recommend that you install UPSTREAM on the virtual server and specify three separate backups, each with their own backup profiles:

```
\\NODE1
\\NODE2
\\VIRTUALSERVER
```

If you wish to specify the file specs for the backups manually, you must specify the system state for the nodes and all the drives for each of the systems (nodes and virtual server).

13.11.2. Restart Scenarios

FDR/UPSTREAM can be run as a service on any Windows NT server. The Windows NT server can be a normal server or a "virtual server" hosted by a Cluster Server installation. This leads to the following scenarios:

- 1. FDR/UPSTREAM running on a virtual server (one hosted by Cluster Server), backing up or restoring its own server or another server, and the virtual server goes down.

- 2. FDR/UPSTREAM running on a stand alone server, backing up another server, which may or may not be a Cluster Server hosted virtual server, and the server being backed up from or restored to goes down.

Both scenarios have a number of common assumptions as discussed in the **All Restart Scenarios** section. Each scenario has unique processing which are discussed in the **Restart for Failed FDR/UPSTREAM Server** and **Restart for Failed Target Server** sections.

13.11.3. All Restart Scenarios

All restart scenarios are based on a number of assumptions as follows:

The backup or restore request must be initiated by a USTBATCH job on the mainframe and the USTBATCH job must have the RESTART parameter specified in its parameter list. The RESTART parameter is discussed further, below.

- FDR/UPSTREAM (UPSTREAM) or the UPSTREAM TCP/IP Attach Manager (USATTMGR.EXE) must be configured to be started automatically when the server restarts. This is accomplished by configuring it as a Windows NT service or by placing it in the Startup folder to be run as an application. For execution on a virtual server hosted by the Cluster Server, it must be configured to run as a service. If it is not running on a virtual cluster server and it is setup to be run as an application from the Startup folder in Windows NT, the server must be configured to automatically log on to the user account for which the Startup folder is configured.
- If FDR/UPSTREAM is running on a virtual cluster server, the communication protocol that is used between FDR/UPSTREAM for windows and the FDR/UPSTREAM host must be TCP/IP. Also, either UPSTREAM or USATTMGR.EXE must be configured as a “Generic Service” resource and it must have a direct dependency on “Network Name” resource for the virtual cluster server.
- FDR/UPSTREAM must be configured to not automatically restart failed backups or restores (NORESTART=Y in the UPSTREAM.CFG file).

Regardless of the scenario, the USTBATCH job must specify the RESTART parameter. The RESTART parameter has the following format:

```
RESTART numretries,retryinterval
```

Where:

- **numretries** is the number of times that the USTBATCH job will retry the failed backup or restore.
- **retryinterval** is the number of minutes that USTBATCH will wait between retries.

The RESTART parameter is a “single-use” parameter that must appear in the USTBATCH parameter list before any “multiple-use” parameters such as COMMAND, TARGLU, TARGNAME, TCPTARG, TPNAME, or WSPARM. For further information on the USTBATCH RESTART parameter, refer to chapter 8 of the FDR/UPSTREAM host manual.

With each scenario, when the backup or restore fails, FDR/UPSTREAM will terminate the communication with the FDR/UPSTREAM host. After 10 minutes (default) of not receiving any data from the FDR/UPSTREAM for windows, the FDR/UPSTREAM host (the UPSTREAM started task on the mainframe) will conclude that a communications error has occurred and it will inform the USTBATCH job that requested the backup or restore that the request failed and that it should attempt to restart it if possible.

If the USTBATCH job determines that the request can be restarted (as specified by the RESTART parameter), the USTBATCH job will send a request back down to the PC to restart the backup (ACTION=1) or restart the restore (ACTION=8), whichever action is appropriate.

13.11.4. Restart for Failed FDR/UPSTREAM Server

This scenario happens when the server that FDR/UPSTREAM is running on goes down or FDR/UPSTREAM itself dies without the server going down. Since FDR/UPSTREAM is no longer running, the FDR/UPSTREAM host will get a communications time out which will signal it to inform the USTBATCH job to attempt a restart.

If the server that FDR/UPSTREAM is running on is a virtual server (hosted by Cluster Server), the Cluster Server will either restart the UPSTREAM or USATTMGR service on the same machine it was running on or fail over the virtual server to another node of the cluster. In either case UPSTREAM.EXE or USATTMGR.EXE will restart and wait for another request from the mainframe.

13.11.5. Restart for Failed Target Server

This scenario happens when the server that FDR/UPSTREAM is backing up from or restoring to goes down. In this case UPSTREAM will encounter an error on one or more files as it attempts to open, read from or write to them. When a file error is encountered, UPSTREAM will check to see if the server connection is still active. If the server connection is no longer active UPSTREAM will get a network connection error and then do one of the following:

- If the server is a Novell server, UPSTREAM will immediately determine that the server has gone down and will not retry the network connection.
- If the server is not a Novell server, UPSTREAM will retry the server network connection once a second for up to 30 seconds (configurable by the USFILESERVERERRORRETRY environment variable) before determining that the server has gone down.

If UPSTREAM determines that the server has gone down, it will immediately stop processing the request and terminate communications with the UPSTREAM started task on the mainframe. This will trigger the restart processing on the mainframe.

If during the server error retry interval, the server responds to the network connection test, UPSTREAM will continue with the backup or restore. In this case the file which originally encountered the error will be skipped.

If the server that UPSTREAM is dealing with is a virtual cluster server, it could happen that the Cluster Server will fail over the virtual server to another node of the Cluster Server and restart it before UPSTREAM has exhausted its server error retry interval. In this case, UPSTREAM can continue its normal processing with only a few failed files.

13.11.6. Cluster Server Quorum Database

UPSTREAM now has the capability of backing up and restoring a Windows 2000 Cluster Server quorum database. This capability is made possible through the use of a FDR/UPSTREAM feature called PlugIns and a PlugIn module named Cluster.dll. The Cluster PlugIn (Cluster.dll) uses the Cluster Server (CLUSAPI.DLL) Backup API to perform online backups and offline restores of the Cluster Server quorum database. This document describes the specifics of the Cluster.dll PlugIn module. Refer to the *FDR/UPSTREAM PlugIns* section for more information about how UPSTREAM interacts with PlugIn modules. This section assumes that you are familiar with the Cluster Server quorum database, its terminology and how to manage it.

NOTE: We recommend that the Cluster Server database be backed up as part of the Windows 2000 System State. See page 13-15 for a more information.

13.11.7. Cluster PlugIn Backups

The Cluster PlugIn can be used with UPSTREAM on any Windows 2000 operating system machine on which the following DLL files exist:

- CLUSAPI.DLL
- NETAPI32.dll
- MPR.dll

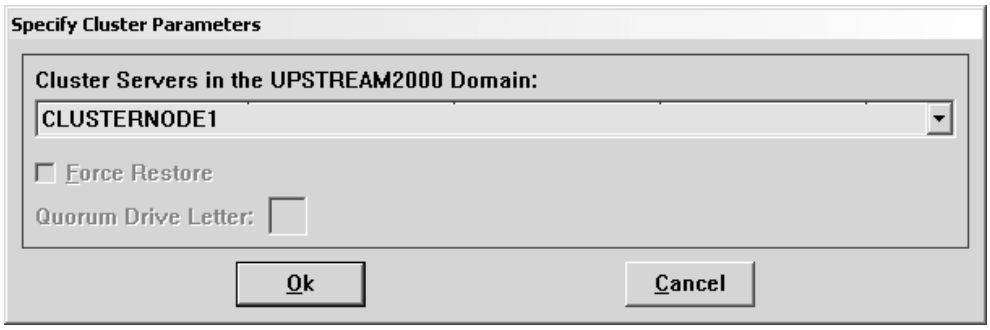
UPSTREAM running on this machine can use the Cluster PlugIn to backup any number of Cluster Server servers as long as they reside in the same domain as the machine on which UPSTREAM is run.

All Cluster PlugIn backups are full backups, even if you select Incremental merge as your backup type. The Cluster Backup API does not support incremental backups. Since a single Cluster Server may become quite large, you may decide to include the Cluster file specifications for your First-time full and Full merge backups only.

From UPSTREAM on your Windows 2000 PC, to specify the use of the Cluster PlugIn to back up a single Windows Cluster server, use the Backup Parameters dialog to add a new file specification (or select a file specification that you want to alter) and then press the **PlugIn…** button. The file spec is not used by the PlugIn. The *PlugIn for File Specification…* dialog is then displayed.

Cluster has a unique PlugIn ID number of 7 and a descriptive name of **Windows Cluster Server**. The PlugIn ID number is used internally by UPSTREAM to uniquely identify PlugIn modules. The descriptive name is used on the *PlugIn for File Specification …* dialog to select this PlugIn for use with a particular file spec.

If you press **PlugIn Parameters...** the dialog specific to Cluster Server is displayed:



For backup, the only parameter is the name of the cluster server you wish to backup. Select the one you wish to use from the pull-down.

Cluster uses the Cluster Server (ClusAPI) Backup API to backup the cluster database files to a temporary directory on disk and then packages these files together in a single virtual file named \\servername\Cluster\Cluster.bin (ex: \\CLUSTERNODE1\Cluster\Cluster.bin). Cluster makes this virtual file appear as a real file to UPSTREAM, which then backs it up in the normal manner.

The actual Cluster Server quorum database is maintained on a special disk drive that is managed solely by the Cluster Server. This is typically the Q: drive of a clustered system. This quorum database drive should not be included in your normal backups since the files on this drive are managed by the Cluster Server and cannot be restored normally.

Cluster requires a specific set of file specification parameters that it sets automatically. As a result, the *Backup Parameters* dialog does not allow you to modify the Backup Specification field or press the *Spec Detail…* button to alter the rest of the file specification parameters.

The Cluster PlugIn may be used for multiple file specifications as long as the Cluster Server names are unique for each file specification. The Cluster PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

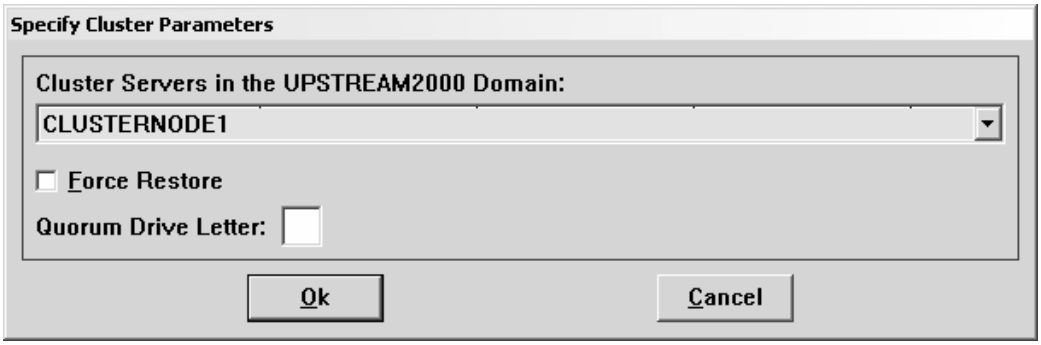
13.11.8. Cluster PlugIn Restores

To start a restore from the server to be restored, in UPSTREAM pull down the **Action** menu and select the **List and Restore**. If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the Cluster PlugIn, the *Inquire/Restore PlugIn Selection for Profile…* dialog will be displayed.

From this dialog, select the **Windows Cluster Server** item and press the **Continue…** button. When the Continue… button is pressed or if the backup version contains file specifications that all use the Cluster PlugIn, the *Inquire/Restore for Profile…* dialog is displayed.

On this dialog you will see all of the top-level file specifications included in this backup version. If you attempt to expand a file specification that does not use the Cluster PlugIn, the list of files for that file specification will not be displayed. Find the file specification for the Windows Certificate Server to be restored and highlight the **Cluster.bin** file for that file specification and press the **Select for Restore** button.

This will enable the **PlugIn…** button (the **More…** button will not be enabled since the Cluster PlugIn requires complete control of the file specification parameters). Press the **PlugIn…** button to display the *PlugIn for File Specification …* dialog. Press the **PlugIn Parameters...** button to display the *Specify Cluster Parameters* dialog.



The server name drop down list will contain the names of all of the machines in the local domain. The current server name will be the name of the server from which the Cluster Server quorum database was backed up, taken from the file spec for the backup. The remaining parameters are discussed below in the *Special Rules for Restores* section.

Once you have set the CertServ PlugIn parameters to your liking, press the **Ok** button to return to the *PlugIn for File Specification ...* dialog. You will now see the **Parameters** field filled in with a set of parameters. For example:

```
SERVER=CLUSTERNODE1 FORCE=N QUORUMDRIVELETTER=
```

13.11.9. Special Rules for Restores

While backups of a Cluster Server node can be performed from any other Windows 2000 system in the domain, restores to a Cluster Server node must be performed on the Cluster Server node. Remote restores are not possible.

To perform a restore to a Cluster Server node, only the node that is being restored to can be running the Cluster service. All of the other cluster nodes in the cluster must be stopped (i.e. not running the Cluster service). For this reason, you must manually shut down the Cluster service on all the other nodes. The exception to this rule is when you specify FORCE=Y sub parameter of the PLUGINPARAMETERS for the restore. In this case, the restore process will shut all of the other nodes in the cluster down.

Another requirement for a successful restore is that the quorum disk (Q: by default) must have the same partition layout (number of partitions and offsets to each partition) as the quorum disk described in the backup. If this is not the case, you must manually reconfigure the quorum disk to match the layout described in the backup. Again, the exception to this rule is when you specify FORCE=Y sub parameter of the PLUGINPARAMETERS for the restore. In this case, the restore process will attempt to reconfigure the quorum disk to match the disk described in the backup.

In the case where the quorum database is now on a drive other than the default Q: drive, specify the QUORUMDRIVELETTER=?: sub parameter of the PLUGINPARAMETERS for the restore. Use the form "?:", where ? is the drive letter of the quorum database drive.

In most cases you will not need to specify FORCE=Y or QUORUMDRIVELETTER=?: if you start the restore by manually stopping all of the cluster nodes for the cluster other than the node that you will be restoring to. Also, since the quorum database is shared between the various cluster nodes, it is not necessary to restore to all of the nodes of the cluster. Only one restore is required for an entire clustered system.

13.11.10. Host Initiating Cluster Backups and Restores

Like all other UPSTREAM backups and restores, those that use the Cluster PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e. after the SPECNUMBER parameter):

```
FILES \\servername\Cluster\Cluster.bin
PLUGIN Cluster.dll
PLUGINPARAMETERS SERVER=servername FORCE=yn QUORUMDRIVELETTER=drive
```

The correct format for the FILES parameter is not crucial since the Cluster PlugIn will override it anyway and force it to be \\servername\Cluster\Cluster.bin. It does this by getting the real server name from the PLUGINPARAMETERS value.

The format for PLUGINPARAMETERS is:

```
SERVER=servername FORCE=yn QUORUMDRIVELETTER=drive
```

Where:

- **SERVER=servername** The name of a Cluster Server to be backed up or restored.
- **FORCE=yn** An optional parameter used only for restore. The value must be either 'Y' or 'N'. When set to 'Y', a restore is forced. This is discussed in detail in the *Special Rules for Restores* section above.
- **QUORUMDRIVELETTER=drive** An optional parameter used only for restore. The value must be blank or in the form "?:", where ? is 'a' – 'z' or 'A' – 'Z'.

13.12. Cluster Installation and Configuration

This section explains how to install and configure FDR/UPSTREAM on a cluster to ensure proper function and flexibility. It is assumed that you are familiar with the relevant cluster issues such as installation, configuration and operation. Refer to the appropriate Microsoft documentation for general cluster information.

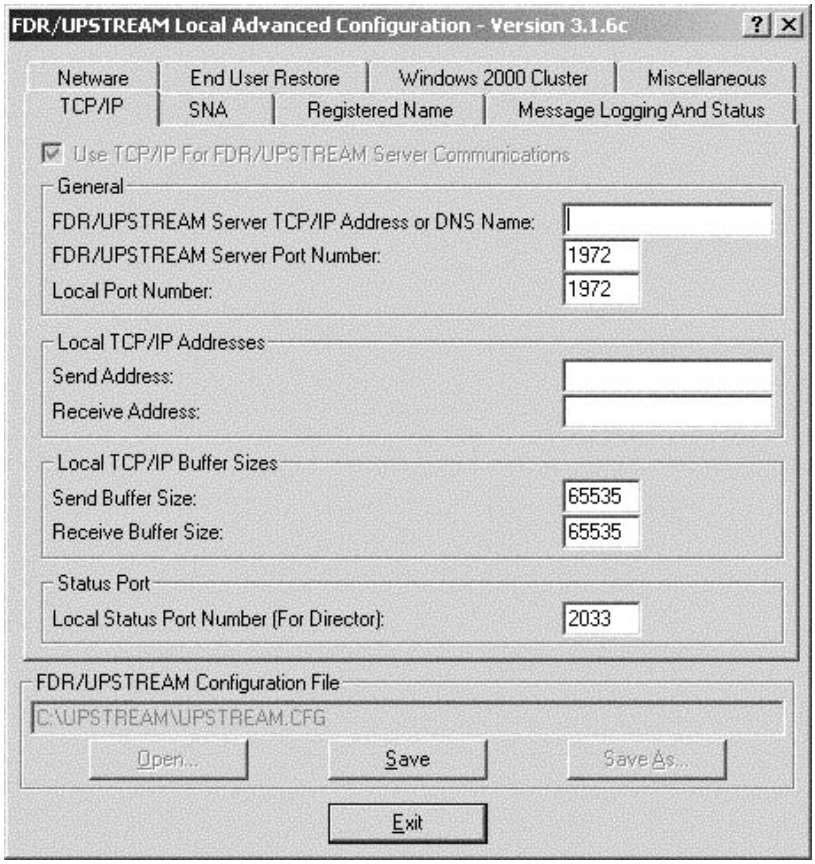
All of the work of installing, upgrading and (re)configuring FDR/UPSTREAM for a cluster system is handled by the FDR/UPSTREAM Local Configurator (USCfg.exe).

13.12.1. Cluster Setup

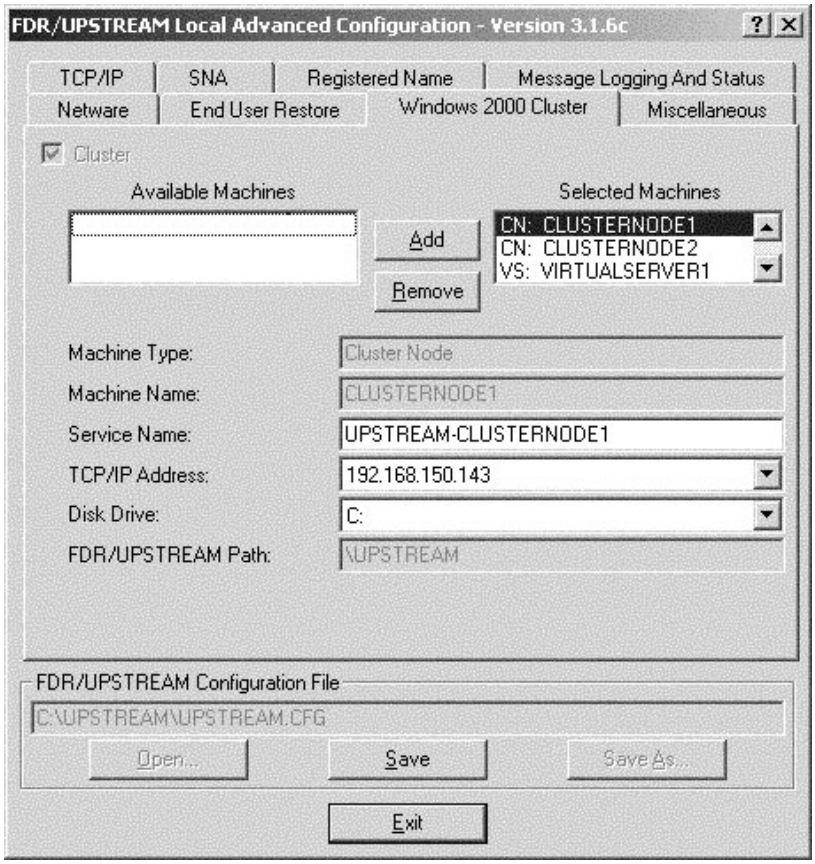
Before FDR/UPSTREAM can be installed on a clustered system, the cluster must first be installed according to the Microsoft documentation. Once the cluster is installed, you should then install any other applications on the cluster that you need to install (such as Microsoft SQL Server, Microsoft Exchange, etc.).

To install or upgrade FDR/UPSTREAM Local on a cluster system, follow the normal installation procedure to install it on one of the nodes of the cluster. The cluster node you choose to install FDR/UPSTREAM on does not matter as the FDR/UPSTREAM Local Configurator will handle the process of installing it on the other cluster nodes and virtual servers.

At the end of the FDR/UPSTREAM Local installation process, a dialog will be displayed which will give you the opportunity to immediately start the FDR/UPSTREAM Local Configurator. Check this option so that the FDR/UPSTREAM Configurator will be immediately started for you. When this happens the following dialog will be displayed:



Enter the TCP/IP address of the FDR/UPSTREAM Server in the FDR/UPSTREAM Server TCP/IP Address or DNS Name field and then click the Windows 2000 Cluster tab to display the following dialog:



The fields displayed on the Windows 2000 Cluster tab are:

- **Cluster:** This checkbox serves as an indication of whether this is a cluster system or not.
- **Available Machines:** This is the list of virtual server machine names that FDR/UPSTREAM is not currently installed on.
- **Selected Machines::** This is the list of virtual server machine names that FDR/UPSTREAM is currently installed on.
- **Add:** Click this button to move a virtual server machine name from the Available Machines list to the Selected Machines list.
- **Remove:** Click this button to move a virtual server machine name from the Selected Machines list to the Available Machines list.
- **Machine Type:** This is the machine type for the currently selected entry in the Selected Machines list.
- **Machine Name:** This is the machine name for the currently selected entry in the Selected Machines list.
- **Service Name:** This is the name that will be given to the FDR/UPSTREAM service for the currently selected entry in the Selected Machines list.

- **TCP/IP Address:** This is the TCP/IP address that FDR/UPSTREAM will use for the currently selected entry in the Selected Machines list. Each machine may have one or more TCP/IP addresses assigned to it, but FDR/UPSTREAM will use only the one selected.

- **Disk Drive:** This is the disk drive that FDR/UPSTREAM will be installed on for the currently selected entry in the Selected Machines list. Each machine may have one or more disk drives, but FDR/UPSTREAM will be installed only on the one selected.

- **FDR/UPSTREAM Path:** This is the directory that FDR/UPSTREAM will be installed in for the currently selected entry in the Selected Machines list. This path may not be modified. It is the directory that was selected during the FDR/UPSTREAM Setup procedure.

The Windows 2000 Cluster tab is used for specifying which virtual server machines FDR/UPSTREAM Local should be installed on. FDR/UPSTREAM Local will be installed on every cluster node machine of the cluster.

To properly configure FDR/UPSTREAM Local on the cluster nodes and those virtual server machines you choose, you must use the FDR/UPSTREAM Local Configurator. A number of rules apply to using the FDR/UPSTREAM Local Configurator:

- Only one FDR/UPSTREAM service may be created for each cluster node or virtual server.
- Only one configuration file (upstream.cfg) may be created. This configuration file is copied to each cluster node or virtual server and tailored accordingly.
- All configuration for the cluster must be performed from one of the cluster nodes. You may not use the FDR/UPSTREAM Local Configurator on a machine that is not part of the cluster to configure the cluster.

For each cluster node and virtual server that FDR/UPSTREAM is to be installed on you must specify a few configuration options:

- The name of the FDR/UPSTREAM service to be created. This defaults to UPSTREAM-machinename (ex: UPSTREAM-CLUSTERNODE1).
- The single TCP/IP address that is owned by the cluster node or virtual server that FDR/UPSTREAM is to use exclusive of all others. This is required to prevent one cluster node/virtual server from receiving remotely initiated requests targeted to another cluster node/virtual server.
- The single disk drive that FDR/UPSTREAM Local is to be installed on. Each virtual server may have a number of disk drives, but FDR/UPSTREAM Local will be installed on only one of them.

Once you have selected the virtual servers that FDR/UPSTREAM Local should be installed on and selected the TCP/IP address and disk drive to be used for all of the cluster nodes and virtual servers, click the Exit button to cause the FDR/UPSTREAM Configurator to start the installation/upgrade/(re)configuration process. During the installation/upgrade/(re)configuration process, the Configurator will do the following:

- Determine if any of the FDR/UPSTREAM services are currently running and ask you if it is ok to stop these services. The FDR/UPSTREAM services must be stopped to properly install/upgrade/(re)configure FDR/UPSTREAM Local on the entire cluster.
- Stops any FDR/UPSTREAM services which are currently started.
- Deletes the FDR/UPSTREAM service from any virtual servers no longer selected.
- Deletes the FDR/UPSTREAM Local directory from any virtual servers no longer selected.
- Copies the FDR/UPSTREAM start menu program folder to all of the other cluster nodes.

- Copies the FDR/UPSTREAM Local directory to all of the other cluster nodes and selected virtual servers.
- Installs the FDR/UPSTREAM Windows 2000 Agent service on all of the cluster nodes.
- Tailors the UPSTREAM.CFG file appropriately for each cluster node and selected virtual server.
- Creates the FDR/UPSTREAM service on any machine that needs it.
- Informs you of any new FDR/UPSTREAM services that were created.
- Starts the FDR/UPSTREAM services on all of the cluster nodes and selected virtual servers.

As you can see by the number of steps that are performed by the Configurator, the installation/upgrade/(re)configuration process is not something that you want to perform manually.

13.12.2. FDR/UPSTREAM Backup Specification

FDR/UPSTREAM has a feature referred to as a full-system file spec. To backup all of the disk drives and other critical components of a computer, UPSTREAM allows you to create a single file spec, which is "\\machinename". A further shortcut is available by specifying "\\.", which means the local system running the backup. Whenever FDR/UPSTREAM is directed to backup a file spec of "\\machinename" (or "\\."), it firsts finds all of the writeable disks and creates its own set of file specs, one for each disk. It creates other file specs to backup the User Quota information on each of the NTFS disks and creates a file spec to backup the System State for the computer. All of this is done automatically; all you have to do is set up the single "\\machinename" file spec.

Since most users want to have their backups initiated via MVS batch jobs, UPSTREAM makes it very easy to specify the backup of a complete computer system. In your USTBATCH job, the critical parameters are:

```
TARGNAME=<cluster node or virtual server machine name>
RESTART=n,m
BACKUPPROFILE=<a backup profile unique to the machine>
ACTION=1
RESTARTTYPE=2
SPECNUMBER=1
FILES=\\.
```

The RESTARTTYPE parameter causes FDR/UPSTREAM for Windows to make the backup restartable in the case of a virtual server failure. The RESTART parameter is a FDR/UPSTREAM host parameter which causes the FDR/UPSTREAM host to restart the backup, where *n* is the number of times that FDR/UPSTREAM host will attempt to restart the backup and *m* is the number of minutes between restart attempts. By specifying the RESTART and RESTARTTYPE parameters correctly, UPSTREAM is capable of taking advantage of the fail-over capabilities of a cluster.

In the case of a virtual server, the second value of the RESTART parameter should be set to the maximum amount of time it will take the cluster environment to fail-over the virtual server to another node. If a serious computer failure should occur on one of the cluster nodes, it is possible that any backup which may be running on the cluster node will not be restartable.

So, to backup the two cluster nodes and a single virtual server of a clustered system you need to create three USTBATCH jobs. Each of these jobs would target the machine name of the cluster nodes and virtual server. In

fact, the only parameters that need to be unique in these three jobs are the TARGNAME and BACKUPPROFILE parameters.

13.13. Windows Registry Restore

Up until now, in order to restore any of the configuration information contained in a Windows NT registry hive file, you had to restore the entire hive file. This would result in the loss of any configuration information that was previously in the registry, but not in the backup of the registry hive file being restored.

In many cases this is desired (for example, if the registry is damaged). However, there are cases where it is not:

- You are using FDR/UPSTREAM to move your workstation/server to a new machine.
- You are replacing the disk in your existing machine.

In these cases the result would be a registry which does not properly reflect the drivers in your machine.

A new feature in FDR/UPSTREAM now allows you to control exactly which information is to be restored from the registry hive backup file without losing the configuration information that is already in the registry.

WARNING: Read the *Registry Modification WARNING!* section before using this new feature.

13.13.1. Windows NT Registry Restore Restrictions

This new method for restoring only a certain subset of registry configuration information can be applied only to the SYSTEM registry hive. It cannot be used to restore the SAM, SECURITY or SOFTWARE hives or any of the specific user hives. The reasons for this are:

- This new restoration method is intended to provide a method of restoring crucial operating system configuration information, to allow for a clean reboot. All of the operating system configuration information is stored solely in the SYSTEM hive.
- Any of the configuration information stored in the other (non-SYSTEM) hives can be selectively restored using the registry editor (REGEDT32.EXE), once the operating system is back up and running properly.
- Only the SYSTEM hive has a built in mechanism for keeping multiple “Control Sets” of configuration information. This new restoration method modifies only the subkeys and values of the ControlSet*nnn* key which is aliased by the CurrentControlSet key. If you should select to restore too much or too little of the configuration information needed, you can always return to the “Last Known Good” configuration and start over. This is not possible with the other registry hives.
- The information stored in the SYSTEM hive, although complex in nature, is mostly documented in the Windows NT Server Resource Kit documentation. The configuration information stored in the SOFTWARE hive is in an uncontrolled format devised by numerous non-Microsoft software vendors. The format of the SAM and SECURITY hives is totally undocumented. This new restoration method is limited to the SYSTEM hive because only the SYSTEM hive is documented sufficiently to allow you to understand the ramifications of your modifications.

The SAM, SECURITY and SOFTWARE hives and the user specific hives can still be restored using the old Entire Replacement method.

The subkeys immediately under the SYSTEM key in the SYSTEM registry hive are:

- **ControlSet*nnn*** There are one or more of these keys each with a unique three-digit (*nnn*) number. FDR/UPSTREAM only allows the modification of the key that is aliased by the CurrentControlSet key as determined by the Select key values. FDR/UPSTREAM does not allow any of the non-current ControlSet*nnn* keys, subkeys or values to be modified in any way.
- **CurrentControlSet** This is actually an alias for one of the ControlSet*nnn* keys as determined by the Select key values. Since the backup file does not contain this key, FDR/UPSTREAM does not allow it to be modified in any way.
- **DISK** This key contains the crucial Fault Tolerant Disk Configuration information. FDR/UPSTREAM does not allow this key or its values to be modified in any way. Information on how to modify the Fault Tolerant Disk Configuration information stored in this key can be found in Microsoft Knowledge Base article #Q131658.
- **Select** The values of this key control which of the ControlSet*nnn* keys contains the current configuration and which contains the "Last Known Good" configuration. FDR/UPSTREAM does not allow this key or its values to be modified in any way.
- **Setup** The information in this key, its subkeys and values is used only during Windows NT Server installation. FDR/UPSTREAM does not allow this key, its subkeys or its values to be modified in any way.

13.13.2. Registry Modification WARNING!

WARNING: This new Windows NT SYSTEM registry hive restoration method is very powerful and also very dangerous. If used correctly it will allow you to recover crucial system configuration information such as lost device driver information and the like. If used incorrectly it might make an already damaged system unbootable. For this reason, it is strongly suggested that you follow these guidelines:

- Understand exactly which SYSTEM hive registry keys and values that you want to restore and why.
- Have a copy of the Windows NT Server Resource Kit available for reference.
- Always create a current Windows NT Emergency Repair Disk before using this new restore method.
- Never run a restore of the SYSTEM registry hive unattended. This may cause more key and value information to be restored than you really want resulting in a damaged or unbootable system. The one possible exception to this rule is when you are restoring the SYSTEM registry hive for a Windows NT system via the ULTra workstation program.
- Make sure that the **Maximum Registry Size (MB)** is configured high enough to accommodate the temporary SYSTEM key that FDR/UPSTREAM must create in order to perform the modification. The **Maximum Registry Size (MB)** should be at least twice the **Current Registry Size**. This can be modified using the **Virtual Memory** dialog (click the **Change** button on the **Performance** tab of the **SYSTEM** applet of the **Control Panel**)

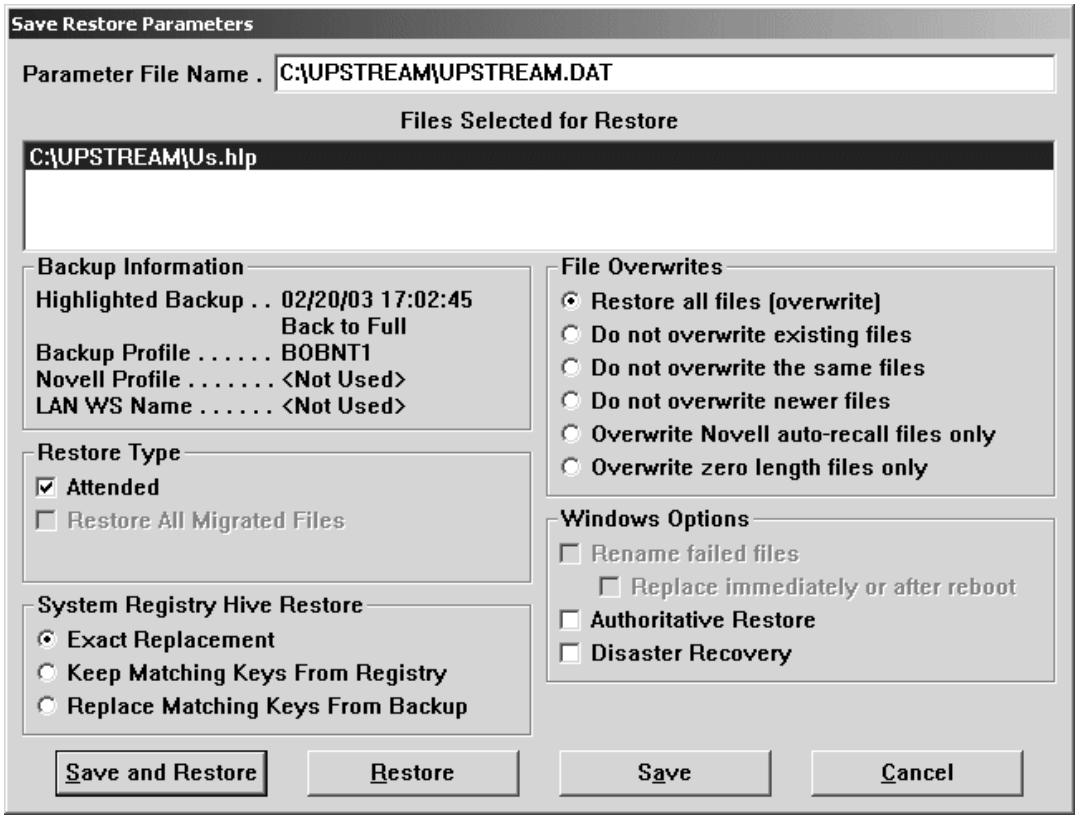
If you make a mistake while modifying the SYSTEM registry hive, you can avoid complete catastrophe with one of the following fixes:

- Reapply the Windows NT Emergency Repair Disk that was created before starting the SYSTEM registry hive restore procedure.
- Reboot using the "Last Known Good" configuration. Since FDR/UPSTREAM does not modify any of the Control Sets in the SYSTEM registry hive other than the current one, the "Last Known Good" configuration should be good enough to allow you to reboot the system to at least get back

to where you started. If after modifying the SYSTEM registry hive, you have completed a successful reboot and have logged on to the system, Windows NT will have replaced the "Last Known Good" configuration with the modified configuration. You can still recover back to your previous "Last Known Good" configuration by correctly modifying the LastKnownGood value of the Select subkey. Refer to the Windows NT Server Resource Kit documentation for a discussion of the values of the Select key for further information.

13.13.3. How It Works

This new Windows NT SYSTEM registry hive restoration method is controlled by an FDR/UPSTREAM parameter named **NTREGRESTORE** and is on the List and Restore final dialog:



Note that you must check the **Registry and Event Logs** checkbox for ANY registry restores to work and you must also specify the registry hive file in the restore. For many users, the system hive is in the file: %SystemRoot%\system32\config\SYSTEM.

The registry restore specific parameters are radio buttons in the **System Registry Hive Restore** frame and are only in affect when the SYSTEM registry hive is being restored. In the UPSTREAM Director, these parameters are available in the Restore List, Options button, NT Options tab.

- **Exact Replacement**: The entire SYSTEM registry hive will completely replace the SYSTEM hive in the active registry. This is how FDR/UPSTREAM has always behaved prior to this new feature. Set NTREGRESTORE=0 in parameter files or from the host.

  Most users will select this option if using UPSTREAM to restore a registry to the same machine it was backed up from and there were no hardware modifications.

- **Keep Matching Keys From Registry:** If selected, all of the keys and values that are in the active registry and not in the backup file will be kept from the registry. All of the keys and values that are in the backup file and not in the active registry are added from the backup file. All keys and values that are matched between the active registry and the backup file will be kept from the registry. Set NTREGRESTORE=1 in parameter files or from the host

  Most users will select this option if using UPSTREAM to restore a registry to a completely new machine (with hardware registry entries that you wish to preserve).

- **Replace Matching Keys from Backup:** All of the keys and values that are in the active registry and not in the backup file will be kept from the registry. All of the keys and values that are in the backup file and not in the active registry are added from the backup file. All keys and values that are matched between the active registry and the backup file will be replaced from the backup file. Set NTREGRESTORE=2 in parameter files or from the host

  Most users will select this option if using UPSTREAM to restore a registry to the same machine it was backed up from but one where the boot disk was replaced.

  When FDR/UPSTREAM is configured to restore a non-SYSTEM registry hive file, it will restore the hive file using the Exact Replacement method as it always has. When FDR/UPSTREAM is configured to restore the SYSTEM registry hive file it will do so according to the restore method (NTREGRESTORE) selected. For both the Keep and Replace methods, FDR/UPSTREAM will load the SYSTEM registry hive backup file into a temporary SYSTEM key (really HARDWARE\SYSTEM) in the registry and then compare this temporary SYSTEM key to the active SYSTEM key. The result of this comparison is a set of information as to which keys and values are to be kept from the active registry and which keys and values are to be replaced and added from the backup file.

  Once FDR/UPSTREAM knows which keys and values are to be replaced and added from the backup file it will either apply these changes to the registry automatically or display this information in a tree view window to be modified by you, depending on whether the restore is attended or unattended.

  When the restore of the SYSTEM registry hive is attended, the recommended method, FDR/UPSTREAM will display the following **Modify SYSTEM Registry Hive Backup** dialog:

The **Modify SYSTEM Registry Hive Backup** dialog allows you to control exactly which keys and values will actually be replaced or added from the backup file. For instance, not all of the keys and values that will be set to be added from the backup file should be restored and not all of the keys and values that might be kept from the active registry are correct.

For every unique key and value found in the active SYSTEM registry hive and the backup file, an item is added to the SYSTEM key tree displayed in the dialog. This SYSTEM key tree can be expand and collapsed by clicking on the plus and minus icons next to each key entry (value entries do not have plus and minus icons next to them). Every key and value entry has an icon which indicates how the key or value is to be handled. Each of these icons have two sections with its own color as follows:

- The top section of the icon indicates if the key or value was found in the backup file or not. It is either **light blue** if the key or value was found in the backup file or **white** if the key or value does not exist in the backup file.
- The bottom section of the icon indicates if the key or value was found in the active SYSTEM registry hive or not. It is either **yellow** if the key or value was found in the active SYSTEM registry hive or **white** if the key or value does not exist in the active SYSTEM registry hive.

A description of the status of the key or value will be displayed directly under the SYSTEM key tree window. Each icon will also have a **check mark** on it to indicate which copy of the key or value (the backup file copy or the active SYSTEM registry hive copy) will be applied to the registry. An icon without a check mark means that neither copy of the key or value will be applied to the registry.

As you highlight keys and values in the SYSTEM key tree, a button will appear that you can click to toggle the check mark. If there is no button, then the check mark cannot be changed.

If you highlight a registry key with subkeys or values (it has a plus sign next to it), a checkbox will appear at the bottom of the dialog: **Subkeys and Values also**. If you check this box and then press the button, the entry will be toggled for all the entries below the highlighted one.

This check mark can be modified in one of the following ways:

- If the icon is **light blue** on the top and **yellow** on the bottom, this means that the key value exists in both the backup file and the active SYSTEM registry hive and that you may toggle between either keeping the key or value from the registry or replacing it from the backup by clicking the appropriate button on the dialog.
- If the icon is **light blue** on the top and **white** on the bottom, this means that the key or value exists only in the backup file and that you may toggle between either adding the key or value from the backup or not adding the key or value from the backup by clicking the appropriate button on the dialog.
- If the icon is **white** on the top and **yellow** on the bottom, this means that the key or value exists only in the active SYSTEM registry hive and that you may not modify how it will be handled. This key or value will always be kept from the registry.

Once you have selected which keys and values are to be replaced and added from the backup file, you can then click the **Ok** button to cause the SYSTEM registry hive to be modified accordingly. If you are unsure of the modifications that need to be made, you can click the **Cancel** button to safely abandon the modifications and leave the SYSTEM registry hive untouched.

13.13.4. ULTra

You can use the UPSTREAM Windows NT Registry Restore facility for restoring ULTra workstations. However, there is no prompted facility. The Keep and Replace options are used for all keys.

13.14. User Quotas

NTFS version 5 (supported in Windows 2000, 2003 and Windows XP only) maintains a set of quota information on a user-by-user basis for each volume formatted with NTFS5. This information is not stored in a file that can be easily accessed, but is instead made available only through a set of specific API functions. To backup and restore this user quota information, FDR/UPSTREAM has a component called the WinQuota PlugIn (WinQuota.dll).

To use the WinQuota PlugIn, supply the following parameters in your parameter file:

```
PLUGIN WinQuota.dll

PLUGINPARAMETERS DRIVE=<drive spec>
```

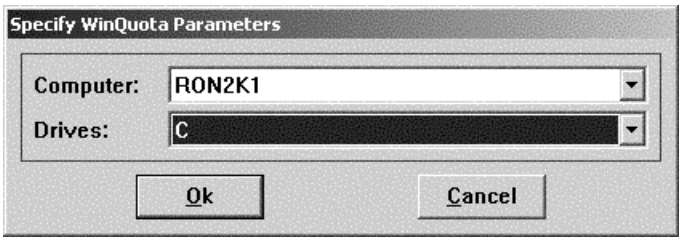
Where:

- **<drive spec>** is the specification of the volume that will have its quota information backed up or restored.

The drive spec (volume specification) can be in one of the following formats:

- **d:** where *d* is a local or mapped drive letter.
- **\\Server\Share** where *Server* is the name of a machine and *Share* is the name of a shared volume.

The PLUGINPARAMETERS required by the WinQuota PlugIn can be set via the following PlugIn specific dialog:



This dialog can be reached by pressing the **PlugIn...** button from either the **Backup Parameters** dialog or the **Inquire/Restore...** dialog.

The WinQuota PlugIn file specifications can be backed up with other non-PlugIn file specifications and other PlugIn file specifications, but they must be restored independently. WinQuota takes full control of the other file specification parameters and therefore disabled the **Spec Detail...** button on the **Backup Parameters** dialog and the **More...** button on the **Inquire/Restore...** dialog.

The WinQuota PlugIn uses the drive specification to create a virtual file named d:\WinQuota.bin or \\Server\Share\WinQuota.bin. This PlugIn may be used with more than one file specification to backup the quota information for more than one drive in a single backup. For restore, the quota information can be restored

back to its original drive or to a completely separate drive (ex: C:\WinQuota.bin is backed up, and is restored to D:\WinQuota.bin, thereby copying the quota information from the C: drive to the D: drive).

NOTE: WinQuota file specifications are created automatically by FDR/UPSTREAM for each NTFS5 volume when you specify a full-system file specification (\\.).

13.15. NTFS Time-Stamps and Daylight Savings Time

The time stamps that Windows NT maintains for files on a drive formatted for NTFS are kept in Greenwich Mean Time (GMT). When you view the detail information for a file on such a drive via the Explorer, File Manager or MSDOS DIR command, the time stamps are converted to the local time of your computer according to your system's time settings. Users in differing time zones will see different time stamp information for the very same file. This phenomenon is a designed feature of Windows NT.

This same mechanism is used for LAN attached drives of other Windows 95/98/NT systems regardless of their file system type (including FAT).

Your system's date and time settings are maintained via the Date/Time applet of the Control Panel. One of the controls in the Date/Time applet is the "Automatically adjust clock for daylight saving changes" check box. When this check box is checked, the time stamps that the system displays for files on an NTFS drive are also adjusted for daylight savings time, as the machine's offset from GMT is increased by one hour. This will cause a file's time stamp to appear to change between the standard time part of the year and the daylight savings time part of the year.

If a file's time changes, FDR/UPSTREAM in full merge processing will assume that the file has changed and request the file from the PC. User's selecting automatic daylight savings time adjustment on NTFS and LAN attached drives would end up with effective first-time full backups twice a year.

In all prior versions of FDR/UPSTREAM, we encouraged users to not check the "Automatically adjust clock for daylight savings changes" checkbox on the machine performing the backups. By not checking this checkbox you avoid the problem of file's times changing. For daylight savings times adjustment we were recommending that you adjust the system's clock using UPSTREAM's facilities.

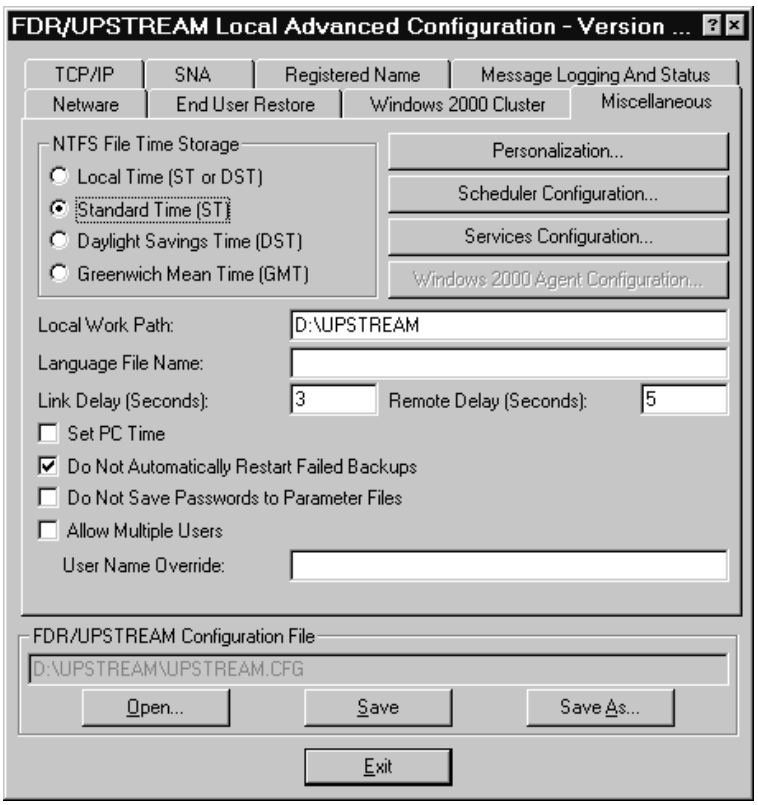
A number of applications, including Microsoft Exchange, do not work well when the system does not automatically adjust for daylight savings time. To address this problem we have made a number of changes to FDR/UPSTREAM.

There are now options for setting the time in the FDR/UPSTREAM configurator and in the FDR/UPSTREAM program itself. These options affect the way that the time is stored on the host and guarantee that the file will be displayed and restored consistently and that the effective first time-full's will be avoided.

These options are available in both the UPSTREAM configurator and in UPSTREAM itself. This allows you to set the way that UPSTREAM will handle NTFS and LAN times by default and override it for a particular backup. These changes only affect backups as they are automatically applied in inquiries and restores.

13.15.1. Setting Time Storage in the UPSTREAM Configurator

In the UPSTREAM configurator, Advanced dialog, Miscellaneous tab, there is a frame **NTFS File Time Storage on the FDR/UPSTREAM Server**.



- **Local Time:** UPSTREAM will store files using the system's local time. If used on Windows systems that do automatic daylight savings time adjustments, NTFS and LAN attached files will appear to have their dates change when daylight savings time is adjusted. We do not recommend this option in these cases.

- **Standard Time:** This is the default option for new installations. If you check this option, NTFS and LAN attached files will be stored on the host using local standard time, regardless of whether daylight savings time is in affect or not. We recommend this option to most new UPSTREAM users.

- **Daylight Savings Time:** If you check this option, NTFS and LAN attached files will be stored on the host using daylight savings time regardless of whether daylight savings time is in affect or not. We only recommend this option if it is currently daylight savings time and you wish to avoid a future effective "first-time full".

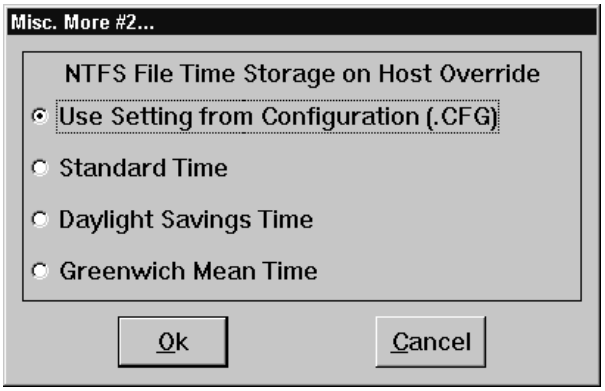
- **Greenwhich Mean Time:** If you check this option, NTFS and LAN attached will files be stored on the host using Greenwhich Mean Time (GMT) regardless of your timezone or daylight savings time. We recommend this option if your LAN or WAN extends across multiple time zones.

For inquiries note that if for all options other than "Local Time", the file will be displayed in inquiries using the local time settings and will be restored with it's original modification time.

13.15.2. Overriding Time Storage in UPSTREAM

Most users will set the way that time is stored on the host for backups in the UPSTREAM configurator and leave it that way.

However, if you have backups which were stored using local time during daylight savings time and backups which were stored using local time during standard time, you can override the settings for a particular backup by pressing the **File Times** button in the **Backup** dialog **More...** dialog.



- **Use Setting from Configuration (.CFG):** This is the default option. During backups, UPSTREAM will store files using the time specified in the configuration file. This is recommended for most customers.

- **Standard Time:** Only recommended when legacy backups are present. If you check this option, for this backup, NTFS and LAN attached files will be stored on the host using local standard time, regardless of whether daylight savings time is in affect or not and regardless of the time conversion option selected in the configuration.

- **Daylight Savings Time:** Only recommended when legacy backups are present. If you check this option, for this backup, NTFS and LAN attached files will be stored on the host using daylight savings time regardless of whether daylight savings time is in affect or not and regardless of the time conversion option selected in the configuration.

- **Greenwhich Mean Time:** Only recommended when legacy backups are present. If you check this option, for this backup, NTFS and LAN attached will files will be stored on the host using Greenwhich Mean Time (GMT) regardless of your timezone or daylight savings time and regardless of the time conversion option selected in the configuration.

13.16. Incrementals and Directories

For Windows, the archive bit on a directory entry is a reliable method indicating whether it's metadata has been modified. During an incremental backup UPSTREAM checks the archive bit on directories as an indication that non-file data on that directory was changed and has to be backed up. Directories without the archive bit set are not included in the backup. As a result the size of a backup file and the amount of data sent to the host during an incremental backup are decreased.

During full merge backups UPSTREAM does not send full non-file data records for all directory entries to the host, but only the placeholders for the directories which have no archive bit set. This speeds up the process not only because UPSTREAM sends less data to the host, but because it doesn't need to open and read most of the directories.

To maintain backward compatibility, two new environment variables were introduced:

- **USSENDDIRS**: If set to any value, forces UPSTREAM to send to the host all directory entries (even unmodified ones) during incremental backup, which was the default behavior up to version 3.1.3.
- **USDONTSENDPLACEHODERFORDIR**: If set to any value, forces UPSTREAM to send full directory entry information for all the directories instead of just placeholders for unmodified directories during merge backup, which was the default behavior up to version 3.1.3.

NOTE: If you are doing a restore from an incremental backup only (not using Files Back to Full) you will not get back non-file data for directories which were not included in the backup; directories will be created with the default attributes.

13.17. Unicode Characters

Historically characters have been stored using 8 bits. It was realized some time ago, that 8 bits is insufficient for storing characters for all languages or other special requirements. A number of variants have been used, but the most recent is Unicode.

Unicode uses 16 bits per character and Windows NT was designed from the ground up to use it. The first 256 values in Unicode (the low order 8 bits) map to the standard character mappings. The remaining values are what we term Unicode characters.

FDR/UPSTREAM supports the backup and restore of files with Unicode characters in the file name. However, since the host only knows how to deal with 8 bit characters, an escape sequence is used to map characters which are outside the 8 bit range. The format for this escape sequence is:

```
|<4 digit hex value>
```

The following file name contains 8 bit characters for the path and a 3 character Unicode file name:

```
C:\UPSTREAM\|433a|5c75|7073
```

Despite the displayed name, the file name is always restored correctly. From the host side, you must specify the mangled (escape sequence embedded) name.

This support also allows UPSTREAM to backup and restore files with invalid file names (files with prefixes of device names, etc.).

The Windows NT version of FDR/UPSTREAM is able to display these characters. Note that keyboard entry of these characters depends upon the installed software on your system.

To enable unicode displays, you must first install a font on your system which is capable of displaying these characters. A monospace font is required. Also, this facility does not work for Windows 95/98, as these operating systems do not support unicode.

For each font there is a character set. You must specify the character set for the font. The character set names available for a given font can be determined with products like BitStream's Font Navigator, the LISTFONT program on the UPSTREAM FTP site, or you can use trial-and-error trying fonts for a character set that you know you need.

UPSTREAM reports can be written in Unicode format. This is useful if you are in a multi-byte environment (Japan, China, etc.) and wish to see backed up and skipped files in their original form (rather than UPSTREAM Unicode or UTF-8). There is a checkbox in the Reporting dialog to specify this.

Then set the following environment variables. These values can be set in USENV.DAT:

Name	Default	Description
USFILECHARSET	0	(Windows NT) If defined, specifies the Windows NT character set number for the USFILEFONT specified font. Values are: 0: ANSI_CHARSET 1 : DEFAULT_CHARSET 2 : SYMBOL_CHARSET 77 : MAC_CHARSET 128 : SHIFTJIS_CHARSET 129 : HANGEUL_CHARSET 130 : JOHAB_CHARSET 134 : GB2312_CHARSET 136 : CHINESEBIG5_CHARSET 161 : GREEK_CHARSET 162 : TURKISH_CHARSET 177 : HEBREW_CHARSET 178 : ARABIC_CHARSET 186 : BALTIC_CHARSET 204 : RUSSIAN_CHARSET 222 : THAI_CHARSET 238 : EASTEUROPE_CHARSET 255: OEM_CHARSET
USFILEFONT	(Not defined)	(Windows NT) The file specification font to use. This can be a monospace or proportional font. Format: <size>.<font name> For example, 12.Terminal The default is the System font.
USMONOCHARSET	255	(Windows NT) If defined, specifies the Windows NT character set number for the USMONOFONT specified font. Values are: 0: ANSI_CHARSET 1 : DEFAULT_CHARSET 2 : SYMBOL_CHARSET 77 : MAC_CHARSET 128 : SHIFTJIS_CHARSET 129 : HANGEUL_CHARSET 130 : JOHAB_CHARSET 134 : GB2312_CHARSET 136 : CHINESEBIG5_CHARSET 161 : GREEK_CHARSET 162 : TURKISH_CHARSET 177 : HEBREW_CHARSET 178 : ARABIC_CHARSET 186 : BALTIC_CHARSET 204 : RUSSIAN_CHARSET 222 : THAI_CHARSET 238 : EASTEUROPE_CHARSET 255: OEM_CHARSET
USMONOFONT	(Not defined)	(Windows NT) The monospace font to use. Format: <size>.<font name> For example, 12.Terminal The default is the system monospace font.
USNOUNICODECODEPAGE	(Not defined)	If specified, UPSTREAM will not use a system code page for translation, but will use a simple one to two byte translation technique. Use this method if UPSTREAM can't properly manipulate files with either the ANSI or OEM code pages (defined using the USUNICODEPAGE environment variable).

Name	Default	Description
USUSELINEDRAW	(Not defined)	UPSTREAM will automatically disable the use of line drawing characters (used predominantly in list and restore) if USMONOCHARSET is defined. By defining this variable to any value, UPSTREAM will use line drawing characters.

14 Novell Considerations

14.1. Overview

FDR/UPSTREAM addresses Novell extensively. To use these facilities:

- Use UPSTREAM on a workstation which has full Novell client support (from Novell) including OS/2, and Windows .
- Use the NLM version. This is the recommend method as it offers the best performance. Its installation, configuration and use is described in chapter 5. You should be familiar with the client issues before using the NLM version.

If you are using the NLM version or a Windows workstation, you can use Novell's Storage Management Services (SMS) for the backups. See page 14-20 for a complete description of advantages, disadvantages and procedures.

FDR/UPSTREAM carries the Novell *Yes Tested and Approved logo* and was a Novell NetWare 5, 5.1 and 6 Launch Partner. Note that to use the facilities that were Yes Tested and Approved you should use SMS for your backups and restores.

To back up a Novell NetWare file server there are several issues which you must address:

- UNC Names
- Planning.
- Backing up Novell information.
- Only the supervisor can back up ALL non-opened files.
- Backing up NetWare Directory Services.

FDR/UPSTREAM can automatically recall migrated files whenever a user accesses them. This chapter also discusses this facility.

NOTE: This chapter discusses the backing up of a file server. If you wish to use your Novell network to back up workstations, see the FDR/UPSTREAM ULTra chapter.

NOTE: If you are using Windows client to back up your Novell server you must use the requestor from Novell, NOT the Microsoft Novell requestor.

14.2. UNC Access for Novell Servers

Universal Naming Convention (UNC) names are used within Windows and OS/2 to name network resources. For files, this naming convention has the advantages of:

- A single name to represent a file, regardless of where it is in the network.
- It is not drive letter oriented.

UNC names can be used for in virtually any Windows or OS/2 command (TYPE, DEL, COPY, etc.), as well as the network oriented (NET) commands. A UNC name has the form:

```
\\<Machine name>\<Share name>\<directory specification>
```

For Novell drives, the form is:

```
\\<Server name>\<Volume>\<directory specification>
```

FDR/UPSTREAM now allows you to access Novell server files using FDR/UPSTREAM's UNC (universal naming convention) names. You can use the standard naming convention or the modified UPSTREAM method:

```
!:\<Server name>\<volume>\<directories and files>
```

Thus, if you wished to back up all the files in the \USERS directory on the SYS volume of the server NW41, you would specify:

```
\\NW41\SYS\USERS\*.*
```

We recommend that whenever possible you use UNC names as it avoids problems with drive letter contention and uniquely identifies the locations for files.

If you are running the NLM version and are using SMS, you can use the simplified UNC naming convention of:

```
\\.
```

Which denotes a backup of all volumes on the server along with the Server Specific Info. Note that you are not allowed to use wildcards in the file specification. UPSTREAM will automatically generate file specs for all of the volumes, so you will see all of the drives (SYS:, etc.) when you do inquires and restores. You can not use this form for restores. This is the recommended method.

You can specify a dot (.) for the Novell Profile's server name in your file specification, destination and exclude specifications. For example:

```
\\.\SYS\USERS\*.*
```

If your Novell Profile is defined to login to the server NW41, UPSTREAM will use file spec:

```
\\NW41\SYS\USERS\*.*
```

The SETNOV program allows you to login to a server without mapping drives so that you can use this facility. To do this, check the *UNC Drives only (no drives mapped)* checkbox.

WARNING: Novell has modified the Novell Requester for Windows NT. You cannot be a service and use mapped drives. If you are currently doing this, you must either run as an application or use UNC names.

WARNING: You must use UNC names for all file specifications in the NLM version of UPSTREAM.

14.3. Planning

Novell servers allow PCs to share disks, printers and other resources. FDR/UPSTREAM supports Novell NetWare® v4.x, v5.x and 6 completely.

Backing up or restoring the data files on a Novell server merely requires mapping a drive (with the MAP command) to the file server you wish to back up or restore and running FDR/UPSTREAM. You can backup or restore more than one file server at a time with FDR/UPSTREAM, but we recommend that due to the extreme size of many Novell servers, that each server be a separate backup with a separate backup profile.

To assure that *all* the Novell specific information that you need is backed up as well as managing issues caused by the large size of many Novell server networks, backing up Novell file servers require special considerations not found when backing up single workstations. These issues are discussed below.

14.3.1. Planning what and when to backup

Novell file servers tend to be very large. This may require a complex plan. You should consider:

- The real performance of FDR/UPSTREAM. You may need to optimize FDR/UPSTREAM to handle this large amount of data. The performance appendix can help you get the best from your environment.
- What your “window” is. This is the number of hours during which you can do backups. For many users, complete backups are done only on weekends. Effective utilization of your time window helps you get the most from FDR/UPSTREAM.
- How often you *need* to perform complete backups. You may want to perform complete backups daily, but an analysis of your requirements may show that weekly or even monthly complete backups are adequate based on a realistic appraisal of your needs and the use of incrementals. Or you may find that complete backups should be performed over a period of several days (by backing up individual directories).
- How many machines to use in the backup. Multiple servers are often best backed up by multiple PCs.
- The client versions do not get some of the more obscure features of Novell including Mac and NFS name spaces, Volume restrictions and the like. If you need this information, you should use the NLM version.

14.3.2. Open files

The second aspect of planning should be to assure that all required files are closed when the backup is performed. This is best done manually be requiring that all users detach from their applications before leaving each night. FDR/UPSTREAM is also certified to work with Open File Manager from St. Bernard Software

FDR/UPSTREAM, through it’s use of Novell’s SMS for file access, is capable of backing up open and active files on NetWare v5.1 and 6 NSS volumes.

To enable the facility, the procedure is:

☐ 1. Load the updated NSS modules on the NetWare 5.1 server, supplied in support pack 2 or later. Make sure to include the TSA as well.

☐ 2. From the server System Console, enter:

```
NSS /FileCopyOnWrite = <NSS_Volume_Name>
```

Repeat this step for each NSS volume.

☐ 3. Verify that Copy on Write is enabled for the target NSS volumes. From the server System Console enter:

```
NSS VOLUMES
```

Copy on Write should be displayed in the Attributes column.

14.3.3. How you use Novell Features

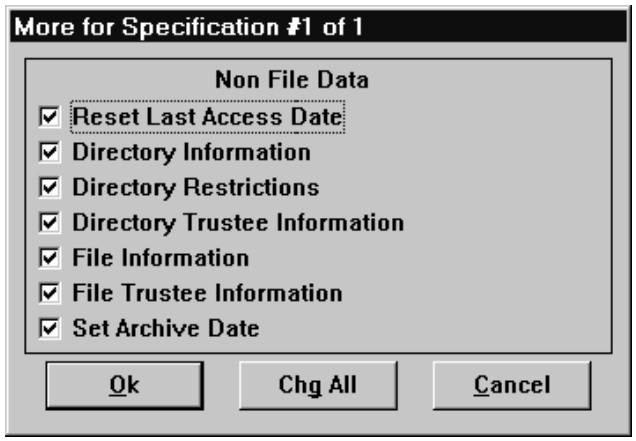
Novell file servers provide a rich selection of information and security features not available in a base DOS environment. These include:

- File and directory specific information
- Directory restrictions
- Trustee rights
- NetWare Directory Services

These issues are discussed in the following sections.

14.4. Backing Up Novell Information

FDR/UPSTREAM includes comprehensive support for selectively backing up and restoring Novell specific information. The selection criteria can be accessed by pressing the **More...** button from the backup or restore file specifications dialog and then pressing the **Novell...** button.



Non-file data is transferred with the data on the backup, and received with the data on the restore. When you select a non-file data option on a backup, FDR/UPSTREAM will attempt to find that attribute and send it with the data. If there is no attribute of that nature (for example, no trustees), then FDR/UPSTREAM will not send any extra bytes. If there is an error accessing an attribute that should be there, then the error is logged and the data part of the file is sent. You may choose to not send many of the non-file data options due to the overhead in retrieving them and the extra transfer and storage overhead.

When you select a non-file data option on a restore, FDR/UPSTREAM will attempt to write that attribute to the file system if it was originally backed up. If there is an error, FDR/UPSTREAM will log the error and still restore the data file, skipping all remaining non-file data options for that file. You may choose not to restore non-file data options if you are restoring to a different file system than the one backed up (like a non-Novell disk), or another file server.

The options on the screen that are not applicable to you can be ignored, as FDR/UPSTREAM will ignore them, even if set, if non-file data of that type cannot be found.

File and directory extended attributes can be combined with Novell information.

The non-file data options for Novell are:

- **Reset Last Access Date:** Selecting this button will cause FDR/UPSTREAM to save the file's information (including last access date and time) before each file accessed during a backup and restore it after the file has been transmitted. If you select Novell Set Archive Date, this facility will be enabled even if not checked. There is additional overhead in using this facility. This is particularly useful if you intend to use Migration (see the *FDR/UPSTREAM Program* chapter) at any time. The default is checked.

- ☐ **Directory Information:** Novell maintains additional information above and beyond what DOS supports about each directory including creation and last modification dates, owner IDs and the like. These can be viewed and set in the FILER or NWADMIN program. The default is checked.

- ☐ **Directory Restrictions:** NetWare supports limiting the amount of space that a user can use based on directory. These are maintained in the NWADMIN program. The default is checked; if you have a large number of directories and do not use directory restrictions, you may choose to uncheck it to improve performance.

- ☐ **Directory Trustee Information:** Security in most Novell environments is maintained based on trustee rights. These are maintained in NWADMIN. Since most Novell LANs use directory level trustee rights for security, the default is checked.

- ☐ **File Information:** Novell maintains additional information above and beyond what many operating systems support about each file including creation and last modification dates, owner IDs and the like. These are viewable and settable in the NWADMIN program. The default is checked.

- ☐ **File Trustee Information:** NetWare supports trustee rights for files as well as directories. The default is checked; if you have a large number of files and do not use file trustees, you may choose to uncheck it to improve performance.

- ☐ **Set Archive Date:** Selecting this button will cause FDR/UPSTREAM to save the file or directory information before each file or directory is accessed during a backup, and setting the last archived date, time and ID of the current user after the information has been transmitted. There is additional overhead in using this facility. The default is checked.

WARNING: There is a bug in the Novell Windows NT Requestor v4.50 with respect to extended attributes. Enabling any of the following non-file data options when backing up a NetWare 5 server may cause your NT machine to crash: NTFS/OS2 File Extended Attributes, NTFS/OS2 Dir Extended Attributes or NTFS/HPFS386 ACLs (Security)

14.5. Logging on (Novell Profiles)

The Novell version of FDR/UPSTREAM includes a facility to manage unattended, secure login as the supervisor (or equivalent), the **Novell Profile**. This is a field, available on the backup and restore screens and references a profile name defined using the FDR/UPSTREAM Local Configurator. A legacy program (SetNov.EXE) is still available for configuring Novell Profiles, but it is now used only on OS/2 systems.

NOTE: If you use the NLM version you must use Novell Profiles

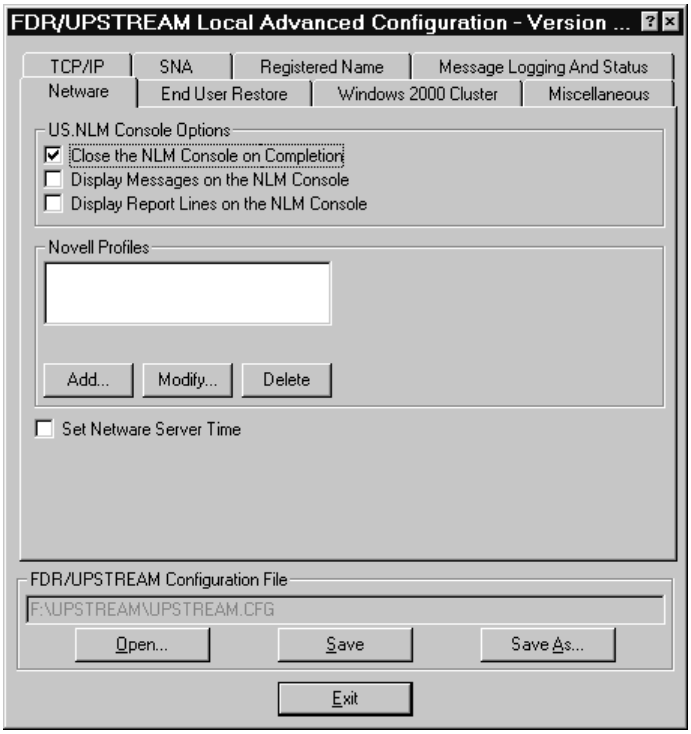
When you specify a valid profile name, FDR/UPSTREAM will perform the following steps before performing the function requested:

- Attaches the specified server (if you are not already attached).
- Logs on as the user name you specify using the specified password.
- Maps the drives on that server as you have specified.

When the FDR/UPSTREAM function (backup, restore, etc.) has completed, it will perform the following steps:

- Either logs off from the file server, or logs a different user on (depending on what you specified).
- If a server or drive was attached to, then that server or drive is detached.

To specify server login information, start the FDR/UPSTREAM Local Configurator and click on the **Netware** tab. The FDR/UPSTREAM Local Configurator Netware tab looks as follows:



The Novell Profile frame lists the defined Novell Profiles and allows you options to Add, Modify or Delete profiles.

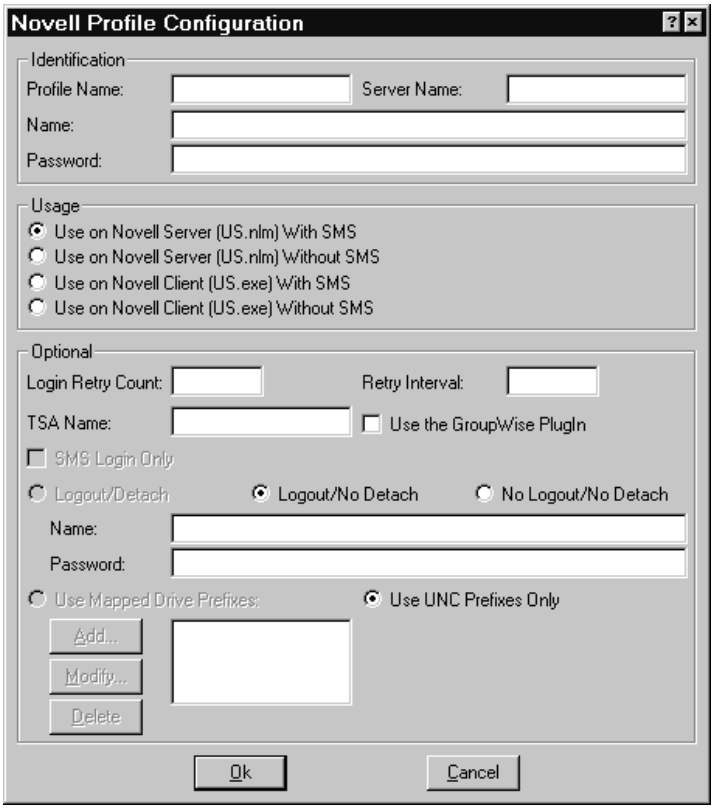
- **Novell Profiles:** This list box displays all the profiles currently defined. If you double-click on an entry, it is the same as pressing the Modify... button. The highlighted entry is the one the Add, Modify or Delete buttons will act upon.

- **Add...:** Click this button to add a new profile.

- **Modify...:** Click this button to modify the currently selected Novell Profile.

- **Delete:** Click this button to delete the currently selected Novell Profile.

All of the information maintained in a Novell Profile is hidden and encrypted. When you click the Add... or Modify... buttons, the Novell Profile Configuration dialog will be displayed:



The fields on Novell Profile Configuration dialog are:

- **Profile Name:** This is any random name which identifies the unattended information you are defining here, generally a server name. Required field. This field is grayed and inaccessible if you are modifying an existing mapping.

- **Server Name:** Enter the NetWare name of the server that you are defining.

- **Login Name:** The user name used to log in to the server you wish to attach to. This field is required. If you are logging into a NetWare v4.x (or higher) server you must use the complete, dotted, fully qualified name. For example: .CN=ADMIN.O=INNOVATION. If the name is not fully qualified a message will be displayed to warn you about problems logging into NetWare v4, v5 and v6 servers. To assure that all information is included in your backups and restores we recommend that you use the NDS admin or equivalent.

- **Login Password:** The password for the Login Name (if any).

- **Use on Novell Server (US.nlm) With SMS:** Check this radio button if this Novell Profile will be used by the NLM version of FDR/UPSTREAM Local and SMS will be used. Refer to section 14.8. for a complete description of SMS.

- **Use on Novell Server (US.nlm) Without SMS:** Click this radio button if this Novell Profile will be used by the NLM version of FDR/UPSTREAM Local and SMS will not be used.

- **Use on Novell Client (US.nlm) With SMS:** Click this radio button if this Novell Profile will be used by FDR/UPSTREAM Local running on a Novell client system (Windows or OS/2) and SMS will be used.

- **Use on Novell Client (US.nlm) Without SMS:** Click this radio button if this Novell Profile will be used by FDR/UPSTREAM Local running on a Novell client system (Windows or OS/2) and SMS will not be used.

- **Login Retry Count:** If a login attempt fails; subsequent attempts may succeed. FDR/UPSTREAM will normally retry a failed login once, if you wish you may increase the number of retries.

- **Retry Interval:** If a login attempt fails, FDR/UPSTREAM will wait for the interval specified here (in seconds) between retries. The default is blank - causing an immediate retry.

- **TSA Name:** This is the Target Service Agent for SMS. Refer to section 14.8. for a description of this option.

- **Use the GroupWise PlugIn:** Check this checkbox if cause FDR/UPSTREAM Local to backup/restore the GroupWise database. Refer to chapter 33 for more information on GroupWise backups and restores.

- **Logout/Detach:** Check this radio button to cause FDR/UPSTREAM Local to logout and detach from the Novell server after the backup or restore operation is complete.

- **Logout/No Detach:** Check this radio button to cause FDR/UPSTREAM Local to logout from, but not detach from the Novell server after the backup or restore operation is complete.

- **No Logout/No Detach:** Check this radio button to cause FDR/UPSTREAM Local to not logout or detach from the Novell server after the backup or restore operation is complete.

- **Logout name**: An optional user name that FDR/UPSTREAM Local will use to log back into a Novell Server after it has successfully logged out. This option is rarely used and grayed if you check the No Logout/No Detach radio button. If this is left blank, FDR/UPSTREAM Local will log off from the server and not log back on. Again, for NetWare v4.x servers you must use the complete, dotted, fully qualified name. For the NLM version you must leave this field blank.

- **Logout password:** The password for the Logout Name (if any).

- **UNC Drives only (no drives mapped):** Check this box if you are using UNC names to back up your servers and do not wish FDR/UPSTREAM to map drives for you. This is recommended and required if you are running as a service in Windows NT.

- **Use Mapped Drive Prefixes:** Check this radio button if you will be backing up the Novell server's volumes via mapped drive letters. This option is grayed for profiles that will be used by the NLM version of FDR/UPSTREAM Local.

- **Use UNC Prefixes Only:** Check this radio button if you will be backing up the Novell server's volumes via their UNC prefixes.

- **Add...:** Click this button to add a drive mapping.

- **Modify...:** Click this button to modify the currently selected drive mapping.

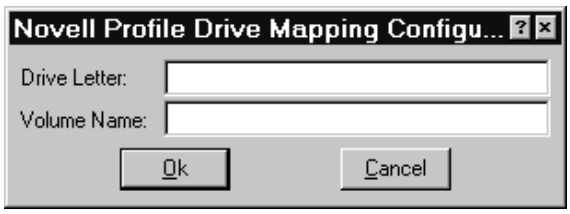
- **Delete:** Click this button to delete the currently selected drive mapping.

- **Drive Mapping List:** This list box contains all of the drive mappings currently defined. If you double-click on an entry in this list box it is the same as clicking the Modify... button.

- **Ok:** Click this button to save the Novell Profile information.

- **Cancel:** Click this button to abandon the changes to the Novell Profile information.

When you click the Add... or Modify... buttons, the Novell Profile Drive Mapping Configuration dialog is displayed:



The Novell Profile Drive Mapping Configuration dialog has the following fields:

- **Drive Letter:** Enter a letter from A to Z designating which drive you wish the server volume to be mapped to.
- **Volume Name:** Enter the NetWare volume name of the volume on the server that you wish to map to.
- **Ok:** Click this button to save the drive mapping.
- **Cancel:** Click this button to abandon the changes to the drive mapping.

14.6. NetWare Directory Services

Novell's NetWare Directory Services (NDS) is an object oriented database which is used to store server related information including security, printer information, application specific information and much more. It is at the core of your server network. In most environments, there is a single directory for all servers; NetWare propagates changes to all servers, but no single server has responsibility for the directory.

The backup/restore implications of this kind of system are:

- A backup of the directory from any server gets the entire directory. Backups from other servers would produce the same information and would thus be unnecessarily repetitive.
- A restore of the directory impacts all servers.
- Any authorized user can, from any location in the internetwork, accidentally delete or otherwise imprudently modify directory entries.

FDR/UPSTREAM includes comprehensive support for the backup and restore of NetWare Directory Services. Using Novell's architected Storage Management Services (SMS) and transporting the data in System Independent Data Format (SIDF), FDR/UPSTREAM offers complete backup and restore of NetWare Directory Services which will work today and into the future.

14.6.1. Planning

Before beginning backups of NetWare Directory Services you should have FDR/UPSTREAM operational on a NetWare attached workstation or the NLM version on a server.

When planning backups of your NetWare servers, if you have even one NetWare server in your tree you should plan on backing up the entire directory.

When running FDR/UPSTREAM on a client workstation, it uses a separate component which resides on a server to back up the directory. This component (USNDS.NLM) performs interprocess communications to send or receive directory information to and from a FDR/UPSTREAM workstation which actually performs the backup. Thus you must set up a workstation with FDR/UPSTREAM with host communications and you must also install and configure USNDS on a server.

FDR/UPSTREAM's directory services backup facility uses Novell's SMS services. Since these services are updated regularly, we recommend that you get the latest SMS updates (SMSUPx) from the Novell web site periodically. In particular, TSANDS.NLM should be the latest available.

Since directory services is designed to be a self-repairing distributed database, we recommend the use of Novell replication and other services for recovery in the event of a server crash. FDR/UPSTREAM directory services backups should be viewed as the last resort method of recovery in a disaster situation as it generates significant network and server overhead when you perform a complete directory services restore.

FDR/UPSTREAM directory services backups will automatically backup the schema. For a complete restore, you must be sure to check the USNDS.LOG file to verify that the schema was restored without errors.

Regular backups of the directory can and should be performed from a single FDR/UPSTREAM PC. The server running the NDS backup can be any server; we recommend the server with the lowest utilization (to minimize user impact).

If you have any questions concerning planning or operations of backups or restores of NetWare Directory Services, feel free to call FDR/UPSTREAM technical support.

If you are using the NLM version, USNDS is no longer required or recommended. To enable internal NDS backup without USNDS, you must check an option in your Novell Profile (see page 5-10). There is no specific configuration necessary to use this option, as there is for USNDS; merely specify an NDS backup or restore and the information in the Novell Profile is sufficient to perform the backup or restore. If you are using this method you can skip to section 14.7.6.

14.6.2. Security

The USNDS NLM itself must have supervisor equivalent access (ADMIN access to the entire directory) to be able to backup or restore the directory. This access can be obtained in two ways:

- The security information can be saved by USNDS during the setup. All FDR/UPSTREAM workstations can then backup or restore NDS information. This has the advantage that backups and restores are simpler and require no separate security attachment, but any workstation that is running FDR/UPSTREAM can backup or restore any component of NDS. Note that while workstations can backup or restore NDS information, they cannot examine or modify it.
- Workstations must use a Novell Profile which represents an authorized user to backup or restore the NDS. This is more secure, but makes backups and restores (particularly ad-hoc restores) of NDS information more difficult.

Choose the method which fits best the security considerations of your organization.

14.6.3. Installation

Support for NetWare Directory Services is provided on the FDR/UPSTREAM NetWare Program diskette or the \UPSTREAM\NDS directory on the CDROM. This diskette contains the following NetWare Loadable Modules:

- USSETUP.NLM: Run this program to install the following NLMs to the SYS:SYSTEM directory.
- USNDS.NLM: This program allows FDR/UPSTREAM workstations NDS access.
- USLOGCLR.NLM: Clears the USNDS.LOG file which is automatically generated by USNDS. Most users will either want to run this program from time to time from the server (usually by installing it in the AUTOEXEC.NCF file) or run USLOGCLR.EXE from any UPSTREAM workstation.

To install the NDS NLMs go to a server where you wish the directory to be backed up from. Note that this can be any NetWare v4.x server that you will be including in your backup plan.

The installation process merely copies the files USNDS.NLM, TSANDS.NLM and USLOGCLR.NLM to the SYS:SYSTEM directory. If you wish you can copy these files from any workstation that has access to that directory and proceed to the configuration step.

To begin the install, put the first Program Diskette in the diskette drive on the server. From the System Console enter:

```
LOAD A:USSETUP
```

You will be asked if you wish to run the install. If you enter ‘Y’, the files will be copied.

The installation program will inform you that you will probably want to modify the AUTOEXEC.NCF to load the USLOGCLR and USNDS NLMs (described below).

14.6.4. Configuration

The FDR/UPSTREAM NDS support NLM (USNDS) requires configuration so that it can properly service NDS backup and restore requests. The configuration consists of Novell SMS options that must be defined, security considerations and reporting.

To configure USNDS, load it from the system console at the server it was installed on:

```
LOAD USNDS
```

The first time you run USNDS you are automatically brought into the configuration. USNDS is a NLM which runs in a separate screen. You can toggle through the loaded NLMs by using the [CTRL][ESC] combination.

The first configuration item is the selection of the Target Service Agent (TSA) you wish to use. A TSA entry is displayed and you must choose whether you wish to use the listed one by entering 'Y' or 'N'. As the screen heading suggests, you will probably wish to use a TSA which begins with your server name, and it will usually be the first entry. For example, if you are on server PAYROLL you may see:

```
PAYROLL:NetWare 4.0 Directory.  Use this one (Y or N) ->
```

Most users will enter 'Y' for the first entry.

Next, you must select a Target Service. If your directory is named ORG_NETWARE_SERVERS, you may see:

```
1. ORG_NETWARE_SERVERS
   Service type   :  NetwareDirectoryServices
   Service version: 1.0
Use this service (Y or N) ->
```

Again, most users will select 'Y' for the first entry.

The next step is the entry of security information to continue the configuration. When NDS is backed up or restored, you must be an authorized user (usually this means supervisor equivalent). To determine which SMS facilities are used in the backup, you must now log in. For example, if you are still using the Novell default, enter for User Name: .CN=ADMIN.O=ORG, and the password of ADMIN. We always recommend the use of the dotted, fully qualified name for all NDS entries. Note that when you enter the password, it is not displayed.

If you enter the security information incorrectly, you will see a message written in the messages section on the screen and you will have the opportunity to reenter the values correctly.

After you have successfully entered your security information, you will be asked:

```
Can UPSTREAM workstations use this login (Y or N) ->
```

If you enter 'Y', UPSTREAM workstations will not be required to have used a Novell Profile for the attach. If you wish to restrict the access enter 'N'. See the security section above.

The next step is the select the Resource to use for backups and restores. Again almost all users will select the first resource which is: Full Directory Backup.

The final step is the amount of reporting information that you wish to write to the USNDS.LOG file:

```
Detailed object backed-up and restored reporting (Y or N) ->
```

If you enter 'Y' all objects included or skipped in a backup or restore will be written to the report. In most cases you will want to turn this on for testing and off in production as this can be extensive depending on the size of your directory resulting in very large USNDS.LOG files.

When you have completed the configuration, the screen will clear, “Configuration successfully updated” will be entered in the messages section of the screen and USNDS will be operational.

14.6.5. USNDS Operations

There are two sections to the USNDS status screen: the information/update section where you entered configuration information at the top of the screen, and the messages section at the bottom which shows the last three or so messages written to the USNDS.LOG file. The information section of the screen shows the number of workstations currently connected and the status which is the last request serviced. This NLM takes few system resources and can be left running at all times.

Since USNDS must be operational for FDR/UPSTREAM to be able to backup/restore the NDS, you should run the INSTALL utility and update AUTOEXEC.NCF to assure that USNDS is automatically loaded at server start. Add the following lines to the end:

```
LOAD USLOGCLR 30 sys:system\usnds.log
LOAD USNDS
```

Note that the 30 in the USLOGCLR statement is the number of days worth of information to maintain in the USNDS.LOG file (stored in the SYS:SYSTEM directory).

To exit the USNDS program, press the [ESC] key. You will be asked:

```
End program (Y or N) ->
```

If you enter ‘Y’, you will then be asked:

```
Modify configuration (Y or N) ->
```

If you enter ‘Y’, you will reenter the configuration process.

When the program terminates, you will be asked :

```
<Press any key to close screen>
```

This will return you to the system console.

14.6.6. Backups and Restores of NDS

There is a checkbox on the FDR/UPSTREAM main backup dialog: **NetWare Directory Services**. If you check this box, the Backup Spec field will change to (NDS).

This specification is for the entire directory. If you wish to include files on a file server you must specify them in separate file specs.

If you wish, you can specify any component or groups of components of the directory to include or exclude if you do not wish to back up or restore the entire directory. To do this, add to the end of backup spec a backslash and the component you wish to include or exclude with wildcards. For example, if you only wish to back up the organizational unit TEST in the organization ORG, use a single include spec as follows:

```
(NDS)\*.OU=TEST.O=ORG.[ROOT]
```

You should then check the Include Subdirectories checkbox in the Spec Detail dialog. The trailing .[ROOT] is required. Note that you can use exclude specifications as well to limit the data transferred. For restores you should use the “Restore and Inquiry (old)” rather than “List and Restore”.

You can backup/restore just the Schema as well. Specify in your file specification:

```
(NDS)\Schema
```

Note that if your backups are to mainframe DASD, FDR/UPSTREAM PCs calculation of the size of the backup will be incorrect and may cause FDR/UPSTREAM MVS to be unable to store the data. If you find this is true,

modify your backup parameter file to use a DASDOVERRIDE or CALCDASDSIZE (see the *Advanced FDR/UPSTREAM* chapter).

FDR/UPSTREAM stores the entire directory, regardless of your specification in a single entry (NDS). File inquiries will show the date and time that the NDS information was backed up.

NOTE: We recommend that you run DSREPAIR before backing up NDS and both before and after a restore of NDS.

14.7. Restoring a Complete Server

Restoring a complete NetWare server is quite complex depending on whether you have a single NDS tree, multiple trees, replication, etc. As the procedures change from NetWare version to version and are defined by Novell, we recommend that you see the procedures described in the Novell documentation:

- For NetWare 4 NDS restore information, see:
  http://developer.novell.com/research/appnotes/1996/October/03/a961003_.pdf
- For NetWare 5 system restores, see:
  http://www.novell.com/documentation/lg/nw5/docui/index.html#../ussms/back_enu/data/hhendhz2.html
- For NetWare 6 restores, see:
  http://www.novell.com/documentation/lg/nw6p/index.html?back_enu/data/hhendhz2.html

The Novell documents refer to SBACKUP, but the concepts for NDS and file restore are similar in UPSTREAM. For a description of how to restore NDS using UPSTREAM, see page 14-12. For a description of restoring Server Specific Info, and the individual files referenced within it (SERVDATA.NDS, DSMISC.LOG, VOLSINFO.TXT, STARTUP.NCF, and AUTOEXEC.NCF) see page 14-22.

14.7.1. Full Machine NetWare 5 Recovery

This section details the Innovation Data Processing recommended approach to recovering an entire NetWare 5x machine in a disaster recovery scenario. This information was developed from experiences in the Innovation labs and should not be taken as the final source for server restore.

For NetWare, it's highly recommended that backups are taken with all users logged off, and all applications closed. Since this is not possible in most environments, we recommend using a third party product, such as St. Bernard Software's Open File Manager, or something similar. If the data you are backing up is on a NSS volume, we recommend turning on 'FileCopyOnWrite'

14.7.2. Multiple Server Tree /Non NDS Restore

☐ 1. BEFORE you have a disaster, do regular Full System Backups using Novell's SMS of your system with UPSTREAM version 3.1.6 or later, using a file specification of "\\.". This will backup all Volumes that use the 'NetWare File System' TSA, as well as the 'Server specific data' The server specific data is actually 5 files: DSMISC.LOG, VOLSINFO.TXT, AUTOEXEC.NCF, STARTUP.NCF, and SERVDATA.NDS. The server specific data will appear as one entry when doing an inquiry of the Upstream backup. Additionally, you should backup NDS.

NOTE: It is NOT necessary to use the server specific data to perform a full system recovery with Upstream. We provide it as a point of reference for the server being recovered.

☐ 2. If the server you are recovering was holding the master replica of NDS, designate a different server as the new Master Replica holder. Then remove the old server from the LAN. If the server held a Non-Master replica, you must remove it from the LAN. Note that to remove a replica from the LAN, you must run DSREPAIR with the –a option.

☐ 3. Remove the server object from NDS using NDS Manager.

- ☐ 4. Install NetWare into the same NDS tree using the same server name. Ignore any messages you may get about duplicate server names. You will not have to restore NDS to this server, as it will replicate onto the server during the install. Ensure that the SYS volume is at least as big as the SYS volume of the source machine.

- ☐ 5. Create any other volumes that may have been on the source machine, making them at least as large as those on the source machine.

- ☐ 6. Apply the same support pack that was on the source machine.

- ☐ 7. Run DSREPAIR. Do an 'unattended full repair' and Replica repairs.

- ☐ 8. Map a drive to the server and install / configure UPSTREAM.

- ☐ 9. Perform a restore of the SYS volume. Choose the option to NOT overwrite any existing files during the restore. The parameter name is 'skip' and the value you should use is'1'. This will ensure that all application and user defined data will be restored, but all systems files will not be over written.

WARNING: Overwriting system files from the backup may result in a completely unusable server.

- ☐ 10. Restore any other volumes.

14.7.3. Single Server Tree / NDS Restore

- ☐ 1. Install NetWare into a new NDS tree. Use the same tree name and the same context as the original; also use the original server name. Ignore any messages you may get about duplicate server names. Ensure that the SYS volume is at least as big as the SYS volume of the source machine.

- ☐ 2. Create any other volumes that may have been on the source machine, making them at least as large as those on the source machine.

- ☐ 3. Apply the same support pack that was on the source machine.

- ☐ 4. Map a drive to the server and install / configure UPSTREAM.

- ☐ 5. Perform a restore of NDS.

- ☐ 6. Run DSREPAIR; perform an 'unattended full repair'.

- ☐ 7. Reboot the server

- ☐ 8. Perform a restore of the SYS volume. Choose the option to NOT overwrite any existing files during the restore. The parameter name is 'skip' and the value you should use is'1'. This will ensure that all application and user defined data will be restored, but all systems files will not be over written.

WARNING: Overwriting system files from the backup may result in a completely unusable server.

☐ 9. Restore any other volumes.

14.7.4. Backup/Restore Novell Errors

FDR/UPSTREAM, with the "log non-fatal" option set, may often report a large number of Novell errors during a backup or restore. Many of these are common and should be expected. These include:

- Printer/mail queue files will be locked. They are in use by the printer/mail application and cannot be accessed by UPSTREAM. This generally only applied to entries in the process of being transferred.
- UPSTREAM PC#2491,Novell #898E. This occurs when UPSTREAM has completed backing up a file and the file is open when it attempts to reset the archive bit or reset the last access date. This is normal and to be expected during a backup when files may be open for read.

However, you may see a large number (in many cases thousands) of messages which are not normal. This is the inevitable affect of a comprehensive backup/restore product - it traverses throughout the entire file system and if there are any inconsistencies, UPSTREAM will be the first to detect them.

The most common errors are UPSTREAM PC messages #2540-2546 where UPSTREAM attempts to resolve NetWare internal identifiers with object names and vice-versa. In general, these occur when UPSTREAM looks up a trustee or owner ID during a backup attempting to resolve it into its name, and then can't get the name. Also, it can happen during a restore when UPSTREAM has the name and attempts to resolve it into an ID.

If this is a restore, you should first verify that you have restored NDS before you restore any of the files/directories.

Otherwise, these are Novell server inconsistencies which if not fixed will cause you problems down the road. When you begin to see them, you should schedule a DSREPAIR run (NetWare v4,v5) or BINDFIX (NetWare v3). You may need to run DSREPAIR/BINDFIX a number of times to get the entries truly repaired. You may find that you need to upgrade your server fix levels (available on http://support.novell.com).

When running a large restore you should always make it restartable, and you should start with the server at the highest Novell fix level you can get. Note that a large number of errors, besides not restoring the non-file data correctly, will significantly degrade restore performance.

We have seen a restore start with few errors, but as UPSTREAM generates a large number of updates, the server can't keep up and UPSTREAM begins reporting errors. We recommend that if this happens that you suspend the restore, run the DSREPAIR/BINDFIX utilities, and restart the restore.

If you continue to have problems, we recommend that you call UPSTREAM technical support.

14.8. Novell SMS

Novell Storage Management Services (SMS) is designed as the standard method for backing up and restoring Novell volumes. All Novell features (name spaces, security attributes, NSS specific features etc.) are included in backups and restores. In most cases this can be the fastest method of backup.

As an added advantage, you can perform a full system backup with a single file spec: \\. This causes UPSTREAM to automatically include all files on all volumes on the server along with the Server Specific Info, which is used for server recovery.

You can use Novell SMS if you are using the NLM or Windows NT version of FDR/UPSTREAM.

The main disadvantage of UPSTREAM's SMS support is that the files backed up can only be restored to a Novell server. You cannot directly restore the data to a local disk. Data is transmitted and stored in SIDF form, and Novell compressed data is not decompressed unless you specify the option to have UPSTREAM decompress it.

WARNING: If you are using UPSTREAM with Novell's SMS and you are running NetWare v5, you must install Support Pack 2A and perform a first-time full. See Novell TID 2951603.

To use SMS with the NLM version of FDR/UPSTREAM, you must load the appropriate Target Service Agent (TSA). You should obtain the latest version from Novell:

- TSA312 for NetWare 3.12
- TSA410 for NetWare 4.1 and 4.11
- TSA500 for NetWare 5.0 and 5.1
- TSA600 for NetWare 6

To use SMS with Windows NT, you must install the SMDR32.DLL from Novell. Note that at this time SMS performance with Windows NT is quite poor; you may choose to use it only for specific files/volumes for this reason.

You specify that a given backup or restore will use SMS, by checking either the **Use on Novell Server (US.nlm) With SMS** or **Use on Novell Client (US.exe) With SMS** radio buttons on the Novell Profile Configuration dialog which is displayed when adding or modifying Novell Profiles using the FDR/UPSTREAM Configurator.

Other than specifying a SMS Novell Profile and using UNC names, there are no other usage requirements within UPSTREAM for SMS. Specify backups and restores as you normally do.

Non-file data options are slightly different for SMS:

- All non-file data for a directory or file is backed up and restored. This means that most of the UPSTREAM Novell non-file data options are ignored (File and Directory Information, Directory Restrictions, and Trustee Information).
- Set Archive Date is observed. UPSTREAM will set the ID of the backup user and the current date during the backup.

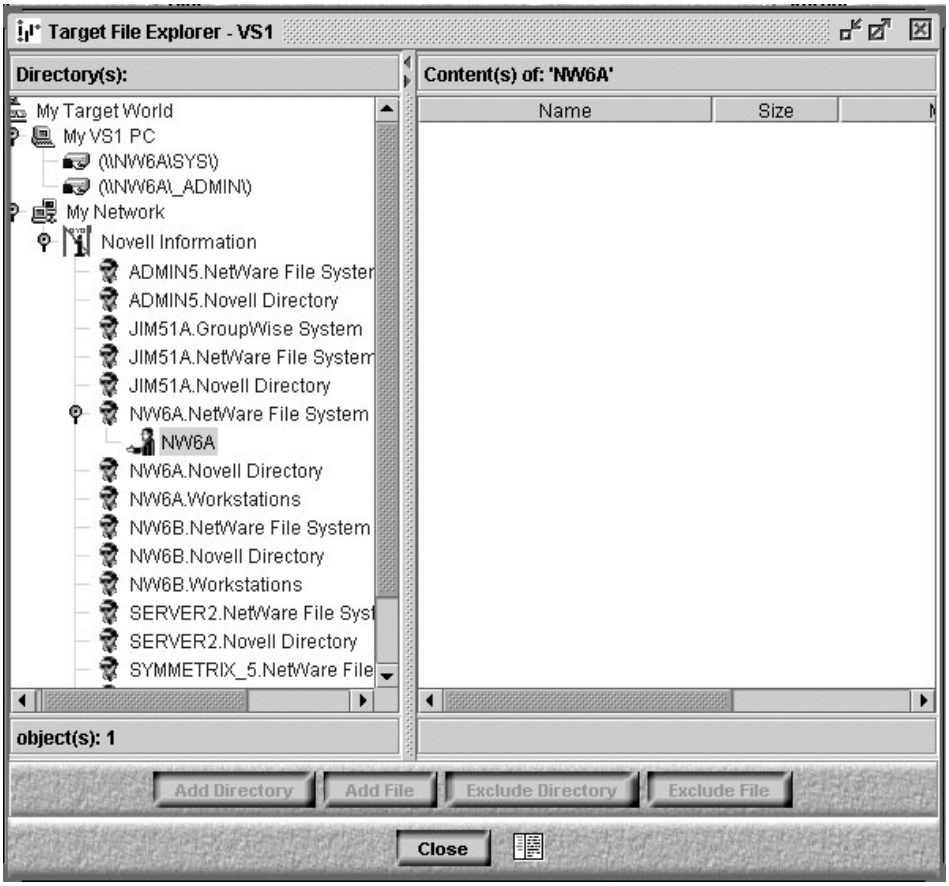
Name	Default	Description

- SMSTARGETSERVICENAME: Allows you to override the default target service name for the TSA (the first target service name found, typically the server).

14.8.1. Browsing TSA Information in the UPSTREAM Director

You can get a list of available TSAs and target service names in the UPSTREAM Director from active copies of UPSTREAM/NLM running SMS.

In the Director, from the target list or the backup window, you can press the **Browse..** button. If the target system is a Novell server with an SMS TSA loaded, expanding the **My Network** leaf in the Directory tree will display the **Novell Information** leaf. When you expand Novell Information, you may be presented with an hour glass as the list of TSAs are prepared and then displayed. Expanding a TSA will display the available target service names. You can not expand below that level.



14.8.2. Server Specific Info

Server Specific Info is Novell SMS shorthand for the 5 files that Novell considers essential for server recovery and which are local to the server itself (rather than global to all servers, such as NDS). These include:

- SERVDATA.NDS Contains server-specific NDS information. The file is used by INSTALL.NLM to recover from an unplanned volume SYS failure. This file allows trustee assignments and other NetWare information to be preserved.

- DSMISC.LOG A text file containing a list of replicas, including replica types, that the backed up server held at the time of backup. It also provides a list of other servers that were in the failed server's replica ring.
- VOLSINFO.TXT A text file containing needed information about the server's volumes, including name space, compression, and data migration information, at the time of backup.
- STARTUP.NCF The NetWare boot file that loads the NetWare server's disk driver and name spaces and some SET parameters.
- AUTOEXEC.NCF The NetWare server executable batch file, located in the NetWare partition of the server's disk, used to load modules and set the NetWare operating system configuration.

Server Specific Info is represented in UPSTREAM as a volume with no files and a <Volume Information> entry.

To specify it in a backup, perform either a full system backup or specify \\server_name\Server Specific Info*.*.

To specify it in a restore, restore the <Volume Information> file. When you perform a restore, Novell SMS will create a directory SYS:SYSTEM\8.3_server_ name where the 8.3_server_name is a shortened name of your server. It will place in it the 5 files which are the Server Specific Info. See the Novell documentation (some of which is listed on page for the use of these files in server recovery.

14.9. NetWare 6 Cluster Services

Included in NetWare® 6, Novell Cluster Services™ 1.6 is a reliable and cost-effective storage area network (SAN) solution that provides you with virtually uninterrupted access to your critical storage resources. Novell provides backup facilities in SMS, but backup applications have to be cluster aware to be able to use them. FDR/UPSTREAM is now sufficiently cluster aware to be able to perform these backups.

In Novell clustering, there can be one or more virtual servers that belong to the cluster with virtual volumes and virtual IP addresses. There are physical machines (nodes) which actually implement the virtual server, volumes and IP addresses. One node at a time is responsible for implementing the virtual resource.

You can disable cluster services within SMS by using the /cluster=off switch when you load TSA600. This causes SMS to treat cluster resources as standard volumes. Only the node which is currently implementing the resource (volume) can see the volume. And when you back it up, you back it up using the machine name of the node.

However, if you use that technique, you must direct your backup and restore request to all cluster nodes unless you know exactly which node is active for a given resource at a given time. If nodes fail over on a regular basis a single full merge backup image may be difficult to obtain as files will appear to change because the server component of the names will change when it fails over. These instructions assume that you have **not** specified the /cluster=off option.

Cluster backups must be done using the NLM version of UPSTREAM with the SMS facilities enabled.

To be able to use SMS to backup a Novell cluster, you must enable and fully activate SLP on your server. The following web address describes the procedures for activating SLP on your server: http://www.novell.com/documentation/lg/ndsedir/index.html?taoenu/data/a5eyqkl.html

There have been known problems in Novell's SMDR in addressing SMS via SLP when other protocols are enabled for SMS. We recommend that you disable the other protocols by entering on the server console:

```
SMDR NEW
```

This will display the SMDR configuration screen. We recommend that you answer 'Y' to disable the other protocols (NDS and SAP) and only enable SLP.

We recommend that you install UPSTREAM onto a cluster enabled volume, so that failed backup or restores can be restarted at the point of failure and that high performance is maintained regardless of which node owns the virtual server.

14.9.1. Configuration

The configuration of UPSTREAM for a cluster node has a number of steps:

- ☐ 1. Install and configure UPSTREAM on all cluster nodes. We recommend that you backup the SYS volume of each node for full recovery.

- ☐ 2. Copy the entire UPSTREAM directory, including subdirectories to a directory (\UPSTREAM is the recommended name) on a volume in a cluster enabled volume pool. Rename **US.NLM** to **US1.NLM**.

☐ 3. Run the UPSTREAM configuration program (**USCFG.EXE**). Some information will already be there referring to the source of the copy. Make the following changes:

- In the **TCP/IP** tab, change the **Local TCP/IP Address** to that of the Virtual Server's address for both the send and receive fields.
- In the **Miscellaneous** tab, change the **Local Workpath** to **\\.\<volume>\<UPSTREAM directory**>. This is the UNC name of the UPSTREAM directory, using a dot (.) in place of the server name. UPSTREAM will replace the dot with the correct virtual server name. This technique is what allows restart. Thus if your volume name is VOL1 and your UPSTREAM directory is UPSTREAM, you would enter: \\.\VOL1\UPSTREAM
- Also in the **Miscellaneous** tab, uncheck the box that says **Do not automatically restart failed backups**. This will allow a backup or restore to automatically continue at the point of failure if the cluster fails over.
- In the **Registered Names** tab, change the registered name to a name descriptive of the Virtual Server or the Volume Pool that you will be backing up.
- In the **Netware** tab, add a new Novell profile:
  - For **Server Name**, use the name of the Virtual Server that owns the volumes that are being backed up.
  - Enter the Name and Password for a supervisory NDS user with full permissions to all of the cluster resources.
  - Press the **Use on Novell Server (US.nlm) With SMS** radiobutton.
  - Enter a **TSA Name**. The TSA Name depends on the name of the virtual server. It's format is: **<VirtualServerName>.Netware Cluster File System**. For example, if your virtual server name is VIRTUALSERVER1, then use the TSA Name: VIRTUALSERVER1.NetWare Cluster File System. If you are unsure you can use the Director Browse feature described in section 14.8.1.

Save the new configuration. Make sure that the configuration file is saved to the cluster volume.

☐ 4. Load Upstream. From the server console of the node which owns the resource enter: **LOAD *VolumeName*:upstream/US1** You will also need to add this line to the Cluster Resource Load Script described below.

14.9.2. Backup Procedures:

To perform a backup or restore, you can target either the Registered Name (specified above during configuration) or the IP address of the Virtual Server.

In your backups or restores you must specify the non-repeating parameter: **SMSTARGETSERVICENAME**. The value of the parameter is usually the Cluster Resource name that owns the volumes being backed up.

To determine the name, type 'Cluster Resources' at the console of one of the nodes in the cluster. This is most likely also the name of the Virtual Server. You can also determine this value in the UPSTREAM Director described in section 14.8.1..

To specify this parameter in your backup or restore in the UPSTREAM Director press the **Options** button and choose the **Netware** tab. Enter this value in the **SMS Target Service Name** field. As with all NLM based UPSTREAM backups, you must also enter your Novell Profile in this tab.

You should use a separate backup profile than the one used for non-cluster enabled volumes, such as SYS, on the cluster nodes.

The file specification for the backup works just as it does for a regular UPSTREAM backup. You can specify a single file or directory, or an entire volume. You must use the UNC format; //ServerName/VolumeName/*.*. If you want to back up all the volumes that are part of the Cluster Enabled Volume Pool, simply specify '//.' This would be the recommended approach, as it ensures a complete backup of all cluster data.

14.9.3. Failover considerations.

You should add into the 'Cluster Resource' load and unload scripts to load or unload UPSTREAM if a failover and/or failback occur. You should add to the last line of the load script:

```
?load <volumename>:upstream/us1
```

Where <volume name> is the name of the volume where you installed UPSTREAM. The question mark preceding the load statement, causes a 10 second pause.

Since UPSTREAM has a number of prerequisite modules (TSA600, TSANDS, etc.), these will need to be loaded before the UPSTREAM line in the load script. We have found that you get the best results if you unload these modules (in case they are already loaded) and then reload them.

The first line of the unload script should simply contain

```
unload us1
```

If you wish, you can make your backups restartable (restores are always restartable). When the cluster fails over, they will be automatically restarted at the point of failure.

14.10. Novell Auto-Recall

Auto-Recall is a facility where when a file has been migrated (moved to other storage), a stub of the file is left behind. If a user accesses the file, then the file is restored to its original media in its original form.

FDR/UPSTREAM supports auto-recall for Novell servers. This comprehensive facility features:

- Auto-detection of files to migrate based on last access date. When specifying files to migrate you can either specify specifically the files to migrate or specify a wildcarded range of files and ask UPSTREAM to only migrate those files which hadn't been accessed for a given number of days. This allows you to use FDR/UPSTREAM as a tool to keep your disks free of unused data.
- Transparent recall. When a file is accessed by any user in any operating system, FDR/UPSTREAM will automatically recall the file.
- User notification. A user on a Windows 95, Windows NT or OS/2 based system can be notified of the recall event and decide whether to allow the recall to proceed or fail.
- Recalls by FDR/UPSTREAM on Novell servers, Windows 95, Windows NT or OS/2 systems.
- Specification of recall retention periods and automatic cleanup of expired migration stubs.

14.10.1. Introduction

Before beginning on migration/auto-recall planning you should have a basic understanding of FDR/UPSTREAM and how it functions in a Novell environment.

There are several steps to a migration/recall:

- ☐ Migrating the files. Determining the files to migrate and performing the migration. This is performed by FDR/UPSTREAM. You can use the NLM version on the server directly or on a separate workstation (DOS, OS/2, Windows, Windows NT). Once you choose a method you should plan on sticking with it. We highly recommend using the NLM version of UPSTREAM. The **File Migration** facility is recommended for performing these migrations, and it is further recommended that you specify a File Migration only profile.

- ☐ Detecting a recall request. FDR/UPSTREAM includes a NLM (NetWare Loadable Module) which runs on the server: USRECALL.NLM. When installed, this NLM will determine if a file must be recalled when it is opened by a workstation application or user for read or read/write by examining it's last access date (Jan. 2, 1981 which is set by UPSTREAM during a Novell migration). This NLM has many configuration options for the processing of auto-recall requests including:
  - Whether the user should be held until the recall completes or the file open should fail and the recall proceed in the background. We strongly recommend that the recall not hold the user. The Novell requestor is single threaded and the workstation will be effectively locked until the recall is satisfied. Also, if the recall takes too long (there are requestor parameters on some versions of the client to set this, but the default is 3 minutes), the user's connection to the server is broken.
  - Whether the user can be notified of recall requests and accept or deny them.
  - How long a recall request should be held for (its timeout).

- ☐ (Optionally) Notifying the user. If the user's workstation is Windows 95, Windows NT or OS/2 and has loaded the FDR/UPSTREAM Auto-Recall notification program (USNOTIFY.EXE) on his workstation the user will be notified of the recall request and have the opportunity to either accept the recall or reject it.

- ☐ (Optionally) Sending status. Status can be sent to the user via NetWare broadcasts, which work regardless of whether the USNOTIFY program is loaded.

- ☐ Recall the file. If the recall can proceed, and your are running the NLM version of UPSTREAM for recalls, then USRECALL will immediately start UPSTREAM to perform the restore. If you are using a client for the recalls, then USRECALL.NLM will send the request to NWRECALL.EXE, the FDR/UPSTREAM Auto-Recaller which will start FDR/UPSTREAM to perform the recall.

  Once the recall has completed, the user, if blocked waiting for the recall to complete, will be freed. If the recall fails for any reason, the user will be returned a NetWare file open error.

- ☐ Clean up expired files. This is performed during the migration.

Communications between the server NLM and the recaller or notification workstation uses the Novell TLI facility which runs over IPX/SPX or TCP/IP. Communications configuration is performed on the server.

14.10.2. Migration

When planning for the migration, some issues to consider related to host storage are:

- Files to be migrated should be stored in a separate backup profile from your regular backups. If you choose to use the same backup profile you need to realize that there will be excessive overhead in host FILE_INFO storage as a record for a migrated file is created for each new full backup.
- Migration should be performed somewhat infrequently. Again, the overhead in the FILE_INFO cluster is quite high.
- You may choose to use deferred merges to keep data stored on disk in case of early user recall.

Some Novell server notes and warnings include:

NOTE: If you intend to migrate using the last access date, you must check the Reset Last Access Date checkbox in the Backup/Spec Detail/More... dialog for ALL backups. Otherwise the last access date will always be the last backup date.

WARNING: For ALL UPSTREAM backups of a server containing migrated files, you MUST check the Novell Auto-Recall Profile checkbox in the Backup/More... dialog. If you do not, an UPSTREAM backup will cause a recall of all migrated files.

NOTE: When checking the Novell Auto-Recall Profile, you can also check Delete expired auto-recall files. When performing a migration for auto-recall you specify a retention period. FDR/UPSTREAM sets the file's creation date to today's date plus the retention period. If you check this box the next backup will cause the stub to be deleted.

NOTE: Auto-recall of migrated files must come from a single backup profile for each server. You cannot use more than one backup profile to hold migrated files for a given server.

WARNING: (If you're using NWRECALL) You may get hangs if you allow the FDR/UPSTREAM machine to perform auto-recalls. This machine should only be used to restore recalled files.

There are three different ways to migrate files for auto-recall using FDR/UPSTREAM:

- File Migration: This is a separate option for specifying files to migrate. This is the recommended method (see later in these notes for a description of this new facility). Note that you must check the **Novell Migration** checkbox in the spec detail dialog.
- Migration. When performing Full Merge backups, the Migrate... option is enabled in the Backup, Spec Detail dialog. When you press this radio button you can specify that all migrated files be Novell Migrated (a stub left and auto-recallable) rather than deleted by checking the **Novell Migration** checkbox. The other migration options are discussed in the Migration section of the FDR/UPSTREAM Program chapter in the manual.
- Specify files be included in any non-merge backup and then (in the Backup/Spec Detail/More... dialog) in the Backup File Deletions frame, press the All Files in Spec radio button and check the Novell Migration checkbox. This will cause the files to be marked for auto-recall rather than explicitly deleted. Note that the expiration of the files is specified using the RETAIN parameter not available on this screen. You should set it by editing the parameter file manually or in the Migration Spec Detail frame. If using this method you must still check the **Novell Auto-Recall Profile** checkbox in the Backup/More... dialog.

For most users we recommend:

- Use a separate backup profile for migration than for your regular backups.
- Use Migration rather than file deletion.
- Migrate those files which have not been accessed for more than 180 days.
- Perform migrations monthly or less often.
- Retain migrated files for 90 days.
- Use deferred merge and do not run the merge utility for several days to allow users to recall files.

If your users will be using the Windows Explorer to browse directories, note that it opens a number of files (based on their extension) to obtain their icons for display. This will cause spurious recalls. There is a feature in migration specifications **Add ext. to stub** which causes UPSTREAM to add the predefined extension .UPSTREAM_MIGRATED to all migrated files which will suppress these recalls. We recommend using this feature in your migrations whenever the Windows Explorer may be used. You will need to note that you have specified it in the recaller configuration (below).

14.10.3. The Components

The NetWare Auto-Recall diskette (or \UPSTREAM\NWRECALL directory) on the CD contains the following files:

File Name	Description
\NOTIFY\OS2\UPSTREAM.MSG	UPSTREAM message file for OS/2 user notification.

File Name	Description
\NOTIFY\OS2\USNOTIFY.EXE	User notification program for OS/2 users accessing migrated files on Novell servers.
\NOTIFY\WINDOWS\UPSTREAM.MSG	UPSTREAM message file for Windows 95 and Windows NT user notification.
\NOTIFY\WINDOWS\USNOTIFY.EXE	Users notification program for Windows 95 and Windows NT users accessing migrated files on Novell servers.
\RECALL\OS2\NWRECALL.EXE	The UPSTREAM auto-recaller program that runs on the UPSTREAM OS/2 machine. This is a full-screen (non-PM) program.
\RECALL\WINDOWS\NWRECALL.EXE	The UPSTREAM auto-recaller program that runs on the UPSTREAM Windows 95 or UPSTREAM Windows NT machine.
\SERVER\USLOGCLR.NLM	Log clearing program (NLM version)
\SERVER\USRECALL.NLM	UPSTREAM auto-recaller server module.
\SERVER\USSETUP.NLM	UPSTREAM auto-recaller server setup program.

Auto-Recall Components

The figure below shows you the components in FDR/UPSTREAM auto-recall:

On the user's machine the components are:

- **The user's program**. Any program or method that the user uses to access a file on the server. This can include such simple facilities as the TYPE command.

- **USNOTIFY**. This is an OS/2 or Windows 95 or NT program which notifies the user when the recall request has occurred on this machine and allows the user to select whether the recall will occur. We recommend its use when possible so that when a recall is in progress, the user does not think that the application has hung.

On the Novell file server the components are:

- **USRECALL**. A server NLM which monitors file system open calls, notifies users (through communications to USNOTIFY on user's machines) and requests recalls to NWRECALL (on the FDR/UPSTREAM PC).

- **UPSTREAM (US.NLM).** This is the recommended method.

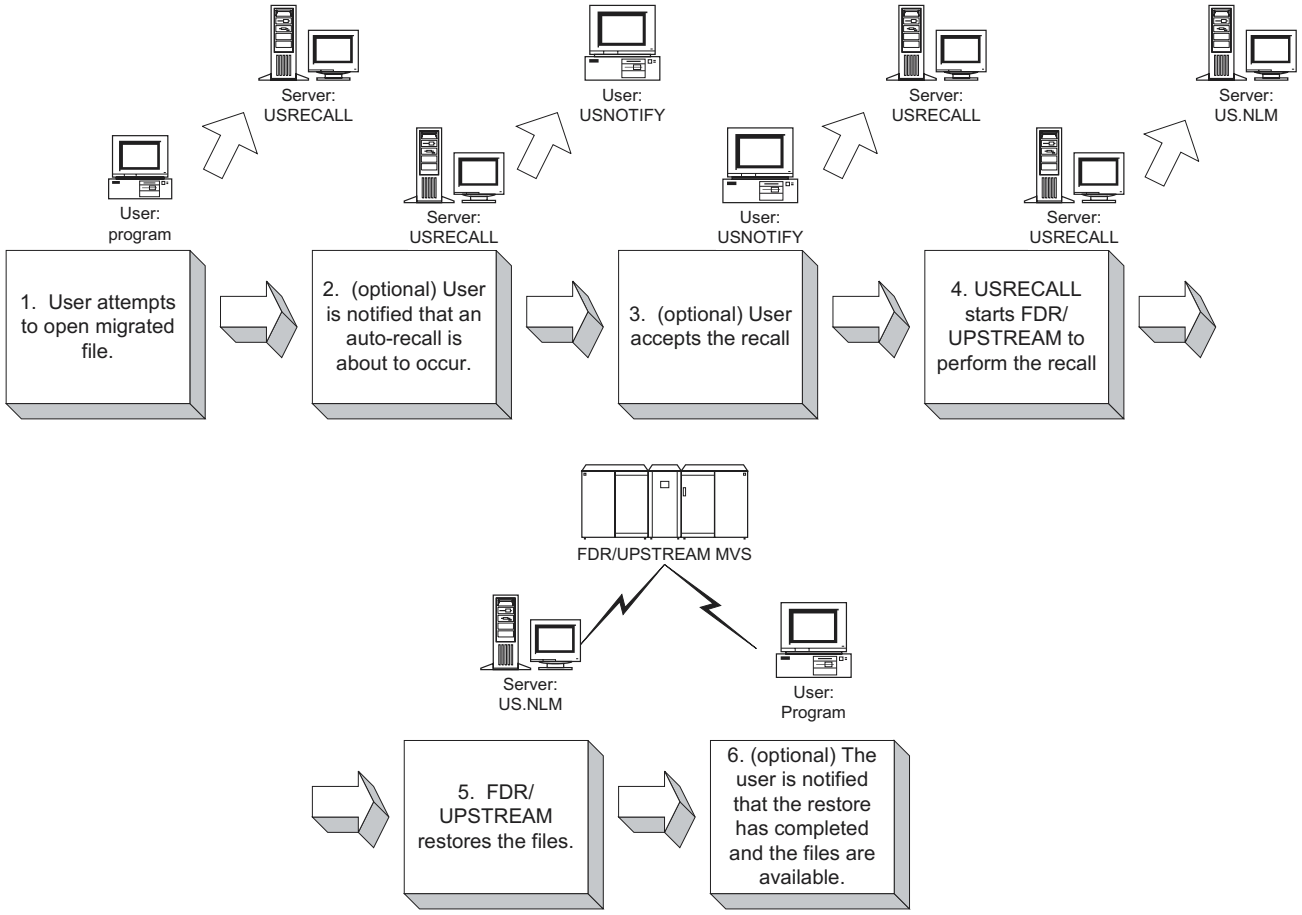
If you are not using US.NLM, you'll need a separate FDR/UPSTREAM machine. On that FDR/UPSTREAM PC, the components are:

- **NWRECALL**. An OS/2 or Windows 95 or NT program which allows must be always running and receives the auto-recall requests from USRECALL on the server and starts FDR/UPSTREAM PC to perform the recall.

- **FDR/UPSTREAM**. Performs the restore (recall).

Communications between USNOTIFY on the user's machine and USRECALL on the server and between USRECALL on the server and NWRECALL on the FDR/UPSTREAM machine uses the Novell standard TLI interface. This interface can utilize the SPX, SPX-2, or TCP/IP protocols, though most users will use SPX-2 or TCP/IP for performance reasons.

The process of auto-recall is shown in the following figure:



The auto-recall process is (assuming the NLM version of UPSTREAM):

- ☐ 1. The user attempts to open a migrated file. When the migration was performed a stub was left for the file. When the user attempts to open this file, USRECALL on the server intercepts the open request and holds it until the recall is started (and optionally completed or fails).

- ☐ 2. (Optional) User is notified that an auto-recall is about to occur (via a broadcast message).

  If USNOTIFY is running on the user's machine, USRECALL will send a message to it. USNOTIFY will beep, and ask the user if the recall should be performed.

- ☐ 3. User accepts the recall. If the user says NO (in USNOTIFY) or the notification request times out, the file open request fails. If the user says YES or USNOTIFY is not running, then the recall is performed. USRECALL has been configured to not have the user wait for the recall, the file open fails (with a file in use error message) and the user will be optionally notified when the recall has completed.

- ☐ 4. USRECALL starts FDR/UPSTREAM on the server. If a number of recalls occur simultaneously, then they will be serviced at the same time.

- ☐ 5. FDR/UPSTREAM restores the files. FDR/UPSTREAM performs a normal file restore directly to the server.

☐ 6. The file restore is completed and the data is available. The user's file open request will be satisfied and the program can proceed normally.

14.10.4. Installation and Configuration of the Server Component

Auto-recall can be performed on NetWare v3.12, v4.1x or v5.x servers. Due to the nature of NetWare (with its fragility with NLMs and operating system hooks), we recommend that you isolate a server for testing before you place it in production, upgrade to the latest levels of Novell software, and install and test auto-recall before placing the server back in production. Note that server upgrades and PTFs are available on their FTP site at ftp.novell.com/pub/updates. We recommend the following updates be applied before installing the auto-recall server component:

- For NetWare 3.12 servers: 312PTA.EXE, CDUP4.EXE, LANDR9.EXE, LIBUPB.EXE, MON176.EXE, NAM312.EXE, SMSUP6.EXE, STRTL5.EXE and VRPUP1.EXE.
- For NetWare 4.10 servers: 410PT6.EXE, 41NDS9.EXE, CDUP4.EXE, INS224.EXE, LANDR9.EXE, LIBUPB.EXE, NAM41A.EXE, SMSUP6.EXE, SRVMN1.EXE and STRTL5.EXE.
- For NetWare 4.11 servers: 411SP1B.EXE, LIBUPB.EXE.

WARNING: You must update your server to assure reliable operation of your server and auto-recall

To install the server component you can copy the files from the \NWRECALL\SERVER directory on the CD or the \SERVER directory on the NetWare Auto-Recall Diskette to the SYS:SYSTEM directory of your server from a workstation, or from the server you can run the USSETUP program.

To run the USSETUP program from diskette, insert the NetWare Auto-Recall diskette in the A: drive and enter from the System Console:

```
load a:server\ussetup
```

To run the USSETUP program from the CD, insert the CD in your CD drive and enter from the System Console (assuming that the CD drive is drive D:):

```
load d:\upstream\nwrecall\server\ussetup
```

You will be asked if you wish to run the program (Enter 'Y'). If installing from CD, you will be asked for the CD directory. Enter **D:\NWRECALL\SERVER**. The program will copy the contents of the directory to the SYS:SYSTEM directory, refer you to this manual and ask you to press a key to return to the System Console.

Load the prerequisite NLMs. Note that these NLMs should be loaded in your AUTOEXEC.NCF file before you load USRECALL.

- TLI.NLM for all interfaces.
- SPXS.NLM for SPX or SPX-2.
- TCPIP.NLM for TCP/IP.

To configure USRECALL, you must load the program:

```
load usrecall
```

This will display the Auto-Recall console.

```
                    FDR/UPSTREAM Auto Recall System
Process #1                          Process #2
Status  : Idle                      Status  : Idle

                              Messages
```

It is divided into 3 sections:

- Connected recallers. The top boxes named Process indicate the recallers that are currently connected and their status.
- A user entry line (in the middle).
- A messages display. All messages are written to the file USRECALL.LOG; the most recent few messages are displayed in this window. Note that this window is used to display help information while you are entering configuration values.

When you enter for the first time, you will be prompted in the user entry line:

```
Configuration file not found.  Create (Y or N) ->
```

Press **Y** and enter to begin configuring.

The user entry line will now prompt you:

```
SPX (Y or N) ->
```

The messages field will now indicate that you have entered configuration. It will also display help for the question. **SPX: SPX is only recommended in an environment where you know that SPX-2 will not work. The default is NO. Most users will press** N **and enter.**

NOTE: If you will be configuring to use FDR/UPSTREAM on the server, you must complete the steps on page 14-36 before you can specify the directory that UPSTREAM is installed in.

The following table describes the options requested during configuration, their defaults and some descriptive help. You can press ENTER to accept the default or prior value. Note that some options only have to be entered if they are relevant; for example you don't have to enter IP parameters if you are only using SPX.

Item	Default	Description
SPX	N	SPX: SPX is only recommended in an environment where you know that SPX-2 will not work. The default is NO.
(SPX only) SPX Socket Number	4226	SPX Socket Number: The SPX socket number must be a unique socket number on the server. We recommend using the default value unless you know it is incorrect. The default is 4226.
(SPX only) Use SAP (SPX)	Y	Use SAP: SAP (Service Advertising Protocol) allows this program to be found easily by workstations but has the disadvantage of increased network overhead. We recommend using it whenever possible. The default is YES.
(SPX only) SPX SAP Service Type	bf74	SAP Service Type: When USRECALL is using SAP to advertise its services, a service type is required to identify the call of service. Most users will leave it at the default value.
SPX-2	Y	SPX-2: The recommended communications protocol for most Novell networks. Disable only if you must use SPX or TCP/IP. The default is YES.
(SPX-2 only) SPX-2 Socket Number	4225	SPX-2 Socket Number: The SPX socket number must be a unique socket number on the server. We recommend using the default value unless you know it is incorrect. The default is 4225.
(SPX-2 only) Use SAP (SPX-2)	Y	Use SAP: SAP (Service Advertising Protocol) allows this program to be found easily by workstations but has the disadvantage of increased network overhead. We recommend using it whenever possible. The default is YES.
(SPX-2 only) SPX SAP Service Type	bf75	SAP Service Type: When USRECALL is using SAP to advertise its services, a service type is required to identify the call of service. Most users will leave it at the default value.
TCP/IP (TLI)	N	TCP/IP (TLI): TCP/IP (using the TLI interface) requires Novell TCP/IP on the recall or notify workstation. The default is NO.
(TCP/IP only) TCP/IP Socket Number	1973	TCP/IP Socket Number: The TCP/IP socket number must be a unique socket number on the server. We recommend using the default value unless you know it is incorrect. The default is 1973.
(TCP/IP only) Use SAP (TCP/IP)	Y	Use SAP: SAP (Service Advertising Protocol) allows this program to be found easily by workstations but has the disadvantage of increased network overhead. We recommend using it whenever possible. The default is YES.
(TCP/IP only) TCP/IP SAP Service Type	bf76	SAP Service Type: When USRECALL is using SAP to advertise its services, a service type is required to identify the call of service. Most users will leave it at the default value.
Process Timeout (in minutes)	30	Process Timeout: The number of minutes that a process will persists without communications from the recall or notify PC. The default is 30.
Support auto-recall	Y	Auto-recall: A facility where a FDR/UPSTREAM machine must be registered and ready to recall migrated files from the host on user demand. The default is YES.

Item	Default	Description
Use NLM version of UPSTREAM for recalls	Y	Use NLM version of UPSTREAM for recalls. Enter 'Y' if you wish to use UPSTREAM on this server for the recalls; 'N' if you wish to use a Windows or OS/2 PC. The default is Y.
Wait for recall	Y	Wait for recall: Select 'Y' if you wish to have the user wait for the file to be recalled. Select 'N' to have the file open fail, and the recall occur later. Selecting 'N' is always safer, but less responsive. The default is Y.
Send status to users	Y	Send status to users: Select 'Y' if you wish users notified when a recall is requested and completes. This option is only available when you do not wait for recalls. The default is Y.
Broadcast delay	2	Broadcast delay. To avoid empty broadcast messages, UPSTREAM will wait for the given number of milliseconds before actually sending the message. The default is 2.
Stub has extension	N	Stub has extension: Select 'Y' if you checked the "Add ext. To stub" option when you performed the migration (NOVELLMIGRATEADDEXT Y). This option is only available when you do not wait for recalls. The default is 'N'
Support user notification	Y	Support user notification. This facility has some overhead, but if enabled, users (when running USNOTIFY) can deny recalls. Select 'Y' to enabled, 'N' to disable.
(Notify only) User must accept	N	User must accept. This requires that the user be attached and must approve all recalls before they will be performed. The default is 'N'.
Auto-recall time-out	300	Auto-recall time-out. Specify the maximum number of seconds before a recall request is denied if it is not satisfied. The default is 300 (5 minutes).
Number of simultaneous opens	10	Number of simultaneous opens: Specify the number of file opens that can be serviced at one time. A larger number improves server performance at the expense of additional memory. The default is 10.
UPSTREAM directory (NLM UPSTREAM only)	SYS:UPSTREAM	UPSTREAM directory: Enter the directory where you have installed UPSTREAM. For example, SYS:UPSTREAM.
Restore complete directory	N	Restore complete directory: Enable this option if you wish all the migrated files in a directory restored when you recall a single file. The default is N.
Number of auto-recall volumes	1	Number of auto-recall volumes. Specify the number of volumes that you wish to support auto-recall for. For each volume there will be certain information that you will be required to enter. The default is 1.
(For each volume) Volume name	(none)	Volume name. Enter the NetWare volume name that FDR/UPSTREAM will perform the auto-recall for. For example, SYS.
(For each volume) FDR/UPSTREAM Drive Letter (non NLM UPSTREAM only)	F	FDR/UPSTREAM Drive Letter. Enter the drive letter that FDR/UPSTREAM uses when it backs up this volume. For example, O. Use '!' if you use UNC names in the backup.

NOTE: Auto-recall usually uses UNC names (specify '!' for the drive letter).

If the required NLMs are loaded, the program will be ready to accept recall requests.

To terminate USRECALL (if it is terminating normally), press the [ESC] key. You will be asked:

```
End program (Y or N) ->
```

After a few seconds hesitation, you will be asked:

```
Modify config file (Y or N) ->
```

If you wish to modify your configuration, you can do it whenever you terminate USRECALL.

14.10.5. Configuration of the recaller for NLM UPSTREAM

If you configured to use the NLM version of UPSTREAM, continue with this section; if you configured to use a workstation version of UPSTREAM, proceed to section 14.10.6., 15.10.6., 14.12.6.

USRECALL requires a predefined parameter file NWRECALL.DAT in the UPSTREAM directory which contains parameters for performing requested restores from the host. To define NWRECALL.DAT you should enter FDR/UPSTREAM on a workstation, perform a single file restore using the same backup profile as you will use for the recalls and save the parameter file as NWRECALL.DAT in the UPSTREAM directory on the server. In particular you should be careful to define:

- The correct backup profile used for the migration.
- A Novell Profile if needed.
- Any reporting options you wish.
- Local backup if you used it for the migration.
- The non-file data types you wish restored.

Since NWRECALL will specify the files to restore, the actual file saved to NWRECALL.DAT is not important.

NOTE: If a recall is denied, that file cannot be recalled for 1 minute.

After you have USRECALL configured and running on the server, proceed to section 14.10.7., 15.10.7., 14.12.7. (page 14-38).

14.10.6. Installation and Configuration of the Recall Component (non NLM UPSTREAM)

NWRECALL is a Windows (16-bit program that will only work in Windows 95 or Windows NT) or an OS/2 full-screen program that sits as a front end to FDR/UPSTREAM.

NWRECALL for Windows has the same restrictions as FDR/UPSTREAM; it requires the requestor from Novell, dated Oct 96 or later.

NWRECALL for OS/2 requires the 32-bit Novell requestor supplied with NetWare v4.11 or CLOS2N.EXE on Novell's web site.

To install NWRECALL, merely copy NWRECALL.EXE from:

- \RECALL\OS2 for an OS/2 installation from diskette.
- \UPSTREAM\NWRECALL\RECALL\OS2 for an OS/2 installation from CD.
- \RECALL\WINDOWS for a Windows 95 or NT installation from diskette.
- \UPSTREAM\NWRECALL\RECALL\WINDOWS for a Windows 95 or NT installation from CD.

Most of the configuration of NWRECALL is actually performed in FDR/UPSTREAM.

NWRECALL requires a predefined parameter file NWRECALL.DAT which contains parameters for performing requested restores from the host. To define NWRECALL.DAT you should enter FDR/UPSTREAM, perform a single file restore using the same backup profile as you will use for the recalls and save the parameter file as NWRECALL.DAT. In particular you should be careful to define:

- The correct backup profile used for the migration.
- A Novell Profile if needed.
- Any reporting options you wish.
- Local backup if you used it for the migration.
- The non-file data types you wish restored.

Since NWRECALL will specify the files to restore, the actual file saved to NWRECALL.DAT is not important.

NWRECALL.EXE has the following command line syntax:

```
NWRECALL.EXE [switches...] [parameters...]
```

The switches are:

- /List: Lists all the recall servers on the network.
- /Trace: Activates command line tracing. Use this only when requested by FDR/UPSTREAM tech support.

The parameters are:

- RECALLSERVER=<server name> This is a required parameter specifying the name of the Novell server which is running USRECALL that you will be performing recalls for.
- WHOLEDIR=<Y or N> If you specify N, only those files requested will be recalled; if you specify Y all migrated files in the directory will be restored. The default is N.
- RECALLCOMMTYPE=<0 for SPX, 1 for SPX-2, and 2 for TCP/IP> Use the type specified on the server in USRECALL. The default is 1.
- RECALLCHECKINTERVAL=<interval> Specify the number of seconds between recall checks. The default is 15 seconds.
- CONFIGFILE=<config file name> Specify the name of the UPSTREAM configuration file. The default is UPSTREAM.CFG.
- PARAMETER=<parameter file name> Specify the name of the template UPSTREAM parameter file with parameters for recalls. The default is NWRECALL.DAT.

Most users will specify:

```
NWRECALL RECALLSERVER=<server name>
```

You must have NWRECALL running at all times that you have USRECALL running on the server. We recommend that is be placed in your STARTUP.CMD file for OS/2 or STARTUP group for Windows 95 or NT.

NWRECALL writes to the FDR/UPSTREAM log (UPSTREAM.LOG) all informative messages and this is where you should look for problem determination.

WARNING: Do not perform recalls from the machine running the recall component as it will hang.

NOTE: If a recall is denied, that file cannot be recalled for 10 seconds.

14.10.7. The User Component

If you wish to notify users recalls when they occur and allow them to not perform the process, you will need to install and configure the USNOTIFY program on all workstations. Note that this process is mandatory if you specified the "User must accept" option when configuring USRECALL on the server.

USNOTIFY for Windows has the same restrictions as FDR/UPSTREAM; it requires the requestor from Novell, dated Oct 96 or later.

USNOTIFY for OS/2 requires the 32-bit Novell requestor supplied with NetWare v4.11 or CLOS2N.EXE on Novell's web site.

We recommend that USNOTIFY be installed on a common directory on the server where the auto-recalls are performed. A good place might be SYS:PUBLIC/USNOTIFY. Merely copy the files with all subdirectories from the diskette or CD. For a diskette install, you might specify:

```
XCOPY A:\NOTIFY\*.* F:\PUBLIC\USNOTIFY\*.* /s
```

or a CD install you might specify:

```
XCOPY D:\UPSTREAM\NWRECALL\NOTIFY\*.* F:\PUBLIC\USNOTIFY\*.* /s
```

This will create the following directory structure:

```
\USNOTIFY
   \WINDOWS
   \OS2
```

The \WINDOWS directory contains the Windows 95 and NT version of USNOTIFY, the \OS2 directory contains the OS/2 version of USNOTIFY.

USNOTIFY is a PM or Windows program with the following command line syntax:

```
USNOTIFY [switches...] [parameters...]
```

The switches are:

- /List: Lists all the recall servers on the network.
- /Trace: Activates command line tracing. Use this only when requested by FDR/UPSTREAM tech support.

The parameters are:

- RECALLSERVER=<server name> This is a required parameter specifying the name of the Novell server which is running USRECALL that you will be performing recalls for.
- RECALLCOMMTYPE=<0 for SPX, 1 for SPX-2, and 2 for TCP/IP> Use the type specified on the server in USRECALL. The default is 1.
- CONFIGFILE=<config file name> A file name where you can specify parameters for this program (an alternate to the command line).
- LOGFILE=<log file name> Specify the name of the log file where USNOTIFY writes messages to. The default is UPSTREAM.LOG.

- MESSAGEFILE=<message file name> Specify the name of the UPSTREAM message file. The default is UPSTREAM.MSG.

WARNING: During a recall, you may not be able to read or write to the server drive. Do not run USNOTIFY from a server drive as it may hang your machine when it attempts to read from the executable, write to the log, and read from the message file

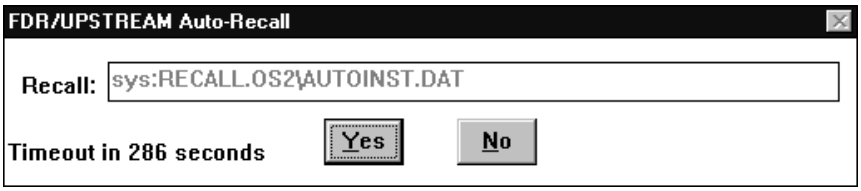
Since you must run USNOTIFY from a user's local drive, we recommend that you add statements to user's login profile to copy the files from the common directory to user's local directories. For example:

```
copy f:\public\usnotify\windows\*.* c:\usnotify\*.*
```

At the user's workstation, you will need to add USNOTIFY to the user's STARTUP.CMD (for OS/2) or Startup group (Windows 95 or NT). For the command line, most users will specify:

```
USNOTIFY RECALLSERVER=<server name>
```

When an auto-recall request is attempted, the notified user will see:



If the user selects Yes, the auto-recall will be performed. If the user selects No or waits until the time out has expired, then the recall will not be performed and the file open will fail.

If the user requests that the file not be recalled, the question (notification) may occur more than once as multiple name spaces are attempting to open the file.

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15 Disaster Recovery

15.1. Introduction

FDR/UP STREAM flexibility is demonstrated as its use not only as a backup/restore utility, but it also integrates very nicely into an organization's disaster recovery plans.

Due to the nature of disaster recovery and methods that vary dramatically by operating system, disaster recovery may be addressed in other chapters in this manual:

- **Windows NT:** Backup for disaster recovery is in section 13.3.1. page 13-16. Disaster recovery is in section 13.5. page 13-26.
- **Windows 2000/2003/XP:** Backup for disaster recovery is in section 13.3.1. page 13-16. Disaster recovery is in section 13.8.9. page 13-59. If you are recovering a Windows XP/2003 system you can also use Microsoft's Automated System Recovery (ASR) which combines the recovery of the operating system with the recovery of data. See section 13.6. page 13-30.
- **NetWare:** Backup for disaster recovery is in section 14.2. page 14-2. Disaster recovery is in section 14.7. page 14-17.
- **OS/2:** See the *FDR/UPSTREAM OS/2 Client Supplement*. Disaster recovery is discussed in the *FDR/UPSTREAM ULTra and OS/2* chapter.
- **UNIX and Linux**: Discussed in the UPSTREAM Rescuer section below.

An important method for disaster recovery, physical disk backups, is discussed in the *UPSTREAM/SOS* and *Physical Disk* chapters.

15.2. UPSTREAM Rescuer

The UPSTREAM Rescuer is an enhancement to UPSTREAM which allows disaster recovery of select UNIX systems including S/390 Linux and Solaris.

An UPSTREAM Rescuer recovery requires first and foremost, a complete backup of the system. Typically, this is accomplished by a successful full "/*" backup which may be followed by incremental backups. UPSTREAM, starting in v3.2.1, now will include all of the information necessary for a full system recovery including device files, FIFOs, hard and symbolic links and more. If you have been running backups with prior versions of UPSTREAM, we recommend that you upgrade and perform a full backup (it may be a full merge) before counting on using the Rescuer for disaster recovery.

UPSTREAM does not backup partition or other disk definition information. However, on all rescuer systems, we include a sample disaster recovery report which can be either backed up or sent via an email notification to make the information available to you at disaster recovery time. See the section below for more information.

The Rescuer uses the single user or emergency boot facilities provided by the UNIX or Linux vendor. Then, with the operating system loaded and running on a RAM or other disk not being recovered, the disk to be recovered is created and mounted and the restore done. This avoids potentially fatal problems of writing to an active operating system disk.

It will restore the system as it was originally. This means that you have to be careful with any substantial changes in hardware. The Rescuer is a disaster recovery tool - it can't be used for system upgrades. If you are unsure whether a recovery will work, call Innovation tech support.

As operating systems are tested and certified with the UPSTREAM Rescuer, Innovation will certify disaster recovery on them. Currently, this includes SuSE's S/390 Linux and Sun's Solaris on SPARC systems.

15.2.1. Remembering Partition Information

UPSTREAM does not backup partition or other disk definition information. However, on all rescuer systems, we include a sample disaster recovery report which can be either backed up or sent via an email notification to make the information available to you at disaster recovery time.

The sample script is name **dr_report.sample** . We recommend that you rename or copy it to **dr_report** so that if you need to modify it, upgrading UPSTREAM will not have the file overwritten. We recommend that you examine the script carefully to determine if you want or need to modify it to suit your environment. By default, it will create/overwrite the file **usdr.rpt**

We recommend that you run dr_report as a pre-processing job before your backup. That simply requires that you add the parameter to the non-repeating section of your request (with parameters like ACTION):

```
PREJOB /opt/fdrupstream/dr_report
```

To send this output to one or more email addresses, you can enable UPSTREAM notification. See the UPSTREAM Notification section (page 11-32) for more details. As part of this setup, you will need to add a non-repeating parameters NOTIFYEVENTS (usually set to 3), NOTIFYTARGETS (usually set to /opt/fdrupstream/upstream.not after setting up this file in the us program) and NOTIFYSUCCESSATTACHMENT (usually set to /opt/fdrupstream/usdr.rpt).

Below is a sample report from an S/390 Linux system:

```
Contents of /etc/fstab
----------------------

/dev/dasda1     /                        ext2            defaults   1   1
/dev/dasdh1     /home                    ext2            defaults   1   2

none            /proc                    proc            defaults   0   0
# End of YaST-generated fstab lines


File System Information
-----------------------

# / on /dev/dasda1 fstype=ext2
Filesystem volume name:   <none>
Last mounted on:          /mnt
Filesystem UUID:          344c58fe-f378-407d-8f64-6f0992629b71
Filesystem magic number:  0xEF53
Filesystem revision #:    1 (dynamic)
Filesystem features:      filetype sparse_super
Filesystem state:         not clean
Errors behavior:          Continue
Filesystem OS type:       Linux
Inode count:              903168
Block count:              1803057
Reserved block count:     90152
Free blocks:              797940
Free inodes:              719712
First block:              0
Block size:               4096
Fragment size:            4096
Blocks per group:         32768
Fragments per group:      32768
Inodes per group:         16128
Inode blocks per group:   504
Last mount time:          Mon Jul  7 17:25:05 2003
Last write time:          Tue Jul  8 09:49:19 2003
Mount count:              2
Maximum mount count:      20
Last checked:             Tue Jul  1 16:59:17 2003
Check interval:           15552000 (6 months)
Next check after:         Sun Dec 28 15:59:17 2003
Reserved blocks uid:      0 (user root)
Reserved blocks gid:      0 (group root)
First inode:              11
Inode size:           128

# /home on /dev/dasdh1 fstype=ext2
Filesystem volume name:   <none>
Last mounted on:          <not available>
Filesystem UUID:          ddb7c256-8330-4c95-99b7-e3cdf9b78452
Filesystem magic number:  0xEF53
Filesystem revision #:    1 (dynamic)
Filesystem features:      filetype sparse_super
Filesystem state:         not clean
Errors behavior:          Continue
Filesystem OS type:       Linux
Inode count:              300960
Block count:              601017
```

```
Reserved block count:     30050
Free blocks:              370545
Free inodes:              277549
First block:              0
Block size:               4096
Fragment size:            4096
Blocks per group:         32768
Fragments per group:      32768
Inodes per group:         15840
Inode blocks per group:   495
Last mount time:          Mon Jul  7 17:25:06 2003
Last write time:          Mon Jul  7 17:26:18 2003
Mount count:              2
Maximum mount count:      20
Last checked:             Tue Jul  1 17:00:02 2003
Check interval:           15552000 (6 months)
Next check after:         Sun Dec 28 16:00:02 2003
Reserved blocks uid:      0 (user root)
Reserved blocks gid:      0 (group root)
First inode:              11
Inode size:           128

DASD Devices
------------
0F0E(ECKD) at (94:0) is   dasda:active  at blocksize: 4096, 1803060 blocks, 7043 MB
0F0F(ECKD) at (94:4) is   dasdb:n/f
0F00(ECKD) at (94:8) is   dasdc:active  at blocksize: 4096, 1803060 blocks, 7043 MB
0F01(ECKD) at (94:12) is   dasdd:n/f
0F02(ECKD) at (94:16) is   dasde:n/f
0F03(ECKD) at (94:20) is   dasdf:n/f
0F04(ECKD) at (94:24) is   dasdg:active  at blocksize: 4096, 1803060 blocks, 7043 MB
0F05(ECKD) at (94:28) is   dasdh:active  at blocksize: 4096, 601020 blocks, 2347 MB
0F06(ECKD) at (94:32) is   dasdi:n/f
0F07(ECKD) at (94:36) is   dasdj:active  at blocksize: 4096, 1803060 blocks, 7043 MB
0F08(ECKD) at (94:40) is   dasdk:n/f
0F09(ECKD) at (94:44) is   dasdl:n/f
0F0A(ECKD) at (94:48) is   dasdm:n/f
0F0B(ECKD) at (94:52) is   dasdn:active  at blocksize: 4096, 1803060 blocks, 7043 MB
0F0C(ECKD) at (94:56) is   dasdo:active  at blocksize: 4096, 1803060 blocks, 7043 MB

Partitions
----------
major minor  #blocks  name

  94     0    7212240 dasda
  94     1    7212228 dasda1
  94     8    7212240 dasdc
  94     9    7212228 dasdc1
  94    24    7212240 dasdg
  94    25    7212228 dasdg1
  94    28    2404080 dasdh
  94    29    2404068 dasdh1
  94    36    7212240 dasdj
  94    37    7212228 dasdj1
  94    52    7212240 dasdn
  94    53    7212228 dasdn1
  94    56    7212240 dasdo
  94    57    7212228 dasdo1
```

15.2.2. Solaris SPARC

At disaster recovery time, you must perform the following process:

☐ 1. Boot system in single user mode from the first Solaris install CD.

```
boot cdrom -s
```

☐ 2. Configure network adapter.

For example, for adapter hme0 with an IP address of 192.168.150.117

```
ifconfig hme0 192.168.150.117 netmask 255.255.255.0 up
```

☐ 3. Configure routing if required.

Assuming your router/gateway IP address is 192.168.150.161

```
route add default 192.168.150.161 1
```

☐ 4. Check network configuration.

```
ifconfig -a

netstat -r
```

Examine ifconfig output to ensure that the network adapter is up and configured with the desired IP address and netmask.

If you configured a router/gateway, examine the netstat output to ensure that the router/gateway is defined.

☐ 5. Set TERM variable.

```
TERM=sun

export TERM
```

☐ 6. Start rpc services.

```
/etc/init.d/rpc start
```

☐ 7. Extract the FDR/Upstream Disaster Recovery image. The UP STREAM software has to be installed and since you have the CD drive used for the operating system boot, you must get the UP STREAM software from either and NFS or FTP server running on another machine:

- To access the tar file from an NFS Server
  - Start the NFS client.

    ```
    /etc/init.d/nfs.client start
    ```

  - Mount the directory on the NFS server.

    As suming the IP address of the server is 192.168.150.211, the exported directory is /home, and the usdr.tar is in /home/user on the NFS server:

    ```
    mount -F nfs 192.168.150.211:/home /mnt
    ```

- Extract the FDR/Upstream Disaster Recovery image to /tmp/fdrupstream.

```
mkdir /tmp/fdrupstream
cd /tmp/fdrupstream
tar xvf /mnt/user/usdr.tar
```

- Unmount the NFS directory.

```
umount /mnt
```

- To access the tar file from an FTP Server
  - Create and change to directory /tmp/fdrupstream

```
mkdir /tmp/fdrupstream
cd /tmp/fdrupstream
```

  - Use ftp to get usdr.tar.

```
ftp ip_address_of_server
```

Provide user and password when prompted.

```
bin
cd directory_containing_udsr.tar
get usdr.tar
bye
```

  - Extract the UPSTREAM files:

```
tar xvf usdr.tar
```

☐ 8. Run uscfg to configure Upstream.

```
./uscfg
```

- Provide the IP address of the FDR/Upstream Host.
- Change the port numbers if required.
- Provide any other parameters required for your installation.
- Tab to the **OK** button, hit enter, and save the configuration.
- ESC+X to exit.

☐ 9. Set up disk slices if required.

If you are going to restore to your existing drive(s), and do not wish to change the sizes of your existing disk slices, you can skip this step.

If you are restoring to new drives, or want to make changes to your existing disk slices, use the **format** command to set up your disks. If you have set up your backups to run the disaster recovery report script, you can use the **prtvtoc** output in the report to get the sizes of your existing disk slices.

It is important that you use the same disk slices on the same disks as listed in /etc/vfstab. If you use a different disk slice for one or more file systems, you must edit /etc/vfstab on the restored system before booting it to reflect the changes you have made.

☐ 10. Create and mount file systems, or mount and empty existing file systems.

To ensure a proper disaster recovery restore, we require that all restores be done to empty file systems.

If the disk slices to be used for restore are identical to the original disk slices, you can use the *mkfs* lines from the output generated by the disaster recovery report script to recreate your file systems with the same options as the original file system.

If you copy the *mkfs* lines from the disaster recovery report into a separate file, and copy it via ftp or nfs to the system you are restoring, you can make this file executable and run it to recreate your file systems.

Please note that only UFS file systems in a disk slice can be created while booted from the Solaris CD.

If you change the size of a disk slice, or restore to a drive with geometry different from the original drive (i.e. a larger drive), it is recommended that you not use the mkfs output. Instead, use the **newfs** command with any desired options to create the file systems.

Another alternative if you are restoring to recover from a software problem to your original drive, is to mount all the existing file systems, change to the top level mount point, and use **rm -r *** to remove all the files from your existing file systems.

Sample mount commands using a top level mount point of /mnt:

```
mount /dev/dsk/c0t0d0s0 /mnt
mkdir /mnt/usr
mkdir /mnt/opt
mkdir -p /mnt/export/home
mount /dev/dsk/c0t0d0s5 /mnt/opt
mount /dev/dsk/c0t0d0s6 /mnt/usr
mount /dev/dsk/c0t0d0s7 /mnt/export/home
```

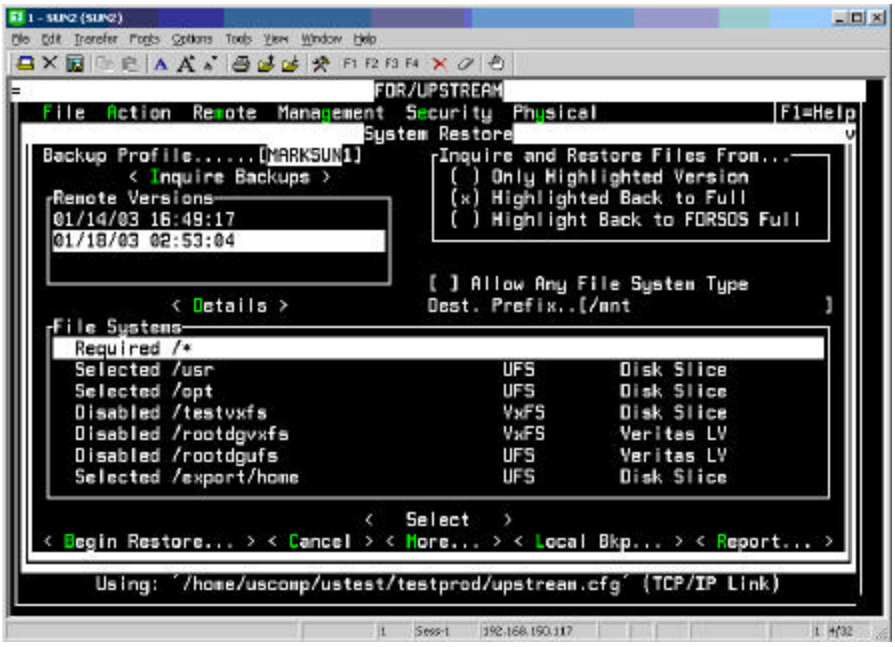
If you are using your original file systems, empty them out

```
cd /mnt
rm -r *
```

☐ 11. Start FDR/Upstream in Disaster Recovery mode.

```
cd /tmp/fdrupstream
./usdr
```

You'll need to provide the profile name, and a user/password if required. Press the **Validate** button to continue.



By default, only UFS file systems in a disk slice are enabled for restore. Veritas file systems, or UFS file systems in a Veritas Volume Manager volume or Disk Suite metadevice, must be restored after booting the restored system un-

less you want to restore them to a disk slice with a UFS file system. Assuming you have created and mounted a file system, enable the **Allow Any File System Type** option and select the appropriate mount points.

If you do not wish to restore any of the file systems selected by default, make sure that file system is highlighted in the **File Systems** listbox and use the exclude button to exclude it.

Move to the **More** screen by pressing the More button.

If the Translation tables shown for **ASCII to EBCDIC**, and **EBCDIC to ASCII**, are not the same translation tables used for the backup, you should change the names to match the names used for the backup. If this is not done, some of the restored file names may be different. The recommended ASCII to EBCDIC translation table is **ans2atoe.tab** and the recommended EBCDIC to ASCII translation table is **ans2etoa.tab**. Press the **Ok** button to return to the System Restore screen.

Press the **Begin Restore** button and then press **Yes** to the confirmation prompt to start the restore.

☐ 12. Edit /mnt/etc/vfstab if required.
If you restored any of your file systems to a different disk slice, you must edit the restored vfstab file and update the appropriate entries with the new device names.

If you have any file systems that must be created and restored after booting the restored system, you should comment out the lines for those mounts to avoid errors when booting the system for the first time.

☐ 13. Install the boot block on the boot drive.
Use the **installboot** command to install a boot block on your boot drive.

For example, to install a boot block on c0t0d0s0, use the following command:

```
installboot /mnt/usr/platform/`uname -i`/lib/fs/ufs/bootblk /dev/rdsk/c0t0d0s0
```

☐ 14. Boot the restored system.

☐ 15. Restore Veritas file systems and UFS file systems in Veritas Volume Manager volumes or Disk Suite meta devices.
Veritas file systems, and UFS file systems in Veritas Volume Manager Volumes or Disk Suite meta devices, must be created and restored after booting the restored system.

After recreating and mounting these file systems on their original mount points, you can use FDR/Upstream's single file system restore option to restore the file systems that could not be restored while booted from the Solaris CD.

If you commented out the entries for these file systems in /etc/vfstab, you should edit /etc/vfstab to uncomment these entries.

We suggest booting the system after completing the restores, and editing /etc/vfstab, to make sure that your system comes up clean.

15.2.3. SuSE's S/390 Linux

At disaster recovery time, you must perform the process described below. Some of the steps require familiarity with Linux utilities, and the man pages may not be available in the starter system. See page 15-13 for a listing of some of these man pages.

☐ 1. Boot the SuSE starter system using the method documented in the SuSE manuals for your configuration. You must configure networking to use FDR/UP STREAM.

For SLES 8, you must fully complete the starter system boot process by defining the installation server so the full starter system can be loaded from CD 1.

Login as root via telnet for SLES (a.k.a.k.a.7.0), or SLES 7 (a.k.a. 7.2). For SLES 8, login as root using the session type you specified. An ssh session is highly recommended.

☐ 2. Create and mount a RAM file system for installation of the FDR/UP STREAM DR client.

```
mke2fs -vm0 /dev/ram3
mount /dev/ram3 /tmp
mkdir /tmp/fdrupstream
```

☐ 3. Extract the FDR/UP STREAM Disaster Recovery image.

For SLES 7 (a.k.a. 7.2), you must use an NFS Server to obtain usdr.tar because the starter system does not contain the ftp command.
For the original SLES (a.k.a. 7.0), and SLES 8, you can use FTP or NFS.

To access the tar file from an NFS Server :

- Mount the directory on the NFS server.

  Assuming the IP address of the server is 192.168.150.211, the exported directory is /home, and the usdr.tar is in /home/user on the NFS server:

  ```
  mount -t nfs 192.168.150.211:/home /mnt
  ```

- Extract the FDR/UPSTREAM Disaster Recovery image to /tmp/fdrupstream.

  ```
  cd /tmp/fdrupstream
  tar xvf /mnt/user/usdr.tar
  ```
  Unmount the NFS directory.
  ```
  umount /mnt
  ```

To access the tar file from an FTP Server

```
cd /tmp/fdrupstream
```

- Use ftp to get usdr.tar.

  ```
  ftp ip_address_of_server
  provide user and password when prompted
  bin
  cd directory_containing_udsr.tar
  get usdr.tar
  bye

  tar xvf usdr.tar
  ```

☐ 4. Run uscfg to configure UP STREAM.

```
./uscfg
```

- Provide the IP address of the FDR/Upstream Host.
- Change the port numbers if required.
- Provide any other parameters required for your installation.
- Tab to the OK button, hit enter, and save the configuration. ESC+X to exit.

☐ 5. Load the DASD module for the required disk addresses.

- SLES and SLES 7

```
insmod DASD DASD=addr1,addr2,.....
```

- SLES 8

```
modprobe dasd_mod DASD=addr1,addr2,.... dasd_disciplines=dasd_eckd_mod
```

☐ 6. Format the DASD if required.

If you are using devices which have been previously formatted with dasdfmt, you can skip this step. If not, you must use the dasdfmt command as documented in the SuSE installation documentation for your release.

☐ 7. Create file systems and lvm configuration if required.

If you wish to restore to DASD by reusing the existing file systems and lvm setup, you can skip this step.

For the original SLES, and SLES 7, you may prefer to use YaST to set up your file systems and lvm configuration. If you choose to use to YaST, exit YaST by aborting the installation AFTER YaST has formatted the file systems.

For SLES 8, we recommend using the commands because YaST will not create file systems or setup your lvm configuration unless you actually start the installation. The YaST in SLES 8 also destroys the starter system and forces a reboot when exiting even if an installation was not performed.

If you have set up your backups to run the disaster recovery report script, you can use the output in the report to assist you in recreating your ext2 file systems, ext3 file systems, and lvm configuration. No information is currently reported for reiserfs or jfs file systems because neither of these file systems include a reporting tool.

The basic format and sequence of the commands to create your lvm configuration is:

- Create a physical volume - pvcreate /dev/DASD??
- Create a volume group - vgcreate vg_name /dev/DASD?? /dev/DASD?? ..
- Create a logical volume - lvcreate -L size -n lv_name vg_name

The basic format for creating file systems is:

- ext2 - mke2fs -b 4096 /dev/....
- ext3 - mke2fs -b 4096 -j /dev/....
- reiserfs - mkreiserfs /dev/....
- jfs - mkfs.jfs /dev/....

Please refer to the appropriate man pages for the above if you need to use more advanced options.

Assuming a simple configuration containing a standard disk volume with the root file system (using ext2) on /dev/dasda1, and a single physical volume volume group on /dev/dasdb1, the following commands can be used to create this configuration.

Create the ext2 file system:

```
mke2fs -b 4096 /dev/dasda1
```

Make /dev/dasdbl as physical volume:

```
pvcreate /dev/dasdb1
```

Create the myvg volume group:

```
vgcreate myvg /dev/dasdb1
```

Create a 512mb logical volume named lv01 in myvg:

```
lvcreate -L 512m -n lv01 myvg
```

Cre ate a 512mb log i cal vol ume named lv02 in myvg:

```
lvcreate -L 512m -n lv02 myvg
```

Cre ate an ext2 file sys tem on log i cal vol ume lv01:

```
mke2fs -b 4096 /dev/myvg/lv01
```

Cre ate an ext2 file sys tem on log i cal vol ume lv02:

```
mke2fs -b 4096 /dev/myvg/lv02
```

Mount all of the vol umes:

```
mount /dev/dasda1 /mnt
mkdir /mnt/myfs01
mkdir /mnt/myfs02
mount /dev/myvg/lv01 /mnt/myfs01
mount /dev/myvg/lv02 /mnt/myfs02
```

☐ 8. If you pre fer to re store over your ex ist ing file sys tems, you must mount them and re move all ex ist ing files be fore re stor ing them with FDR/UP STREAM.

If you are us ing lvm, you must first ac ti vate your ex ist ing lvm con fig u ra tion:

```
vgscan
vgchange -a y
```

As suming the same con fig u ra tion as in step 7, mount your file sys tems:

```
mount /dev/dasda1 /mnt
mount /dev/myvg/lv01 /mnt/myfs01
mount /dev/myvg/lv02 /mnt/myfs02
```

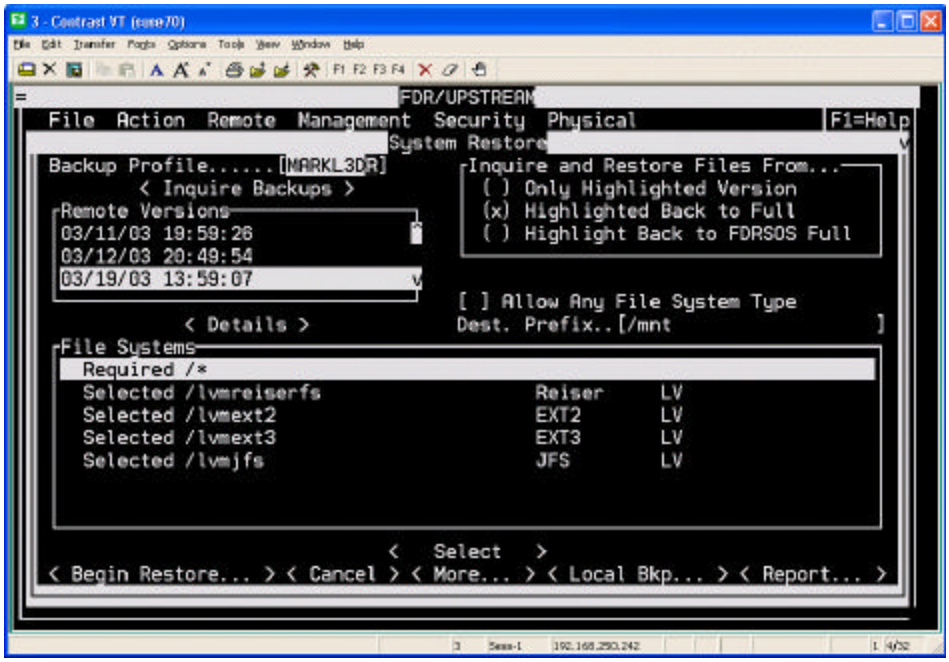
Re move all the files from these file sys tems:

```
cd /mnt
rm -r *
```

☐ 9. Start FDR/Up stream in Di sas ter Re cov ery mode.

```
cd /tmp/fdrupstream
./usdr
```

Pro vide the pro file name, and a user/pass word if re quired.



If you do not wish to restore any of the file systems selected by default, make sure that file system is highlighted in the File Systems listbox and use the **Exclude** button to exclude it.

Press the **More...** button to enter the More dialog.

If the translation tables shown for ASCII to EBCDIC, and EBCDIC to ASCII, are not the same translation tables used for the backup, you should change the names to match the names used for the backup. If this is not done, some of the restored file names may be different. The recommended ASCII to EBCDIC translation table is ans2atoe.tab and the recommended EBCDIC to ASCII translation table is ans2etoa.tab.

Press the **OK** button to return to the System Restore screen.

Press the **Begin Restore** button and then press **Yes** to the confirmation prompt to start the restore.

☐ 10. Edit /mnt/etc/fstab if required.

If you restored any of your file systems to a different DASD partition, or you excluded and file systems, you must edit the restored fstab file and update the appropriate entries with the new device names.

If you have any file systems that must be created and restored after booting the restored system, you should comment out the lines for those mounts to avoid errors when booting the system for the first time.

☐ 11. Install the ipltext on the boot drive.

The ipltext must always be installed on the restored boot drive. This is required even for an existing drive that already has ipltext installed.

Assuming the same sample configuration as above, install the ipltext using the commands shown below for your version of SuSE SLES.

- For the original SLES (7.0), the silo command is used as follows:

```
chroot /mnt
cd /boot
```

If your DASD configuration differs from your original configuration, you should edit the parmfile in the /boot directory at this time to make the required changes (the silo command below is all on one line)

```
silo -d /dev/dasda -f /boot/image -p /boot/parmfile -b /boot/ipleckd.boot -B
/boot/boot.map -t2

exit
```

For SLES 7 (7.2) with the 2.4 Kernel, and SLES 8, the zipl command is used as follows:

```
chroot /mnt
```

If your DASD configuration differs from your original configuration, you should edit the zipl.conf file in the /etc directory at this time to make the required changes. Do NOT edit the parmfile in the /boot directory. The zipl command overwrites this file with the information in /etc/zipl.conf.

```
zipl -c /etc/zipl.conf
exit
```

☐ 12. Boot the re stored sys tem.

Un mount all of the file sys tems you mounted above.

For SLES 8 only, you must en ter and exit YaST to get the starter sys tem to shut down. You must also is sue the shut-down com mand from the con sole used to an swer the boot prompts. For SLES (7.0) and SLES 7 (7.2), you can is sue the shut down com mand from your telnet ses sion.

```
shutdown -h now
```

Boot your sys tem from the de sired DASD de vice.

15.2.4. Help ful Linux man Pages

This sec tion con sists of man pages which may not be avail able when run ning the Linux Res cuer.

VGSCAN

```
vgscan - scan all disks for volume groups and build /etc/lvmtab and /etc/lvmtab.d/*
which are the database for all other lvm commands.

SYNOPSIS
vgscan [-d/—debug] [-h/-?/—help] [-v/—verbose]

DESCRIPTION
vgscan scans all SCSI, (E)IDE disks, multiple devices and a bunch of other disk de-
vices in the system for volume groups defined.

OPTIONS
-d, —debug
Enables additional debugging output (if compiled with DEBUG).
-h, -?, —help
Print a usage message on standard output and exit successfully.
-v, —verbose
Display verbose information of vgscan’s activities.

Hint
Put vgscan in one of your system startup scripts. This gives you an actual logical
volume manager database before activating all volume groups by doing a “vgchange -ay”.

DIAGNOSTICS
vgscan returns an exit code of 0 for success and > 0 for error:
1 error reading physical volumes
2 error inserting volume group name into lvmtab
3 no volume group(s) found
4 error creating lvmtab
5 no or not enough free device specials to store volume group in lvmtab
6 error storing VGDA on disk(s)
95 driver/module not in kernel
96 invalid I/O protocol version
97 error locking logical volume manager
99 invalid command line

See also
lvm(8), vgcreate(8), vgchange(8)

AUTHOR
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```

LVCREATE

lvcreate - create a logical volume in an existing volume group

SYNOPSIS
lvcreate [-A/—autobackup y/n] [-C/—contiguous y/n] [-d/—debug] [-h/-?/—help] [-i/—stripes Stripes [-I/—stripesize StripeSize]] {-l/—extents LogicalExtentsNumber | -L/—size LogicalVolumeSize[kKmMgGtT]} [-n/—name LogicalVolumeName] [-p/—permission r/rw] [-r/—readahead ReadAheadSectors] [-v/—verbose] [-Z/—zero y/n] VolumeGroupName [PhysicalVolumePath...]

lvcreate {-l/—extents LogicalExtentsNumber | -L/—size LogicalVolumeSize[kKmMgGtT]} [-c/—chunksize ChunkSize] -s/—snapshot -n/—name SnapshotLogicalVolumeName LogicalVolumePath

DESCRIPTION
lvcreate creates a new logical volume in a volume group (see vgcreate(8), vgchange(8)) by allocating logical extents from the free physical extent pool of that volume group. If there are not enough free physical extents then the volume group can be extended (see vgextend(8)) with other physical volumes or by reducing existing logical volumes of this volume group in size (see lvreduce(8), e2fsadm(8)).

The second form supports the creation of snapshot logical volumes which keep the contents of the original logical volume for backup purposes.

OPTIONS
-A, —autobackup y/n

Controls automatic backup of VG metadata after the change (see vgcfgbackup(8)). Default is yes.

-c, —chunksize ChunkSize
Power of 2 chunk size for the snapshot logical volume between 1k and 1024k.

-C, —contiguous y/n
Sets or resets the contiguous allocation policy for logical volumes. Default is no contiguous allocation based on a next free principle.

-d, —debug
Enables additional debugging output (if compiled with DEBUG).

-h, -?, —help
Print a usage message on standard output and exit successfully.

-i, —stripes Stripes
Gives the number of stripes. This is equal to the number of physical volumes to scatter the logical volume.

-I, —stripesize StripeSize
Gives the number of kilobytes for the granularity of the stripes. StripeSize must be 2^n (n = 2 to 9)

-l, —extents LogicalExtentsNumber
Gives the number of logical extents to allocate for the new logical volume.

-L, —size LogicalVolumeSize[kKmMgGtT]
Gives the size to allocate for the new logical volume. A size suffix of K for kilo-

bytes, M for megabytes, G for gigabytes or T for terabytes is optional. Default unit is megabytes.

-n, –name LogicalVolumeName
The name for the new logical volume. Without this option a default names of “lvol#” will be generated where # is the LVM internal number of the logical volume.

-p, –permission r/w
Set access permissions to read only or read and write. Default is read and write.

-r, –readahead ReadAheadSectors
Set read ahead sector count of this logical volume to a value between 2 and 120.

-s, –snapshot
Create a snapshot logical volume.

-v, –verbose
Gives verbose information about lvcreate’s activities.

-Z, –zero y/n
Controls zeroing of the first KB of data in the new logical volume. Default is yes. Warning: trying to mount an unzeroed logical volume can cause the system to hang.

Examples
“lvcreate -i 3 -I 8 -L 100 vg00" tries to create a striped logical volume with 3 stripes, a stripesize of 8KB and a size of 100MB in the volume group named vg00. The logical volume name will be chosen by lvcreate.

“lvcreate –size 100m –snapshot –name snap /dev/vg00/lvol1" creates a snapshot logical volume named /dev/vg00/snap which has access to the contents of /dev/vg00/lvol1 at snapshot logical volume creation time.

DIAGNOSTICS
lvcreate returns an exit code of 0 for success or > 0 for error:
1 invalid volume group name
2 error checking existence of volume group
3 volume group inactive
4 invalid logical volume name
5 error getting status of logical volume
6 error checking existence of logical volume
7 invalid physical volume name
8 invalid number of physical volumes
9 invalid number of stripes
10 invalid stripe size
11 error getting status of volume group
12 invalid logical volume size
13 invalid number of free physical extents
14 more stripes than physical volumes requested
15 error reading VGDA
16 requested physical volume not in volume group
17 error reading physical volume
18 maximum number of logical volumes exceeded
19 not enough space available to create logical volume
20 error setting up VGDA for logical volume creation
21 error creating VGDA for logical volume in kernel
22 error writing VGDA to physical volume(s)
23 error creating device special for logical volume
24 error opening logical volume
25 error writing to logical volume

```
26 invalid read ahead sector count
27 no free logical volume manager block specials available
28 invalid snapshot logical volume name
29 error setting up snapshot copy on write exception table
30 error initializing snapshot copy on write exception table on disk
31 error getting status of logical volume from kernel
32 snapshot already exists
95 driver/module not in kernel
96 invalid I/O protocol version
97 error locking logical volume manager
98 invalid lvmtab (run vgscan(8))
99 invalid command line

ENVIRONMENT VARIABLES
LVM_AUTOBACKUP
If this variable is set to “no” then the automatic backup of VG metadata is turned
off.

LVM_VG_MAX_BACKUPS
This variable determines the backup history depth of kept VGDA copy files in
/etc/lvmconf. It can be set to a positive number between 0 and 999. The higher this
number is, the more changes you can restore using vgcfgrestore(8).

LVM_VG_NAME
The default Volume Group Name to use. Setting this variable enables you to enter just
the Logical Volume Name rather than its complete path.

See also
lvm(8), vgcreate(8), lvremove(8), lvrename(8), lvextend(8), lvreduce(8), lvdisplay(8),
lvscan(8), lvmsadc(8), lvmsar(8)

AUTHOR
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```

PVCREAT

```
pvcreate - initialize a disk or partition for use by LVM

SYNOPSIS
pvcreate [-d|—debug] [-f|—force [—force]] [-y|—yes] [-h|—help] [-v|—verbose] [-V|—ver-
sion] PhysicalVolume [PhysicalVolume...]

DESCRIPTION
pvcreate initializes PhysicalVolume for later use by the Logical Volume Manager (LVM).
Each PhysicalVolume can be a disk partition, whole disk, meta device, or loopback
file. For DOS disk partitions, the partition id must be set to 0x8e using fdisk(8),
cfdisk(8), or a equivalent. For whole disk devices only the partition table must be
erased, which will effectively destroy all data on that disk. This can be done by ze-
roing the first sector with:
dd if=/dev/zero of=PhysicalVolume bs=512 count=1
Continue with vgcreate(8) to create a new volume group on PhysicalVolume, or
vgextend(8) to add PhysicalVolume to an existing volume group.

OPTIONS
-d, —debug
Enables additional debugging output (if compiled with DEBUG).
```

-f, –force
Force the creation without any confirmation. You can not recreate (reinitialize) a physical volume belonging to an existing volume group. In an emergency you can override this behaviour with -ff. In no case case can you initialize an active physical volume with this command.

-y, –yes
Answer yes to all questions.

-h, –help
Print a usage message on standard output and exit successfully.

-v, –verbose
Gives verbose runtime information about pvcreate’s activities.

-V, –version
Print the version number on standard output and exit successfully.

Example
Initialize partition #4 on the third SCSI disk and the entire fifth SCSI disk for later use by LVM:

```
pvcreate /dev/sdc4 /dev/sde
```

DIAGNOSTICS
pvcreate returns an exit code of 0 for success or > 0 for error:
1 no physical volume on command line
2 error removing existing lvmtab entry for new physical volume
3 error setting up physical volume structure
4 error writing physical volume structure to disk
5 wrong partition type identifier
6 error physical volume name
7 error getting size of physical volume
95 driver/module not in kernel
96 invalid I/O protocol version
97 error locking logical volume manager
98 invalid lvmtab (run vgscan(8))
99 invalid command line

SEE ALSO
lvm(8), vgcreate(8), vgextend(8), lvcreate(8), cfdisk(8), fdisk(8), losetup(8), mdadd(8)

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VGCHANGE

vgchange - change attributes of a volume group

SYNOPSIS
vgchange [-A|–autobackup{y|n}] [-a|–available{y|n}] [-d|–debug] [-h|–help] [-l|–logicalvolume MaxLogicalVolumes] [-v|–verbose] [–version] [-x|–allocation{y|n}] [VolumeGroupName...]

DESCRIPTION
vgchange allows you to change the attributes of one or more volume groups. Its main purpose is to activate and deactivate VolumeGroupName, or all volume groups if none is specified. Only active volume groups are subject to changes and allow access to their

logical volumes. During volume group activation, if vgchange recognizes snapshot logical volumes which were dropped because they ran out of space, it displays a message informing the administrator that such snapshots should be removed (see lvremove(8)).

OPTIONS

-A, —autobackup{y|n}
Controls automatic backup of metadata after the change. See vgcfgbackup (8). Default is yes.

-a, —available{y|n}
Controls the availability of the volume group for input/output. In other words: makes a volume group known/unknown to the kernel.

-d, —debug
Enables additional debugging output (if compiled with DEBUG).

-h, —help
Print a usage message on standard output and exit successfully.

-l, —logicalvolume MaxLogicalVolumes
Changes the maximum logical volume number of an existing inactive volume group.

-v, —verbose
Displays verbose runtime information about vgchange’s activities.

—version
Displays version and exits successfully.

-x, —allocation{y|n}
Enables or disables the extension/reduction of this volume group with/by physical volumes.

EXAMPLES

To activate all known volume groups in the system:
vgchange -a y

To change the maximum number of logical volumes of inactive volume group vg00 to 128.
vgchange -l 128 /dev/vg00

DIAGNOSTICS

vgchange returns an exit code of 0 for success and > 0 for error:
1 error writing VGDA to physical volume(s)
2 error changing extensibility of volume group
3 error doing backup of VGDA
4 extension of MaxLogicalVolume would cause overlapped physical extents
5 error backup of volume group metadata
6 error copying volume group metadata to work file
7 error creating volume group directory and special files
8 error removing volume group directory and special files
9 error setting up copy on write exception table
10 error reading copy on write exception table from disk(s)
95 driver/module not in kernel
96 invalid I/O protocol version
97 error locking logical volume manager
98 invalid lvmtab (run vgscan(8))
99 invalid command line

If volume groups can’t be activated, run vgscan(8) and retry.

ENVIRONMENT VARIABLES

LVM_AUTOBACKUP
If this variable is set to “no” then the automatic backup of VG metadata is turned off.

LVM_VG_MAX_BACKUPS
This variable determines the backup history depth of kept VGDA copy files in /etc/lvmconf. It can be set to a positive number between 0 and 999. The higher this number is, the more changes you can restore using vgcfgrestore(8).

SEE ALSO
lvm(8), vgcreate(8)

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VGCREATE

vgcreate - create a volume group

SYNOPSIS
vgcreate [-A|—autobackup {y|n}] [-d|—debug] [-h|—help] [-l|—maxlogicalvolumes MaxLogicalVolumes] [-p|—maxphysicalvolumes MaxPhysicalVolumes] [-s|—physicalextentsize PhysicalExtentSize[kKmMgGtT]] [-v|—verbose] [—version] VolumeGroupName PhysicalVolumePath [PhysicalVolumePath...]

DESCRIPTION
vgcreate creates a new volume group called VolumeGroupName using the block special device PhysicalVolumePath previously configured for LVM with pvcreate(8).

OPTIONS
-A, —autobackup {y|n}
Controls automatic backup of VG metadata after the change (see vgcfgbackup(8)). Default is yes.

-d, —debug
Enables additional debugging output (if compiled with DEBUG).

-h, —help
Print a usage message on standard output and exit successfully.

-l, —maxlogicalvolumes MaxLogicalVolumes
Sets the maximum possible logical volume count. More logical volumes can’t be created in this volume group. Absolute maximum is 256.

-p, —maxphysicalvolumes MaxPhysicalVolumes
Sets the maximum possible physical volume count. More physical volumes can’t be included in this volume group. Absolute maximum is 256.

-s, —physicalextentsize PhysicalExtentSize[kKmMgGtT]
Sets the physical extent size on physical volumes of this volume group. A size suffix of k for kilobytes or M for megabytes is optional, megabytes is the default if no suffix is present. Values can be from 8KB to 512MB in powers of 2 and unit kB with default 4 MB.

-v, —verbose
Display verbose runtime information about vgcreate’s activities.

```
—version
Display version and exit successfully.

EXAMPLES
To create a volume group named test_vg using physical volumes /dev/hdk1, /dev/hdl1,
and /dev/hdm1 with default physical extent size of 4MB:
vgcreate test_vg /dev/sd[k-m]1

To limit kernel memory usage, there is a limit of 65536 physical extents (PE) per log-
ical volume, so the PE size determines the maximum logical volume size. The default PE
size of 4MB limits a single logical volume to 256GB.

There is also (as of Linux 2.4) a kernel limitation of 2TB per block device.

DIAGNOSTICS
vgcreate returns an exit code of 0 for success and > 0 for error;
1 no volume group and physical volume names on command line
2 no physical volume names on command line
3 invalid volume group name
4 error checking existence of volume group
5 maximum number of volume groups exceeded
6 error reading physical volume(s)
7 invalid physical volume name
8 error getting physical volume size
9 no new physical volume
10 physical volume occurs multiple times on command line
11 memory reallocation error
12 no valid physical volumes on command line
13 some invalid physical volumes on command line
14 physical volume is too small
15 error setting up VGDA
16 error writing VGDA to physical volumes
17 error creating VGDA in kernel
18 error inserting volume group into lvmtab
19 error doing backup of VGDA
20 error writing VGDA to lvmtab
21 volume group directory already exists in /dev
95 driver/module not in kernel
96 invalid I/O protocol version
97 error locking logical volume manager
98 invalid lvmtab (run vgscan(8))
99 invalid command line

ENVIRONMENT VARIABLES
LVM_AUTOBACKUP
If this variable is set to “no” then the automatic backup of VG metadata is turned
off.

LVM_VG_MAX_BACKUPS
This variable determines the backup history depth of kept VGDA copy files in
/etc/lvmconf. It can be set to a positive number between 0 and 999. The higher this
number is, the more changes you can restore using vgcfgrestore(8).

SEE ALSO
lvm(8), pvdisplay(8), pvcreate(8), vgdisplay(8), vgextend(8), vgreduce(8),
lvcreate(8), lvdisplay(8), lvextend(8), lvreduce(8)

AUTHOR
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```

16 FDR/UPSTREAM ULTra

16.1. Overview

The FDR/UPSTREAM ULTra (UPSTREAM LAN Transport) feature allows you to use a single FDR/UPSTREAM PC to back up and restore to the disks of workstations which are attached to the LAN and do not have FDR/UPSTREAM or any kind of host communications on them. Workstations can be grouped into profiles so that through a single PC or host request any number of workstations can be backed up or restored.

This is a sophisticated facility using LAN protocols (you can use IPX/SPX, NetBIOS or TCP/IP) to communicate between the FDR/UPSTREAM PC and the workstation. The workstations can be any combination of DOS, Windows, or OS/2 PCs.

The FDR/UPSTREAM ULTra feature of FDR/UPSTREAM allows you to install a small DOS program, a PM program on OS/2 workstations or a Windows program on Windows and Windows NT workstations and have a FDR/UPSTREAM machine on the LAN backup and restore data to the workstation.

There are two components to the LAN Workstation feature of FDR/UPSTREAM:

- Workstation component (ULTRA). Install ULTRA (ULTRAD for DOS) on the workstation to allow it to be accessed by FDR/UPSTREAM. You must give ULTRA a workstation name so that it can be found by the requestor PC. You can optionally also give it a password so that you can restrict unauthorized users from accessing your PC.
- Requestor component (FDR/UPSTREAM or LANCOPY). The requestor specifies the name of the workstation and optionally the password. FDR/UPSTREAM accesses the workstation in the same way that it accesses a local disk. LANCOPY is a program provided to allow you to copy files to and from the workstation and perform directory listings.

As well as backups, restores and file transfers, ULTra can also be used to start programs on remote workstations either locally or host requested. This can be very helpful in such functions as software distribution.

FDR/UPSTREAM ULTra works by using IPX/SPX, NetBIOS or TCP/IP communications across the LAN. Thus, the FDR/UPSTREAM PC can attach to a workstation through the LAN regardless of whether the LAN supports SNA or not. You can use the FDR/UPSTREAM ULTra through FDDI, Ethernet, across NetWare internal bridges and just about any other way that LANs get access to their own features.

FDR/UPSTREAM ULTra is priced separately from the base FDR/UPSTREAM product. The current version supports generic NetBIOS, Novell IPX/SPX and TCP/IP networks. Contact your sales representative for pricing information.

If you are using OS/2, see the *FDR/UPSTREAM Client OS/2 Supplement* for instructions for using ULTra in OS/2.

16.2. DOS Workstations

To install the workstation component, you can either run the INSTALL.BAT file included on the workstation diskette, or create a directory and copy the files from the diskette to it. On the CD, the files are in the \ULTRA\DOS directory. You can create a DOS ULTra diskette on a Windows NT machine using the MAKULTRA program. See page 17-8 for details on this procedure.

The DOS version is a command line program and supports IPX/SPX and NetBIOS only.

The DOS the workstation component (ULTRAD.EXE), is loaded in the following way:

```
ULTRAD <Workstation Name> [/p[password]]
```

- **Workstation Name:** Up to 31 characters uniquely naming the workstation on the LAN.

- **/P[password]:** You can optionally enter a password, or enter /P to have ULTRAD prompt you for the password (to avoid having it displayed).

For example, if you wish to load ULTRAD with the workstation name of TOM_SMITH and a password of PIE, enter:

```
ULTRAD TOM_SMITH /pPIE
```

or

```
ULTRAD TOM_SMITH /p
```

and then you'll be prompted for the password.

To exit ULTRAD, press the ESC key and confirm when prompted.

16.2.1. RESET.EXE

If you are using the NetBIOS interface for workstations or on the UPSTREAM PC and the adapter has not yet been reset for NetBIOS (the IBM LAN Support Program will often reset it, but many other NetBIOS implementations will not), you may need to use the included RESET.EXE program.

This program should be used with care as it resets the NetBIOS interface. If you have open LAN Server or other LAN connections which use NetBIOS, they will be broken. This program should only be used if you are not using other NetBIOS applications (including server/drive support).

For FDR/UPSTREAM, RESET.EXE should be placed in your U.BAT file, to be run even before APPC is loaded. If you are using ULTra, you should create a batch file to run RESET.EXE before starting ULTra (or use AUTOEXEC.BAT).

The format for RESET is:

```
RESET <adapter number> <session count> <command count>
```

Where:

- <adapter number>: The communications adapter number, either 0 for the primary adapter or 1 for the secondary adapter. A parameter is required.
- <session count>: The maximum number of simultaneously running sessions. The range is 0..254. The default is 5.
- <command count>: The maximum number of outstanding commands. The range is 0.254. The default is 15.

Note that you can disable either the NetBIOS or IPX/SPX connectivity types, by specifying environment variables USNOTLI=Y to disable IPX/SPX and USNONETBIOS=Y to disabled NetBIOS.

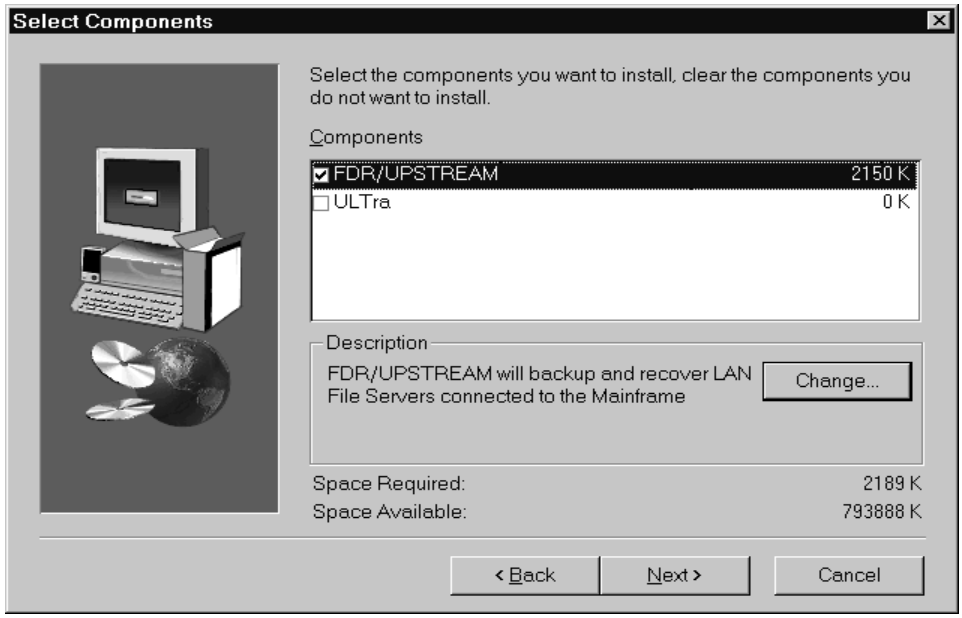
16.3. Windows Workstations

The installation and later configuration of the ULTra workstation component for Windows is performed from the SETUP program.

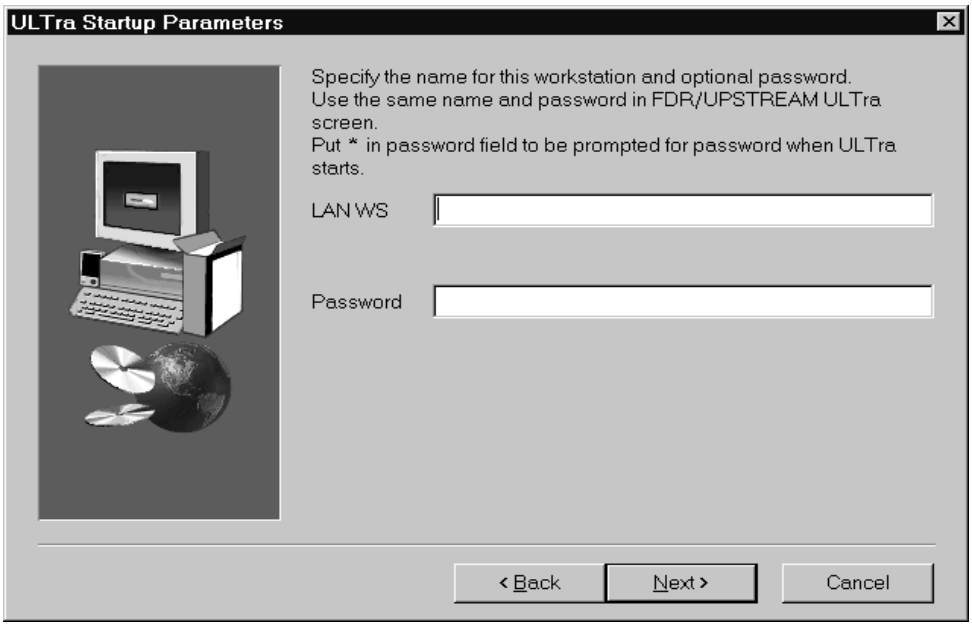
For a CD install enter <drive>:\SETUP. Many users will enter: **D:\SETUP**.

You will see a banner and then be asked for your Name and Company. UPSTREAM does not use this information, but it is required. Press the **Next>** button to continue.

You will then be asked to Choose Destination Location. If you do not wish to use the default directory of C:\UPSTREAM, press the Browse button to specify a different directory. Installing a new version of UPSTREAM over an existing version is safe as configuration, parameter and other important files are preserved. Press the **Next>** button when you are satisfied with the directory for UPSTREAM. This will display the Select Components dialog.



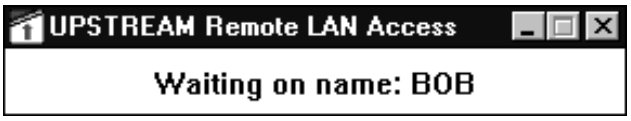
The FDR/UPSTREAM option is checked by default. If you wish to install the ULTra client software, then check that option. Press the **Next>** button. This will display the ULTra Startup Parameters dialog.



- **LAN WS:** Enter up to 31 characters uniquely naming the Workstation on the LAN. This field is required. The default name is the user name you specified at the start of the setup prefixed with WS.

- Password: If you wish to have this workstation assigned a password (which must be entered from the UPSTREAM machine which accesses it), enter it here. Leave this field blank for no password. Enter an asterisk ('*') if you wish the ULTra program to request the password when it is started.

All ULTra activity is displayed in the main ULTra program window. The ULTra program window can be minimized to save desktop space. To terminate ULTra, close it by pulling down the system menu in the upper left hand corner of the window and selecting **Close**.



Note that you can disable either the NetBIOS or IPX/SPX connectivity types, by specifying environment variables USNOIPXSPX=Y to disable IPX/SPX, USNONETBIOS=Y to disable NetBIOS or USNOTCP=Y to disable TCP/IP.

In Windows 3.1, if you are using the default NetBIOS parameters you will need to increase the size of the NetBIOS heap. You will need to increase these values further if you will be increasing either your LANBUFFER size or NUMECBS. In the SYSTEM.INI file, add or modify the NetHeapSize in the 386Enh section:

```
...
[386Enh]
...
NetHeapSize = 100
```

NOTE: Window 95 ULTra running NetBIOS will use only the NetBIOS marked as the default protocol in the Network applet of the Control Panel

16.4. Workstation Messages

ULTra maintains a log, ULTRA.LOG in the directory that ULTra was started from. The messages in the log are time-stamped and indicate a primary error code, sometimes a secondary error code and a return code. The error codes can be looked up in the UPSTREAM Messages chapter of this manual or the UPSTREAM.MSG file. The return codes are either Novell return codes or operating system return codes (depending upon their context).

Some of the error codes are merely notifications of activity. Error code 4000 indicates the time the TSR was loaded. 4001 indicates the time it was unloaded. 3005 is a normal connect. 3675 is a normal disconnect. Many other messages are merely notifications as well. All serious failures are logged on the requestor side as well as the workstation side.

The size of the workstation log can be reduced without deleting the entire file by running USLOGCLR. Since this is not the default log file name you must specify the name on the command line. For example, to remove all but the last 5 days worth of messages, enter:

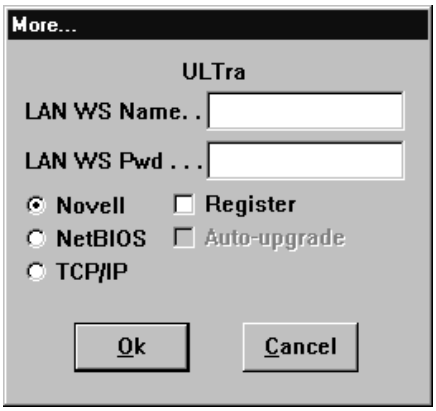
```
USLOGCLR 5 ULTRA.LOG
```

16.4.1. TCP/IP Verification file

As an additional level of security FDR/UPSTREAM ULTra for TCP/IP supports a verification file on the workstation. If the file **UPSTREAM.VRF** exists in the ULTra workstation's program directory, ULTra will only accept connections from UPSTREAM or LANCOPY machines with IP addresses specified in this file. The file is free-format; the address just has to be somewhere in the file.

16.5. The FDR/UPSTREAM Requestor Component

The FDR/UPSTREAM ULTra dialog lets your specify that a given backup, restore, file transfer or job request should be serviced by an ULTra workstation. The ULTra dialog is available from a number of FDR/UPSTREAM dialogs by pressing the <ULTra...> button.



- **LAN WS Name:** The LAN Workstation name of the ULTra machine you wish to connect to. This is assigned on the command line when ULTra was started on the workstation. If you place an at sign ('@') before the name an ULTra profile will be used (see the ULTra chapter for defining ULTra profiles); these are only valid for backups and restores. This is required for ULTra.

  When specifying a TCP/IP name on the ULTra workstation, the name specified on the ULTra command line is not used. You must either specify:

  - A name already defined in a name server, or the existing LAN name for the workstation.
  - The actual IP address of the workstation.

- **LAN WS Pwd:** The optional password assigned by the user of the LAN Workstation on the command line when they started ULTra.

The connection type radio buttons are:

- **Novell:** Check this radio button if you wish to connect to the LAN workstation using IPX/SPX.

- **NetBIOS:** Check this radio button if you wish to connect to the LAN workstation using NetBIOS.

- **TCP/IP:** Check this radio button if you wish to connect to the LAN workstation using TCP/IP.

The following checkboxes are for registration and auto-upgrades:

- **Register:** Check this box if you wish to register the ULTra workstation with the host so that the host can locate the workstation by registered name (rather than specific SNA or TCP/IP addressing). You must check this box to use the auto-upgrade facility. The default is not checked.

- **Auto-upgrade:** Check this box if you wish to automatically upgrade the ULTra software on the ULTra workstation. This facility requires sophisticated setup; see the *Management* chapter for more information.

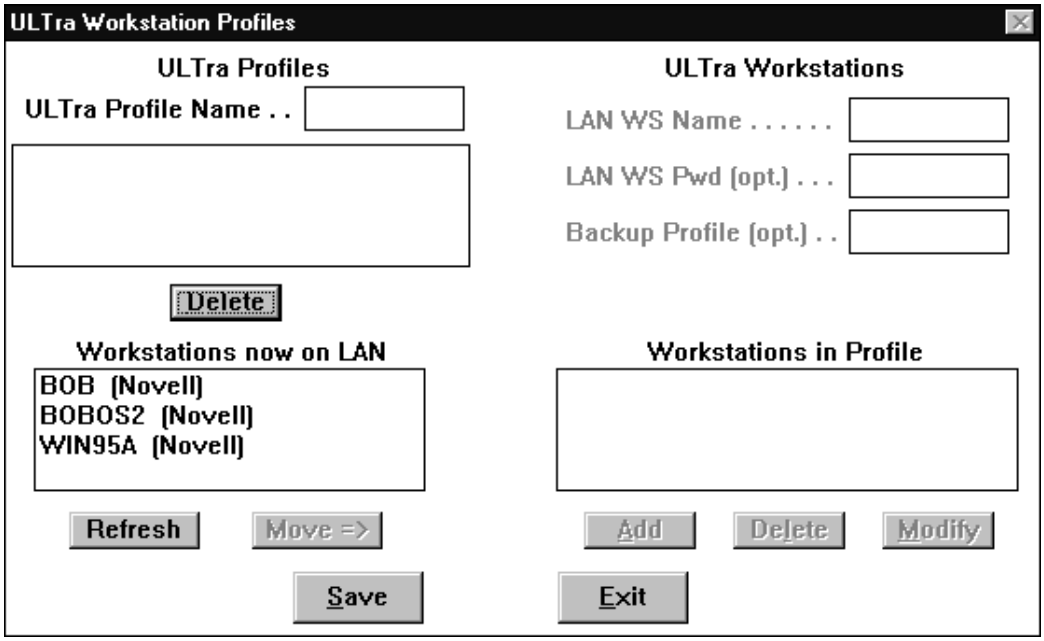
When you perform a backup or restore using FDR/UPSTREAM ULTra, the FDR/UPSTREAM PC contacts the workstation through the LAN. This brings up the status display on the workstation. Then as file I/O requests need to be processed they are routed to the workstation. The FDR/UPSTREAM PC just appears to be performing a normal backup or restore (though the LAN Workstation Name is on the status display). When the backup or restore is complete, the workstation's status display disappears and both PCs are ready for the next action.

In most cases you will want to back up a number of workstations the same way: i.e. the same file specifications, fulls on the same day, etc. To make this simple, FDR/UPSTREAM ULTra allows you to be able to group workstations together and specify a similar operation for each using an ULTra profile.

When you specify a backup or restore using an ULTra profile, the backup or restore operation is repeated multiple times, one backup or restore operation for each LAN Workstation name specified.

16.5.1. Creating an ULTra Profile

ULTra profiles are created in the SETNOV program (it is the **Novell and ULTra** icon if you are running OS/2 or Windows). In the entry dialog (titled *Server Profiles*), you will see a button: **<ULTra>**. When you press this button, a message box stating: *It will take 3-5 sec. to get information about active NetBIOS ULTra stations* followed by a message box stating: *It will take 3-5 sec. to get information about active TCP/IP ULTra stations*. Press these buttons in turn, and after a short wait the ULTra Workstation Profiles dialog will be displayed.



- **ULTra Profile Name:** Enter the name of an existing ULTra profile or a new profile. If you enter a name of an existing ULTra profile, the profiles in the Workstations in Profile list will change to reflect the workstations defined for that profile. If you enter a new profile name, you will be asked if you wish to create it. The list box underneath this field consists of the existing profiles; if you a highlight entry in the list box the ULTra Profile Name will change as well as the list of profiles in the Workstations in Profile list. Many of the fields in this dialog are grayed and unavailable if you do not have a value in this field. You can enter from 1 to 8 characters for the profile name.

  The <Delete> and <Save> buttons allow you to respectively delete an existing profile or save the profile which is specified in the ULTra Profile Name field.

- **Workstations now on LAN:** If your PC is currently attached to the LAN, this list box displays the ULTra workstations which are active at this time. This can be useful in helping you define the entries in your ULTra profile.

  Pressing the <Refresh> button will have the list refreshed with the currently active ULTra workstations. Pressing the < Move=> > button causes the highlighted entry to be moved to the LAN WS Name field.

  Note that workstations may be in the list up to three times, with a different connectivity type. The connectivity type is for display only and is ignored when specifying the ULTra profile. The connectivity type used will be the type specified in UPSTREAM. Note that TCP/IP workstations, if not listed on a name server or with Microsoft networking may display an IP address. IP addresses are valid in ULTra.

- **LAN WS Name:** Enter the LAN Workstation Name which you wish to add to the ULTra profile currently specified. The LAN Workstation Name is a command line parameter to ULTra (you can also use the TCP/IP IP address). This value can be entered automatically by pressing the <Move> button. This is a required field.

- **LAN WS Pwd:** Enter the password specified by the user on the ULTra workstation. This value is encrypted before being stored. This is an optional field. If left blank it is assumed that the workstation has no password.

- **Backup Profile:** In most cases you will leave this field blank which will cause FDR/UPSTREAM to use the same Backup Profile name as LAN Workstation Name. If you wish though, you can specify a different Backup Profile name .

- **Workstations in Profile:** This list box contains all the workstations defined for this profile. Changing the highlighted entry will change the values in the edit fields above.

- **Add:** Press this button to add the specified LAN Workstation Name to the profile. Remember that you must press the <Save> button to save the entry to disk.

- **Delete:** Press this button to delete the specified LAN Workstation Name from the current profile. Remember that you must press the <Save> button to save the entry to disk.

- **Modify:** Press this button to update the LAN Workstation entry (to reflect a changed password or backup profile). Remember that you must press the <Save> button to save the entry to disk.

- **Ok:** Press this button to leave the dialog. Remember that you must press the <Save> button to save any profile changes to disk.

16.5.2. Using ULTra Profiles

To use an ULTra profile, specify a backup as you normally would. Since this backup reflects a group of workstations with slightly different configurations, you will want to make the backup specifications encompass the largest workstation.

For example: if you are backup up three workstations and two of them have a C: drive and the third has a C: and D: drive, your backup specifications should include both a C: and D: drive.

In the backup profile field you can enter any value as it will be overridden (but it remains required). In the LAN WS Name field (in the <More...> dialog), enter an “at” sign (@) and then the ULTra profile. For example, if you have an ULTra profile named USERS enter in the LAN WS Name field:

```
@USERS
```

When the backup begins, FDR/UPSTREAM will display message number 5003N which says that an ULTra profile backup is starting and indicates the LAN Workstation Name which will be used. The dialog will be displayed for 10 seconds (regardless of your Message Time Limit). Pressing the <Ok> button during this period allows you to abort all remaining backups or restores in the profile. Otherwise, when it times out, backups or restores will be started for each LAN Workstation Name in the profile.

Note that all the workstations in an ULTra profile must be attached via the same connectivity type (IPX/SPX, NetBIOS or TCP/IP), as specified in the <ULTra...> dialog.

16.6. The LANCOPY Requestor Component

LANCOPY is a utility program provided with FDR/UPSTREAM ULTra to allow you to copy files to and from a workstation which has ULTra loaded on it or perform directory listings of files on a workstation.

16.6.1. Copying files

The LANCOPY file copy facility of FDR/UPSTREAM ULTra allows a requesting PC to copy files to and from a workstation through the LAN without going through a file server. There are two formats for LANCOPY, one for copying files from the remote workstation and one for coping files from the local PC. To copy files from the remote workstation, the format of LANCOPY is:

```
LANCOPY <Workstation Name>  R<Drive>:<file spec>
        L<Drive>:<file spec> [/p<password>] [/s]
        [/i[NE | NO | T]]
```

- **Workstation Name:** The name of the workstation, specified when ULTra was loaded.
- **R<Drive>:<file spec>:** 'R' stands for remote. The remainder is the file specification on the remote computer.
- **L<Drive>:<file spec>:** 'L' stands for local. The remainder is the file specification on your computer.
- **/p<password>:** The optional password specified on the workstation.
- **/s:** Optionally specifies that subdirectories be included in the copy.
- **/iNE, /iNO or /T:** The connectivity type: Use /iNE for NetBIOS, /iNO for Novell IPX/SPX or /iT for TCP/IP. The default is /iNO.

Note that wildcards, if used, are required in both the local and remote file specifications.

For example, to copy all the files from the c:\temp directory on a workstation named TOM_SMITH to the d:\new directory on your machine, including subdirectories and a password of PIE enter:

```
LANCOPY TOM_SMITH rc:\temp\*.* ld:\new\*.* /pPIE /s
```

The form for a copy in the other directory (from your PC to the workstation) is:

```
LANCOPY <Workstation Name>  R<Drive>:<file spec>
        L<Drive>:<file spec> [/p<password>] [/s]
        [/i[NE | NO | T]]
```

For example, if you wished to reverse the movement of files from the previous example, specify:

```
LANCOPY TOM_SMITH ld:\new\*.* rc:\temp\*.* /pPIE /s
```

Note: The DOS version of LANCOPY will not copy the extended attributes or the long file names of an OS/2, Windows 95 or Windows NT workstation.

16.6.2. Directory Listings

If you wish to perform a directory listing of a workstation, the format is:

```
LANCOPY <Workstation Name> <file spec> /d [/p]
        [/i[NE | NO | T]]
```

- **Workstation Name:** The name of the workstation, specified when ULTra was loaded.

- **<file spec>:** The file specification on the remote computer that you wish to see a directory listing of (including wildcards).
- **/d:** Required to denote a directory listing.
- **/p<password>:** The optional password specified on the workstation.
- **/iNE or /iNO:** The connectivity type: Use /iNE for NetBIOS and /iNO for Novell IPX/SPX. The default is /iNO.

The DOS version of LANCOPY shows directory listings in standard DOS form. The OS/2 version shows directory listings in OS/2 HPFS form including extended attributes and long file names.

Note that all files are displayed including system and hidden files.

16.7. Tuning

There are a number of parameters to help you tune the LAN Workstation version and most work on both the requestor and the workstation. These parameters are set through environment variables (SET <variable>=<value>) which are set on the command line before you run the program. You may choose to add these to your AUTOEXEC.BAT file.

For example, in DOS, to reduce the amount of memory required on the workstation, enter the following on the command line before running ULTra:

```
SET LANBUFFER=1024
SET NUMECBS=5
```

Name	Default	Description
ADAPTER	0	The NetBIOS adapter number to use. 0 is the primary adapter, 1 is the secondary adapter.
LANBALANCE	2	How the internal buffers are optimized. While this parameter can be specified on the requestor, it is only useful on the workstation. 0 = Mostly receive 1 = Mostly send 2 = Balance send and receive
LANBUFFER	8192	The size of the I/O buffer. A larger size will increase I/O performance at the expense of memory. Do not set this value lower than 512 or greater than 32767.
LANTIMEOUT	0	How long in seconds a communications request will be held for before timing out. The default of 0 means to never time out.
NOSAP	(not specified)	The default is to use the NetWare Service Advertising Protocol, where each workstation registers itself once a minute with every file server on the internetwork. You can disable this feature to reduce the amount of overhead on the internetwork by specifying a value for NOSAP. However, you will also lose the ability to cross bridges and routers.
NUMECBS	10	The number of event control blocks used in the data transfer. A larger number increases LAN performance at the expense of memory. Do not set this value lower than 5 or greater than 254.
SERVERTYPE	29631	When using the Service Advertising Protocol, this is the TYPE advertised by the workstation. It is specified in inverted byte format.
SOCKET	9026	The IPX socket used for communications. If you have a socket conflict, specify a different value. This value is in inverted byte order.
TIMEOUT	20	The number of seconds that a node will wait for a connection packet from the remote. You should always specify the same value on the requestor and workstation.
USDATAGRAMTO	3	The number of seconds before a datagram (broadcast) used in session establishment will time out.

Name	Default	Description
USLAPS	(not specified)	(OS/2 only) If specified, force the use of the LAPS interface instead of the LAN Server interface.
USNOIPXSPX	(not specified)	If specified, then the IPX/SPX interface will not be used for ULTra servers or requestors.
USNONETBIOS	(not specified)	If specified, then the NetBIOS interface will not be used for ULTra servers or requestors.
USNOTCP	(not specified)	If specified, then the TCP/IP interface for ULTra will not be used.
USNOTLI	(not specified)	If specified, then the TLI (advanced IPX/SPX) interface will not be used for ULTra servers or requestors.
USTCPDGSOCKET	8996	The TCP/IP socket UPSTREAM will use for datagram transmission.
USTCPSOCKET	8995	The TCP/IP socket UPSTREAM will use for connection-oriented transmission.
USUSE32BITNETBIOS	(not specified)	(OS/2) Causes FDR/UPSTREAM to use the 32-bit interface rather than the 16-bit interface.
USUSEWIN32ALTERNATEFILENAMES	(not specified)	If specified, then ULTra on a Windows 95 or Windows NT machine will use the mangled name (8.3) instead of the long file name.

16.8. Recovering a Windows 95/98/ME Workstation

FDR/UPSTREAM ULTra can be used to provide a single diskette disaster recovery solution for Windows 95 workstations. Using the DOS version of FDR/UPSTREAM ULTra on the workstation to be recovered in combination with the complete FDR/UPSTREAM product on the LAN, the operating system, long file names, and everything necessary for complete system recovery can be achieved.

The process consists of the following:

- Create a recovery diskette.
- Save the long file name information and perform, using the DOS version of FDR/UPSTREAM ULTra, a recovery backup.
- Perform regular backups.
- When a disaster occurs, boot the recovery diskette and recover the base operating system.
- Recover long file names.
- Restore your remaining data.

The following completely describes the process.

16.8.1. Create a Recovery Diskette

A recovery diskette is a Windows 95 (DOS v7) bootable diskette containing device and LAN support, as well as FDR/UPSTREAM ULTra software.

The first step, is to format the recovery diskette using the /s option which transfers the operating system. From a Windows 95 MS-DOS prompt, enter:

```
C:\WINDOWS> format a: /s
```

You do not need to specify a particular volume label, so press the [ENTER] key to skip that step.

Copy the contents of the DOS version of ULTra to your recovery diskette. If you need to save space you only need ULTRAD.EXE, UPSTREAM.MSG (you can remove this one in a pinch) and in some cases RESET.EXE for NetBIOS. We also recommend that you copy the Windows 95 FORMAT and HIMEM programs to your recovery diskette:

```
C:\WINDOWS> copy c:\windows\command\format.com a:
C:\WINDOWS> copy c:\windows\himem.sys
```

If your new hard disks will not come properly partitioned, you will also have to copy the FDISK program.

At this point the process of creating the recovery diskette varies significantly depending upon your device support, LAN drivers, etc. The following steps were used to create a NetBIOS recovery diskette for an IBM Token-Ring environment.

- Copy the IBM LAN Support Program drivers to the diskette (this consisted of DXM.MSG, DXMA0MOD.SYS, DXMC0MOD.SYS, DXMMSG.001, DXMT0MOD.SYS).
- Create a CONFIG.SYS as follows. As described in the DOS ULTra installation section, you may need to use the RESET program and you may need DXMT0MOD parameter modifiers.

```
files=99
buffers=20
dos=high
```

```
device=a:\himem.sys
device=a:\dxma0mod.sys
device=a:\dxmc0mod.sys
device=a:\dxmt0mod.sys
```

The following steps were used to create an IPX/SPX recovery diskette for an IBM Token-Ring environment:

- Copy the IBM LAN Support Program drivers to the diskette, excluding the NetBIOS driver. This consisted of: DXM.MSG, DXMA0MOD.SYS, DXMC0MOD.SYS, and DXMMSG.001.
- Create a CONFIG.SYS as follows:

```
files=99
buffers=20
dos=high
device=a:\himem.sys
device=a:\dxma0mod.sys
device=a:\dxmc0mod.sys
```

- Install the DOS version of the NetWare drivers for your hardware environment to a PC with the same LAN hardware as your target PC. Copy the contents of the \NWCLIENT directory to an \NWCLIENT directory on your PC. Modify the STARTNET.BAT file so that it uses the A: drive instead of the drive that you installed your software to.
- Create an AUTOEXEC.BAT that runs the STARTNET.BAT file.

16.8.2. Perform a Recovery Backup

There is a program, LFNBK, in the Windows 95 distribution, which allows long file names on your disk to be converted to short file names, and the long file name information to be stored in a file for later recovery.

Copy this file to your Windows directory. From a MS-DOS prompt enter (assuming that the D: drive is your CD):

```
C:\WINDOWS> copy d:\admin\apptools\lfnback\lfnbk.exe
```

Run the LFNBK program, using the /b to back up the long file name information:

```
C:\WINDOWS> lfnbk /b
```

At this point, your system no longer has long file name information available. Note that before your PC will behave normally, you will need to rerun the LFNBK program with the /r option. To perform your recovery backup, insert your recovery diskette and reboot your PC.

Once the PC is rebooted in DOS and you have installed LAN support, run the ULTra program with the workstation name you wish to use.

At this point, go to the FDR/UPSTREAM Workstation/Server that will be used to backup/restore your Windows 95 PC. Perform a complete backup of the C: drive. Note that we recommend that you perform a first time full and use a separate backup profile for each Windows 95 PC that you are preparing a recovery plan.

After the backup has completed, reboot the Windows 95 PC, and run the long file name backup program from a MS-DOS prompt with the recovery option to restore your PC to normal:

```
C:\WINDOWS> lfnbk /r
```

16.8.3. Perform Regular Backups

You should perform regular backups either using the ULTra or complete version of FDR/UPSTREAM for Windows 95. This will assure that your applications and minor system changes are recorded and can be restored. If you perform major system changes or change your LAN hardware we recommend that you rebuild your recovery diskette and perform a new recovery backup.

16.8.4. Recovering Windows 95

At the time you install a replacement hard disk or procure a new computer, boot up the machine using your recovery diskette. You may need to partition the hard disk using FDISK or a similar utility. See the disk/computer manufacturers documentation for more information.

Before performing the following verify that there is no important data to be lost on your new disk. Then format the hard disk of your new hard disk using the system transfer option:

```
A:\> format c: /s
```

Load ULTra on your workstation and proceed to the FDR/UPSTREAM machine. Restore the entire contents of the C: drive.

Once the drive has been restored, reboot the computer.

16.8.5. Restoring Long File Names

When you reboot your PC your environment is not completely restored. Your folders will be incomplete and have truncated names. If you can not get to a MS-DOS prompt, use the **Run** command from the **Start** menu to run **C:\WINDOWS\LFNBK /r**

After the program has completed, your environment (including host connectivity if any) is restored.

16.8.6. Restore your Remaining Data

Perform a complete restore of your entire system to recover all of your application data as well as minor changes to your environment (registry and other system changes).

16.9. ULTra Workstation Compression

FDR/UPSTREAM ULTra supports workstation level compression. This offers better performance on slow LAN links as well as better network resource utilization.

With workstation compression, the compression that you specify on the UPSTREAM PC is actually performed on the workstation. This guarantees that the minimum amount of data is transmitted throughout all phases of communications.

There are a few cases where ULTra compression will not or should not be used:

- ULTra compression will not be used on DOS workstations. DOS workstations have insufficient memory for compression. Workstation compression is disabled automatically.
- When using high compression, the LAN link is fast and the workstation is particularly slow. Workstation compression would result in overall performance degradation.

To limit workstation compression on the workstation, specify the environment variable ULTRACOMPR.

Name	Default	Description
ULTRACOMPR	4	The maximum compression level to perform on the workstation. 0 = No compression 1 = Fast Compression 2 = High Compression 1 3 = High Compression 2 4 = High Compression 3

To limit workstation compression on the UPSTREAM PC, use the standard UPSTREAM parameter ULTRA-COMP:

Name	Default	Req.	Description
ULTRACOMP	4	No	The maximum compression level that the workstations are to perform. Higher levels of compression specified will be performed on the UPSTREAM PC. 0 = No compression 1 = Fast Compression 2 = High Compression 1 3 = High Compression 2 4 = High Compression 3

16.10. Additional ULTra Features

The ULTra facility and its capabilities are pervasive throughout the entire FDR/UPSTREAM product. Discussed in other sections of this manual are other features of FDR/UPSTREAM where ULTra is one of the components, but not the primary one. See the referenced chapters:

- **Registration:** FDR/UPSTREAM ULTra workstations can be configured to automatically register their LAN Workstation name with the host allowing an administrator to determine it's last access, FDR/UPSTREAM workstation connectivity information and more... See the *FDR/UPSTREAM Program* and *Management* chapters for more information.
- **Auto-Updates:** The FDR/UPSTREAM ULTra workstation software can be automatically updated through administrator control. There is some setup, but once defined, you can easily update the FDR/UPSTREAM software for a large number of workstations. See the *Management* chapter for more information.
- **File Transfer:** FDR/UPSTREAM offers a unique facility where it's powerful, high performance file transfer facility is available to ULTra workstations. See the *File Transfer* chapter for more information.
- **Job Execution:** Batch jobs and programs can be executed both on the FDR/UPSTREAM workstation and on ULTra workstations as well as remote ULTra termination. See the *Advanced FDR/UPSTREAM* chapter for more information.
- **File Viewing:** Text files residing on the local hard disk, LAN attached drives or ULTra systems can be viewed from a FDR/UPSTREAM machine. See the *FDR/UPSTREAM Program* chapter for more information.
- **Physical Disk/FDRSOS backups/restores:** You can backup and restore disks at the hardware level using ULTra. This is an extremely powerful feature, allowing complete disk restores of virtually all operating systems from a single floppy. See the *Physical Disk* chapter for more information.
- **Windows NT Registry restores:** You can use ULTra to restore Windows NT registries. See the *Windows NT/2000/2003/XP Considerations* chapter for more information.

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17 Physical Disk

17.1 Introduction

Physical disk backups are sector-by-sector backups of the disk itself regardless of the disk formatting and partitioning. These operate at the very lowest level of the disk.

These types of backups have a number of disadvantages including:

- Inability to restore single files. It is this reason alone why most users choose to use physical disk backups as disaster recovery tool only, and perform logical disk backups as their primary backup method.
- Inability to recognize unused or even unformatted areas of the disk. Thus physical disk backups are always the same size regardless of the data on the disk.
- Inability to deal with substantial changes in hardware. For example, for Windows NT if you restore a boot disk from a multi-processor system to a single-processor system it will not boot. There are a number of other similar issues - check with UPSTREAM technical support if you will be restoring to dissimilar hardware.

But their advantages in a number of areas make them a tool worth considering.

- Disaster recovery. In a complete disaster FDR/UPSTREAM has a number of techniques which allow a physical disk backup to be used for high speed system restore, often from a floppy disk on a “bare metal” system.
- Performance. Since the disk heads move across the disk sequentially, there is no head or rotational delays which may often significantly reduce performance.
- Databases. A number of database vendors store their data directly onto physical disks using their own labeling schemes. Thus a physical disk backup is the only way to backup this data.

Because of these advantages, physical disk backups can be a powerful tool in your backup strategy.

FDRSOS is a physical disk backup product. FDR/UPSTREAM has the ability to restore directly from FDRSOS backups providing an alternate path if your site does not have access to EMC hardware for the restore.

17.2 Physical Disks and FDRSOS

FDR/UPSTREAM can be used to perform physical disk backups and restores. Some of the features of this facility include:

- Complete system backups of an entire disk. This will include all operating system information, as well as all file regardless of their open or "in-use" state.
- Restores of FDRSOS backups using FDR/UPSTREAM. If your disaster site does not have the required hardware/software to restore your FDRSOS backups using FDRSOS, you can use FDR/UPSTREAM and its physical disk restore facility.
- ULTra support so that physical disk backups of workstations can be performed. With this you can (using the DOS version of ULTra) perform a single disk disaster recovery restore of a DOS, Windows, Windows NT or OS/2 workstation or server.
- You can even perform the backup or restore using a different operating system if you wish. For example, you could perform the backup using Windows NT, but perform the disaster recovery restore using DOS.
- Extremely high performance. Since FDR/UPSTREAM is not utilizing operating system access facilities but is instead using direct disk access there is virtually no disk I/O degradation due to rotational delay or seek time.
- FDR/UPSTREAM compression. As with standard backups/restores FDR/UPSTREAM compression can significantly improve performance. Since file I/O is no longer a significant performance bottleneck FDR/UPSTREAM compression is even more effective.
- Checkpoint restart. Complete disk backups automatically checkpoint at a user specified interval (the RESTORECHECKPOINT parameter in your parameter stream, whose default is every 120 seconds). Restores can also checkpoint restart at the checkpoints determined during the backup.
- Restores to disks with differing geometries and with disk managers.

Note that this facility performs physical, not logical disk backups. Only complete physical disks can be restored; you cannot use it for file level restores. This is not a replacement for standard FDR/UPSTREAM backups but is meant to be an extension of them allowing high speed disaster recovery restores. We recommend that you perform physical disk backups whenever you make significant system upgrades.

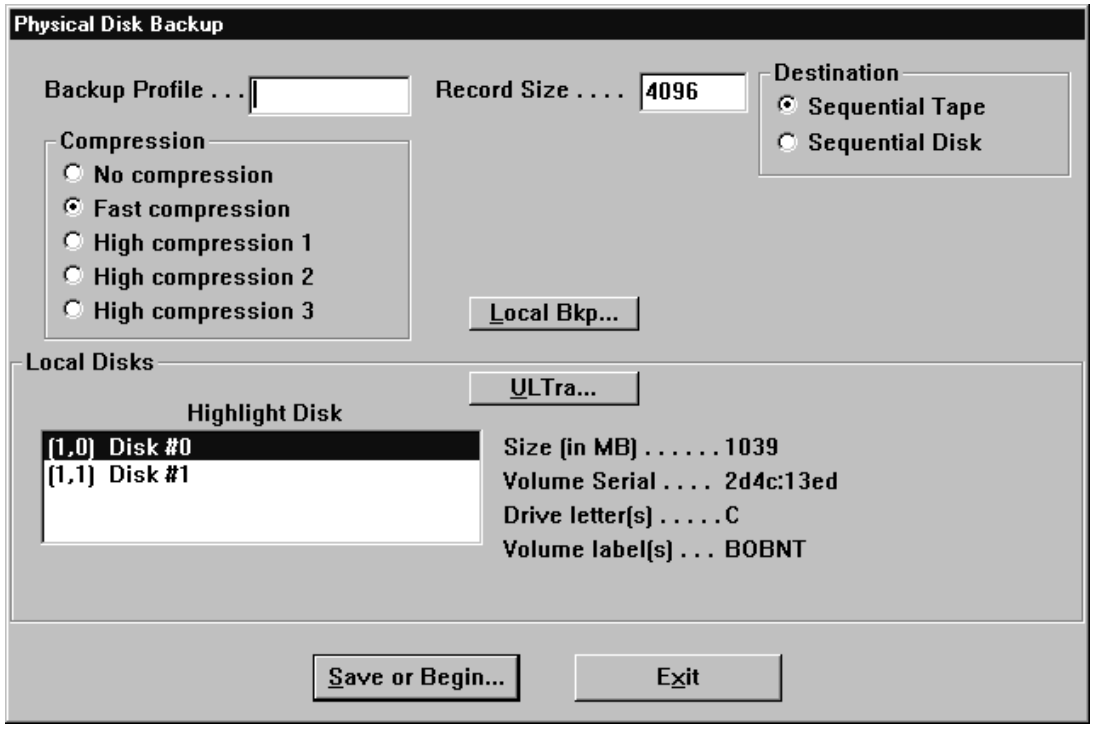
Note that physical disk backups take an image of the disk at the time of the backup. If files are open or change during the backup, the backup may be incomplete or even corrupt. We recommend that if you wish to guarantee the integrity of your backup that you use operating system commands or FDRSOS utilities (described in the FDRSOS manual) for flushing/locking the disk during physical disk backups.

There is a menu item, **Physical** which includes two menu options: **Physical disk backup** and **FDRSOS/Physical disk restore**.

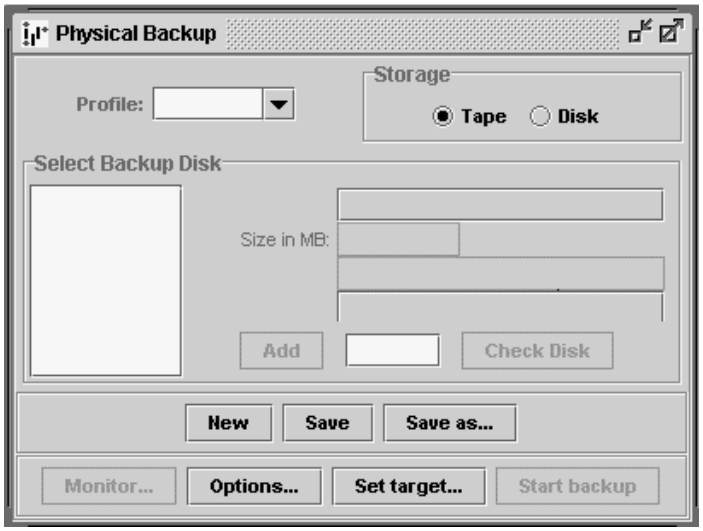
NOTE: If the disk you are restoring to has differing geometries than the original or either uses a disk manager, see section 17.3, 19.3, 24.3, page 17-15.

17.2.1 Physical Disk Backups

To specify a physical disk backup, pull down the **Physical** menu and select **Physical disk backup.** You will see the Physical disk backup dialog:



In the UPSTREAM Director, if you press the **Physical Backup** tab, you will see a similar screen:



The parameters are:

- **Backup Profile:** You can specify any valid backup profile, however we recommend that you dedicate backup profiles specifically for physical disk backups.

- **Record Size:** Specify the file read size of the data, in multiples of 4096 bytes. We recommend a record size of 8192 or greater for good performance.

- **Compression**: Specify the level of compression you wish to use. Note that high compression may result in slower backups due to increased PC CPU utilization.

- **Destination:** Specify either disk or tape. The default is tape.

- **Local Bkp:** Press this button if you wish to specify local backup options.

- **ULTra:** Press this button to specify physical disk backups of ULTra LAN attached workstations.

The parameters in the Local Disks frame are relevant to the disk you will be backing up:

- **Highlight Disk:** Physical disks are denoted by an internally assigned number and name. When you highlight a disk, information about it is shown in the fields to the right of the list box (size, volume serial(s), drive letter(s), volume label(s)). Some of these fields may have assigned more than one value if a physical disk is divided into multiple partitions. If your disk is a member of a volume set, that will be noted as well.

  For UNIX systems, only the pathname of the available physical disks are displayed.

  FDR/UPSTREAM is able to interpret FAT, HPFS and NTFS disks and provide some information about them to help you relate a physical disk to the data on it. However, there are many cases where the information cannot be displayed. If you have any questions about relating physical disks to your data, contact FDR/UPSTREAM technical support for assistance.

  Press the **Save or Begin...** button to save your parameters and/or begin the physical disk backup.

  Physical disk backups can be suspended for later restart and in most other ways operate as standard backups (see the Notes below).

17.2.2 FDRSOS/Physical Disk Restores

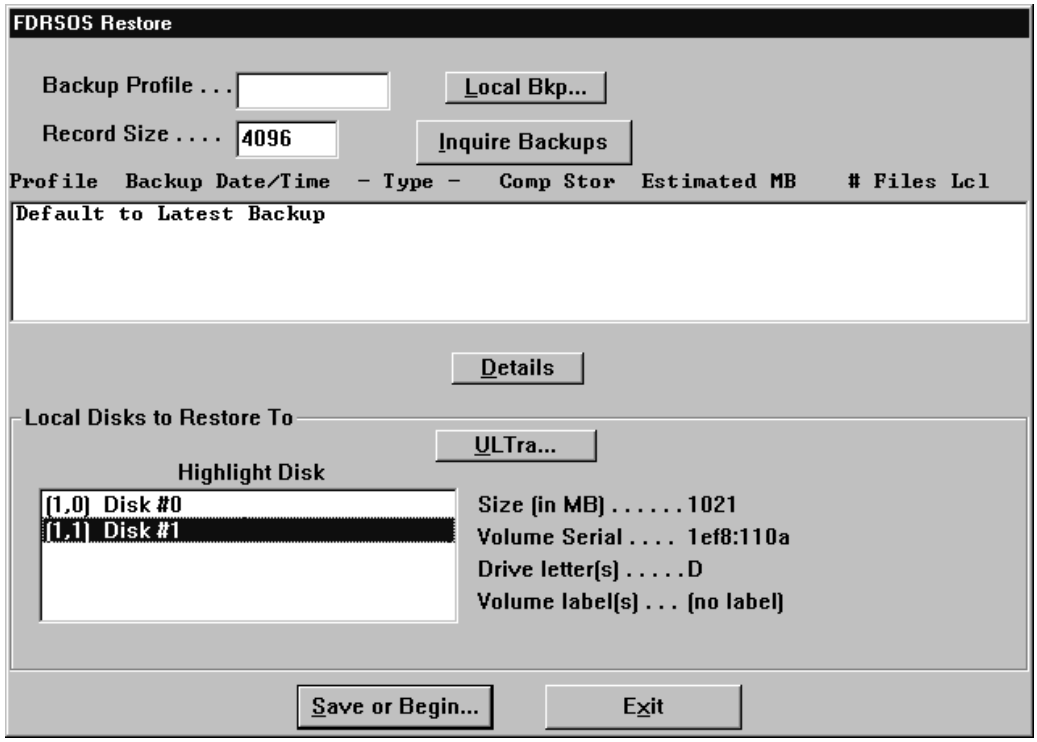
FDRSOS is a separate product licensed by Innovation Data Processing which allows high speed physical backups and restores of EMC Symmetrix SCSI or fiber disk arrays to and from an IBM mainframe. The attraction of the EMC Symmetrix is the ability to store and administer both open systems and IBM mainframe data on the same large device. The EMC disk array must have the ESP feature installed.

FDRSOS allows the open systems (UNIX, PC operating systems, etc.) disk to be backed up and restored to mainframe disk or tape.

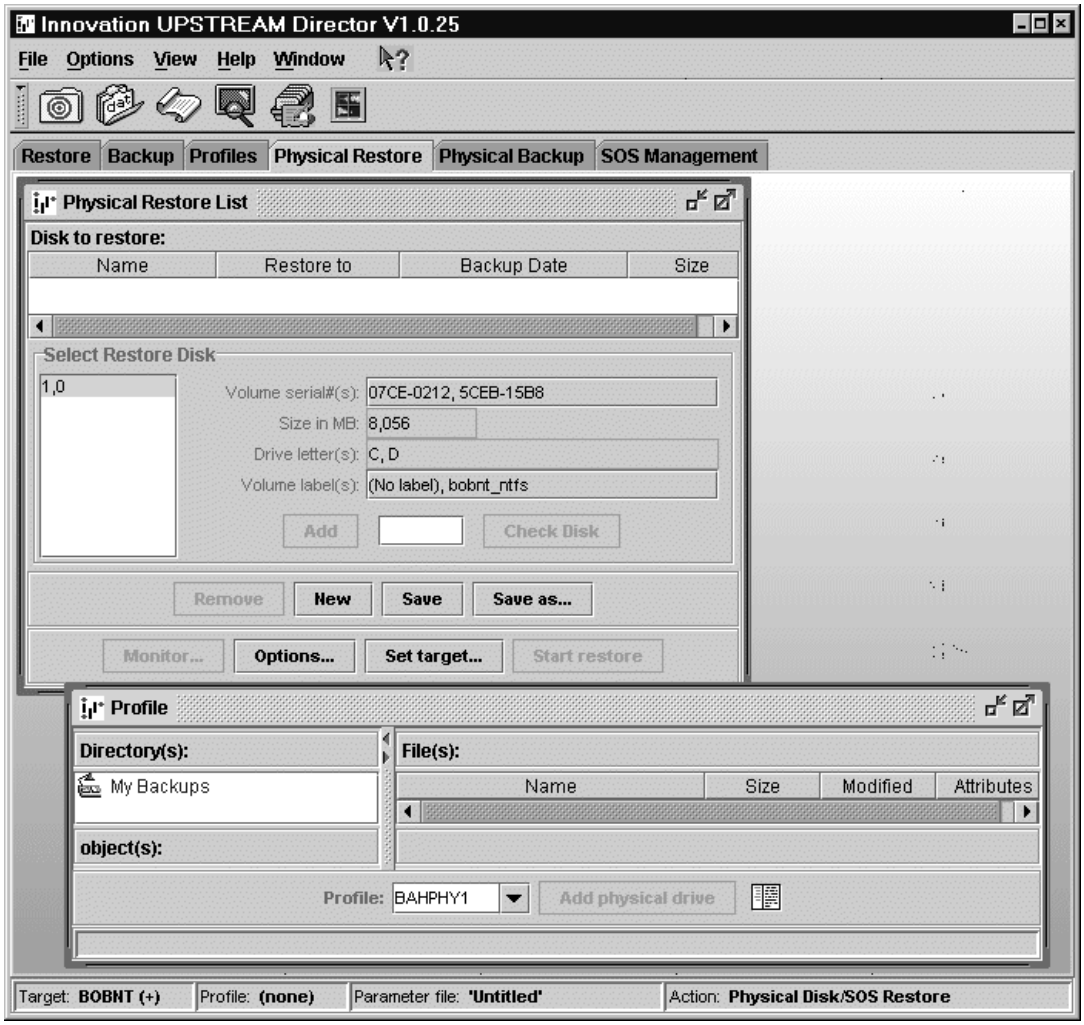
FDR/UPSTREAM can be used in concert with FDRSOS allowing you the ability to restore FDRSOS backups to EMC or non-EMC disk drives using FDR/UPSTREAM's powerful communications engine.

To specify a physical disk restore or FDRSOS restore using FDR/UPSTREAM, pull down the **Physical** menu and select **FDRSOS/physical disk restore.** An automatic version inquiry will be performed and you will see the FDRSOS/physical disk restore dialog:

WARNING: Physical disk or FDRSOS restores should ONLY be performed by administrators.



In the Director, when you press the **Physical Restore** tab you see:



The parameters are:

- **Backup Profile:** You can specify any valid backup profile which contains physical disk or FDRSOS backups.

- **Record Size:** Specify the file blocking size of the data, in multiples of 4096 bytes. This is only used for FDRSOS restores (physical disk backups used the value specified for the backup). We recommend a record size of 8192 or greater for good performance.

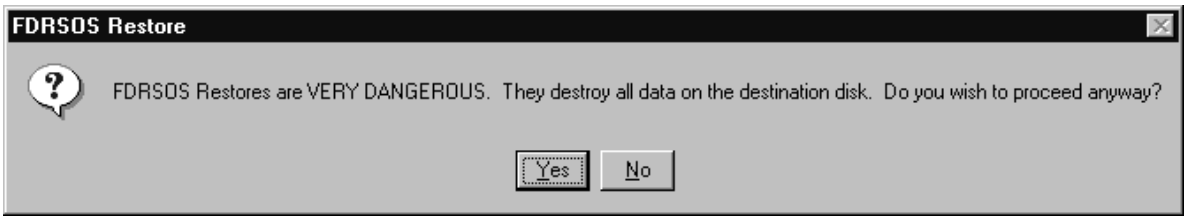
The parameters in the Local Disks To Restore To frame are relevant to the disk you will be restoring (replacing):

- **ULTra...:** Press this button to restore to an ULTra LAN attached workstation.

- **Highlight Disk:** As for physical disk backups, this list box helps you relate physical disks to your data. As noted above, if you have any questions about relating physical disks to your data, contact FDR/UPSTREAM technical support for assistance.

Press the **Save or Begin...** button to save your parameters and/or begin the physical disk/FDRSOS restore. FDR/UPSTREAM will not allow you to perform the restore if the original disk is larger than the current disk

and will warn you if the original disk is smaller than the current disk. You will also be warned with the following message:



WARNING: FDRSOS or Physical Disk Restores are VERY DANGEROUS. They should only be performed by administrators who are very familiar with the consequences of physical disk restores. ALL data that exists on the disk will be destroyed. The warning above is the LAST warning and should be heeded.

FDRSOS/physical disk restores can be suspended for later restart and in most other ways operate as standard restores (see the Notes below).

17.2.3 System Requirements

For Windows NT, UNIX and OS/2 access is via standard operating system calls which support all types of hard disks. We do not recommend physical disk backups for Windows 95/98.

17.2.4 Disaster Recovery

Physical disk and FDRSOS backups are ideal for disaster recovery; indeed, that is their primary purpose. If you lose a disk on your workstation or server, this facility can make complete system recovery simple.

However, if you lose the boot disk of your workstation or server, it can be quite difficult to get FDR/UPSTREAM completely operational in a disaster environment. You have to apply the operating system, device drivers, communications support, etc. before you can run FDR/UPSTREAM to perform the restore. This method is recommended for non-UNIX environments only.

To simplify this process, we recommend the use of the DOS version of FDR/UPSTREAM ULTra. By placing DOS, LAN and low-level disk drivers on a single bootable floppy disk with FDR/UPSTREAM ULTra, you can use an operational FDR/UPSTREAM machine to direct the physical disk restore to the ULTra machine. It works regardless of operating system (except for UNIX); OS/2, Windows NT, Windows 95, etc. can be recovered using this method.

The next section describes a method of creating a DOS disk using Windows NT.

To create a disaster recovery DOS ULTra diskette, the steps in this process are:

- Create a bootable DOS diskette. See the appropriate DOS manual for instructions.
- Copy the appropriate low-level disk (ASPI) and LAN drivers to the disk as well as the ULTRAD.EXE DOS ULTra program.

- Modify your CONFIG.SYS and AUTOEXEC.BAT to properly install the LAN and disk drivers as well as ULTra.

For example, if you are preparing a disaster recovery disk for a machine with an IDE hard drive (which requires no special disk driver), an IBM token-ring card over NetBIOS, your CONFIG.SYS might be as follows:

```
REM Operating system statements
Device=a:\himem.sys
Dos=high
REM LAN drivers
Device=a:\dxma0mod.sys
Device=c:\dxmc0mod.sys
REM LAN NetBIOS support
Device=c:\dxmt0mod.sys
```

And your AUTOEXEC.BAT would simply be:

```
ULTRAD <workstation name>
```

To recover the machine:

- Replace the hardware with the same configuration as existed before the disaster.
- Boot the machine with the ULTra disk.
- From a working FDR/UPSTREAM machine, bring up the physical disk restore dialog, select the most recent physical disk backup from the failed machine, specify the ULTra LAN workstation name.
- Begin the restore. When the restore has completed, you can reboot the machine and the original configuration should be replaced.

We recommend that you test this process in your environment to assure that you have it set up correctly.

17.2.5 Windows NT ULTra Disaster Recovery Boot Disk Creation Procedure

This section describes the method of using the Network Client Administrator in Windows NT to create a DOS bootable floppy for ULTra disaster recovery. This procedure is provided to ease your creation of a DOS bootable floppy if you have Windows NT available. The system that you recover does not have to be Windows NT, nor must you use this procedure to recover a Windows NT system. It is provided merely to ease the creation of a network aware diskette.

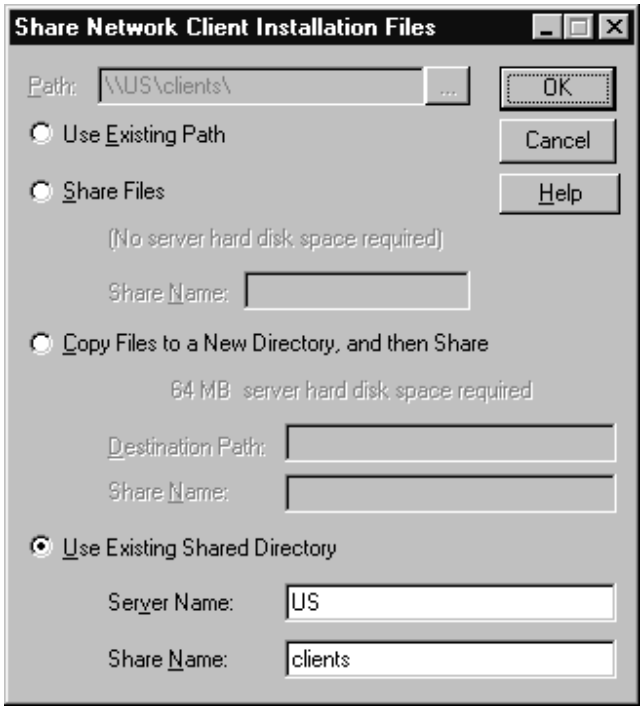
The purpose of the Network Client Administrator in Windows NT is to create bootable floppy diskettes that can be used to easily start the installation procedure for MS-DOS/Windows 3.x and Windows 95 on machines that will serve as clients to a Windows NT server. The procedure for creating a bootable floppy diskette to start FDR/UPSTREAM ULTra uses the Network Client Administrator to create a bootable floppy diskette for installing MS-DOS and then modifies the diskette to convert it into a FDR/UPSTREAM ULTra diskette. The MAKULTRA.EXE program supplied with FDR/UPSTREAM for Windows NT is the program that first invokes the Network Client Administrator (NCADMIN.EXE) to create the bootable floppy diskette and then modifies it.

Note that NCADMIN is a Windows NT Server program; it is not available for Windows NT Workstation.

The procedure to create the diskette starts by running MAKULTRA.EXE.

- ☐ Start the MAKULTRA.EXE program from the main FDR/UPSTREAM directory. MAKULTRA.EXE will immediately invoke NCADMIN.EXE to present you with a number of dialogs starting with the "Network Client Administrator" dialog.

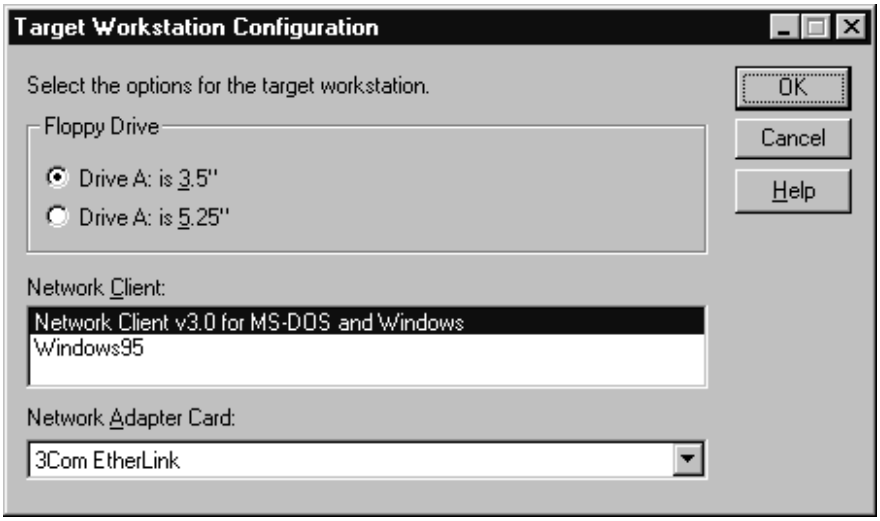
- ☐ On the "Network Client Administrator" dialog check the **Make Network Installation Startup Disk** radio button. Press the **Continue** button to display the "Share Network Client Installation Files" dialog.



- ☐ On the "Share Network Client Installation Files" dialog, if the "Use Existing Shared Directory" radio button is checked, it can be assumed that the Network Client installation files have already been copied to a Windows NT Server, so do the following:
  - Verify that the server name and share name in the "Server Name:" and "Share Name:" fields match the Server\Share to which the Network Client installation files were originally copied.
- ☐ If the "Use Existing Shared Directory" radio button is <u>not</u> checked, do the following:
  - Insert your Windows NT Server installation CD in the CD-ROM drive.

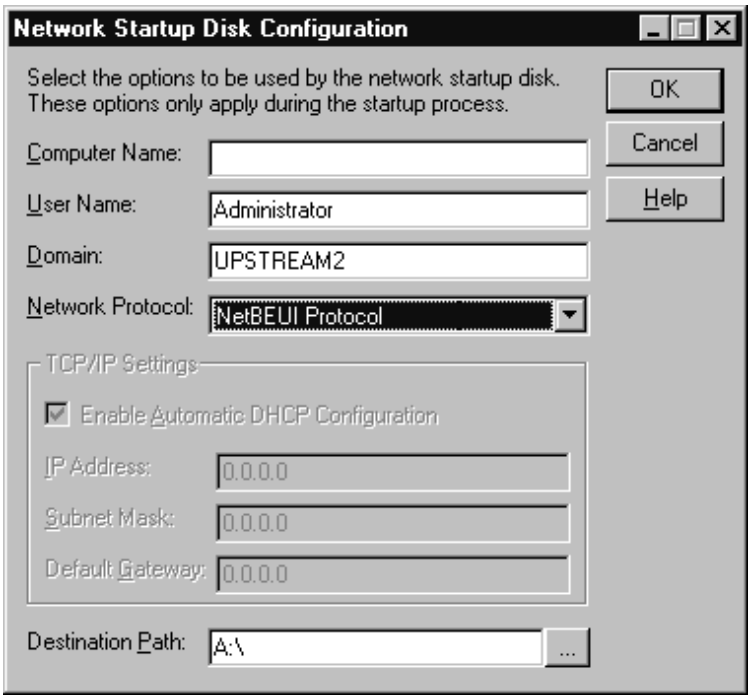
- Check the **Copy Files to a New Directory, and then Share** radio button.
- Enter “d:\CLIENTS” in the “Path:” field, where d: is the drive letter of your CD-ROM drive.
- Enter a path name to be created in the “Destination Path:” field. The drive letter of the destination path should be on the Windows NT machine that you will use as your disaster recovery base system. The path must not already exist since the copying procedure will create it.
- The default share name in the “Share Name:” field is **Clients**. DO NOT change this share name.

☐ Press the **Ok** button to display the “Target Workstation Configuration” dialog.



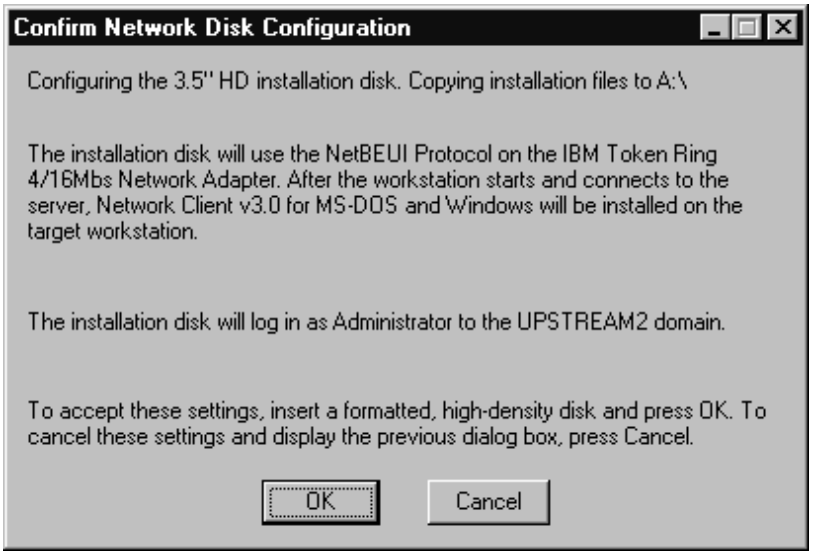
☐ On the “Target Workstation Configuration” dialog:

- Check the **Drive A: is 3.5** radio button if you want to create a 3.5 inch bootable floppy disk, otherwise check the **Drive A: is 5.25** radio button to create a 5.25 inch bootable floppy disk.
- Select **Network Client v3.0 for MS-DOS and Windows** from the “Network Client:” list.
- Select the appropriate network adapter type for the target computer from the “Network Adapter Card:” list.
- Press the **Ok** button to display the “Network Startup Disk Configuration” dialog.



☐ On the "Network Startup Disk Configuration" dialog:

- Enter the name to be used for the target computer in the "Computer Name:" field. The name **ULTRADR** is a good name for the target computer, but any name will do.
- Modify the user name and domain in the "User Name:" and "Domain:" fields if the defaults are not to your liking. The user name must be set up as a user account in the specified domain.
- Select either **TCP/IP Protocol** or **NetBEUI Protocol** from the "Network Protocol:" list TCP/IP is emulated over NetBIOS and we *strongly* recommend that you do **not** select it as it is unreliable. DO NOT select "NWLink IPX Compatible Protocol" since this protocol supports only IPX, not SPX, and ULTra needs both IPX and SPX protocols. The protocol that you select (either TCP/IP or NetBEUI) must be configured in the network settings for all of following machines (these machines may be the same machine or different machines):
    - The Windows NT Primary Domain Controller (or Backup Domain Controller) to which the target computer will log on.
    - The Windows NT Server that will be accessed to run FDR/UPSTREAM ULTra (ULTRA.EXE).
    - The machine (not necessarily Windows NT) on which FDR/UPSTREAM (US.EXE) will be run.
- If "TCP/IP Protocol" was selected from the "Network Protocol:" list, enter the appropriate information for the fields in the "TCP/IP Settings" group.
- The default destination path in the "Destination Path:" field is **A:\.** DO NOT change this destination path.
- Insert a bootable DOS floppy disk in the A: drive. A bootable floppy disk can be created on a MS-DOS or Windows 95 system with the "FORMAT A: /S" command.
- Press the **Ok** button to display the "Confirm Network Disk Configuration" dialog.



- ☐ On the "Confirm Network Disk Configuration" dialog:
  - Verify that the displayed configuration settings are correct.
  - Press the **Ok** button. The Network Client installation files will be copied to the Network Disk diskette. Once the Network Disk creation process is finished, a completion message box will be displayed to inform you if it was successful or not:
- ☐ Press the **Ok** button to return to the main "Network Client Administrator" dialog to redisplay the "Network Client Administrator" dialog.
- ☐ On the "Network Client Administrator" dialog press the **Exit** button to exit. A final dialog will be displayed with additional precautions.
- ☐ Read the precautions listed on this dialog.
- ☐ Press the **Ok** button to exit the Network Client Administrator.

Once you have exited the Network Client Administrator, MAKULTRA.EXE will verify that the diskette has been created successfully and will then modify it to invoke a program named ULTRAD.EXE instead of the MS-DOS setup program, SETUP.EXE. When MAKULTRA.EXE is finished you will have a diskette with which you can boot a damaged machine in order to then perform a raw disk restore. You should thoroughly test this diskette by booting from it a number of times to ensure that the network device drivers copied to it by NCADMIN.EXE are correct.

WARNING: There is a known problem with some of the network drivers that are copied to the bootable diskette by NCADMIN.EXE. If you suspect that your diskette has not been properly created by NCADMIN.EXE, contact Innovation Data Processing Tech Support for a possible work around.

Once created and tested, the ULTra Disaster Recovery boot disk should be kept in a safe place to be accessed in the event of a disaster or when needed to further test your disaster recovery plan.

17.2.6 Notes

The following are some issues to keep in mind for physical disk/FDRSOS backups and restores:

- If the disk you are restoring to has a different geometry than the one you were backing up or is using a disk manager, see page 17-15.
- You can disable physical disk access through personalization by either checking the “No physical disk” checkbox or the “No FDRSOS Functions” checkbox.
- You must enable record packing and the PACKRECSIZE must be greater than the record size.
- All physical disk backups/restores are automatically restartable and can be restarted in the same manner as standard backups/restores (through the Action menu for example). The RESTORECHECKPOINT parameter is used to determine how often checkpoints are taken for physical disk backups or FDRSOS restores. Physical disk restores are automatically checkpointed at the checkpoints assigned during the physical disk backup.
- DASDOVERRIDE can be used to modify the amount of storage allocated for physical disk backups. This can be particularly important if the disk is massively compressible.
- (OS/2 Backups) To force the OS/2 file system to write all cached data to HPFS drives, you can enter the following command from an OS/2 prompt:

  ```
  C:\OS2\CACHE.EXE /LAZY:OFF
  ```

  To enable HPFS disk caching after backup is done, enter the following command:

  ```
  C:\OS2\CACHE.EXE /LAZY:ON
  ```

- (Restores) The newly created hard drive becomes accessible after you reboot your system.

  If you restore to a drive of larger capacity the rest of the target drive becomes unusable. You can create secondary (logical) partitions on that drive to utilize the remainder of the disk space.
- (Restores) If you are restoring a non-boot drive of different characteristics than the original disk, you may be able to access the data.
- (Restores) If the original drive had Dynamic Drive Overlay (DDO) installed tat the time of the UPSTREAM Physical Disk backup, the same DDO software must be installed on the target drive even if it has different (larger) capacity.
- The FDR/UPSTREAM internal physical disk format is: 1,<disk number> for operating system accessed disks where the disk number is 0 based for Windows NT and OS/2 and 128 based for DOS and 16-bit Windows. For example, specify 1,0 for the first physical disk on an NT system.

  For ASPI attached disks the format is: 2,<host adapter>,<target>,<LUN>. For example 2,0,4,0 is an ASPI device, ASPI adapter #0, target ID #4, logical unit number 0.

  For UNIX raw disks the format is: 4,<physical disk mount point>.
- For host initiated physical disk backups and restores the following are relevant parameters (besides the standard parameters BACKUPPROFILE, COMPRESSLEVEL, DASDOVERRIDE, LATESTVERSION, PASSWORD, RECORDSIZE, RESTORECHECKPOINT, STORAGETYPE, USERID, and VERSIONDATE):

Name	Default	Required	Description
ACTION	1	Yes	(New value) The function to be performed: 14 = Physical disk/FDRSOS restore. 15 = Physical disk backup.

SOSDISK	None	Yes	The source for backups and the destination for physical disk/FDRSOS restores, using the internal FDR/UPSTREAM physical disk format.
FILES	None	Yes (Restores)	For restores of physical disk backups, specify: <:\location*.* where location is the internal FDR/UPSTREAM physical disk form. For restores of FDRSOS backups, specify />_FDRSOS_BACKUP if the source was a UNIX disk or >:*.* if the source was a PC disk.

17.3 Restores with Differing Geometries/Disk Managers

17.3.1 Overview

One of the features of FDR/UPSTREAM is the ability to perform backups and restores of entire physical disk drives. FDR/UPSTREAM has had this ability for a while, but due to a number of disk management issues, including issues relating to restores to different disk geometries and disk managers, a straight restore of a disk in most cases does not provide a total solution.

To properly address the various disk management issues, the physical disk restore must be performed according to a specific procedure that will ensure that these issues are handled correctly.

17.3.2 Disk Management Issues

There are a number of issues that must be addressed for a physical disk restore to be successful. The first of these issues is the geometry of the disk that is to be restored to.

The first sector of the disk (cylinder #0, track #0, sector #1) contains the Master Boot Record (MBR). The master boot record contains the Master Boot Program (MBP) and the partition table (PT). The MBP uses the PT to determine where on the disk the various partitions (individual disk volumes) reside. The entries in the PT are disk geometry specific and in most cases the geometry of the restore disk is different than the geometry of the disk that was backed up. This causes the MBP to interpret the PT incorrectly and therefore incapable of recognizing the partitions.

In order for the MBP to be able to correctly find the partitions, the partitions have to be aligned on cylinder boundaries according to the geometry of the restore disk. The entries of the PT also need to be modified to properly address these newly aligned partitions. Once this is done the MBP can correctly locate and recognize the partitions.

To perform this partition alignment process a new program named PartFix.exe has been developed. As its name states, it is to be used for fixing partitions. The operation of PartFix.exe is described in the **Using PartFix.exe** section.

The other issue to be addressed when performing a physical disk restore is the proper handling of any installed disk management software.

Due to the limitations of some of the legacy BIOS's is some older computers, the BIOS may not be able to access the total capacity of some of the newer larger capacity disk drives. To overcome these legacy BIOS limitations, most of the disk drive vendors supply disk management software with their drives. This disk management software comes from one of only two software vendors. These two disk management software vendors are:

- Ontrack Data International, Inc.
- Micro House International

Ontrack Data International, Inc. markets a product named Disk Manager. Disk Manager is a registered trade mark of Ontrack Data International, Inc. Micro House International markets a product named EZ-Drive. EZ-Drive is a registered trade mark of Micro House International.

Both of these software products get installed on new disk drives to allow the computer system to be able to access the full capacity of the disk. These disk manager programs work by trapping the Interrupt 13h calls that the

BIOS would normally handle, thereby bypassing the limitations of the BIOS. While these two disk manager program perform the same functions, they do so in slightly different ways. The workings of Disk Manager are described in the **Ontrack Disk Manager** section and the working of EZ-Drive are described in the **Micro House EZ-Drive** section.

The usual reason for performing a physical disk restore is to recover from some sort of a major hard disk failure. In most cases, the disk drive of the computer needs to be replaced. The chances of finding a disk drive with the exact same characteristics as the drive that failed are slim and in most cases you will need to replace the drive with another one that is usually larger and with a different geometry.

When you purchase a new disk drive larger than 8GB, it will usually come with either the Ontrack Disk Manager or the Micro House EZ-Drive software. These two disk management programs are mutually exclusive. This can lead to a possible conflict if the new drive comes with one of the disk management programs and needs to be installed in a computer that already has another disk drive that uses the other program. In this case you should not use the disk management software that came with the new drive, but instead use the disk management software that came with the drive that is not being replaced. Both of the disk management programs should be capable of working with any disk drive on the market. There is no firm requirement for which disk management program you must use, although the various disk drive vendors may have preferences as to which disk management program you use.

The installation diskette for both of these disk management programs should be bootable. If it is not, read the documentation that comes with the disk management software to determine how to create a bootable installation diskette.

Both of these disk manager programs work the same way. They supplant the BIOS of the computer to overcome any disk capacity limitation that the BIOS might have. They do this by installing themselves on track #0 of the disk. During the boot up process, the BIOS will load the program that is on track #0 of the disk. This is usually the standard MBP, but instead it is the disk manager program. The disk manager program then provides a virtual image of the disk to whatever operating system is found in the active partition of the disk. The way in which these two disk manager programs virtualize the disk are different as explained in the following sections.

17.3.3 Ontrack Disk Manager

The Ontrack Disk Manager software virtualizes the disk by moving the MBR from sector #1 of track #0 to sector #1 of track #1, installing itself on track #0 of the disk and then hiding track #0 from the operating system. The virtual image that the operating system sees starts at track #1. The operating system thinks that track #1 is really track #0 and can therefore not see the real track #0. The normal MBR for the disk is now in sector #1 of the virtualized track #0 so that the operating system does not know the difference.

Because of this disk virtualization, the operating system and therefore UPSTREAM, does not have access to the real track #0. UPSTREAM cannot back up track #0, and any physical disk backup of this disk will not contain the disk manager program. This situation is ok due to the way in which restores are performed.

The Disk Manager software diskette that comes bundled with a new disk drive is usually a specially modified version created specifically for the vendor of the disk drive. This diskette contains the actual Disk Manager program along with one or more programs to aid in the installation of Disk Manager. The Disk Manager program is the same for all disk drive vendors, while the installation program is unique to the disk drive vendor. The installation program will not work with a disk drive from another vendor. To get a generic version of the Disk Manager installation program that will work with any vendor's disk drive, go to the Ontrack web site at *www.ontrack.com* and purchase either *Disk Manager for DOS* or *Disk Manager for Windows*. Both of these products contain everything that is needed for installing Disk Manager on any disk from any vendor.

17.3.4 Micro House EZ-Drive

The Micro House EZ-Drive software virtualizes the disk by moving the MBR from sector #1 of track #0 to sector #2 of track #0, installing itself on track #0 of the disk (except for sector #1) and then hiding the real sector #1 from the operating system. The virtual image that the operating system sees is the real track #0, but with sector #1 and sector #2 being the same. The normal MBR for the disk is now in both sector #1 and sector #2 of track #0 and the operating system, which does not reference sector #2, does not know the difference.

Because of this disk virtualization, the operating system and therefor UPSTREAM, does not have access to the real sector #1 of track #0. When UPSTREAM backs up track #0 it is actually backing up the MBR twice (sector #1 and sector #2) and backing up only part of the EZ-Drive program (the part of EZ-Drive which is on the real sector #1 is hidden from UPSTREAM). This causes some complications during the restore process which requires a specific restore procedure to be followed.

The EZ-Drive software diskette that comes bundled with a new disk drive has the disk drive vendors logo on it (and in the software too). Even though the software displays a specific logo, you should be able to install the EZ-Drive program on any disk from any vendor. To get a generic version of EZ-Drive that does not have a specific disk drive vendor's logo on it, go to the Micro House website at *www.microhouse.com* and purchase the EZ-Drive program.

17.3.5 Using PartFix.exe

As explained in the *Disk Management Issues* section, a disk to be restored to will in most cases have a different disk geometry than the disk from which the backup was taken. To overcome these geometry differences, the partitions on the disk must be realigned on cylinder boundaries. This is where PartFix.exe comes in. PartFix.exe is a program that fixes the partitions on a disk to realign them on cylinder boundaries. It also modifies the PT in the MBR to reference the newly aligned partitions. PartFix.exe can also be used to consolidate the free space between partitions of a disk, thereby allowing the allocation of a new partition that is larger than what might otherwise be possible if the disk's free space was not consolidated. The full list of functions that PartFix.exe can perform are:

- Determine the current geometry and partition layout of a disk, without altering the disk.
- Realign (fix) the partitions of a disk on cylinder boundaries.
- Consolidate free space into a single large area of free space at the end of the disk.
- Null (write binary zeroes to) the unused sectors of the disk for security purposes.
- Backup track #0 (all but sector #1 and sector #2) to a disk file.
- Restore track #0 (all but sector #1 and sector #2) from a disk file.

PartFix.exe is a DOS program so it can be run from a bootable DOS diskette without having to rely on an operating system that has to be booted from the hard disk that is to be worked on. Windows NT, for example, will not allow PartFix to modify a disk that it has booted from. PartFix.exe is capable of dealing with disks that have any combination of operating system and data partitions with varying file systems. PartFix.exe works with partitions with the following file systems:

- FAT
- FAT32
- HPFS

- NTFS

When PartFix /h is entered from a DOS command line, it displays the following:

```
PartFix - Fixes the partitions of a physical disk.
The valid syntaxes for PartFix are as follows:

   PartFix DiskID [/f] [/h] [/l[filename]] [/q] [/s]
   PartFix DiskID /b[filename]] [/l[filename]]
   PartFix DiskID /r[filename]] [/l[filename]]

   Where:  DiskID   - Is the physical disk identification string.
           /b[filename]]   - Backs up track #0 of the disk.
           /f              - Causes the disk's partitions to be fixed.
           /h              - Displays this help text.
           /l[filename]    - Causes a log file to be written.
           /q              - Suppresses the sector moving and nulling status
                             display (quiet mode).
           /r[filename]]   - Restores track #0 of the disk.
           /s              - Nulls unused disk sectors after the move for security
                             purposes.

If you don't know the DiskID, use the /h option to display a list of
available DiskIDs.

If the /b, /f or /r parameters are not specified, PartFix will display the
current partition information for the specified physical disk.

The /b, /f and /r parameters are mutually exclusive.
```

To use PartFix.exe to display the current disk partition information, enter:

```
PartFix DiskID
```

To use PartFix.exe to realign the partitions and consolidate free space, enter:

```
PartFix DiskID /f
```

The DiskID parameter is the UPSTREAM physical disk ID. For PartFix it has two formats as follows:

- 1,nnn A disk accessed via the BIOS and OS interface
- 2,n,n,n A disk accessed via the SCSI/ASPI interface

For IDE and EIDE disks accessed via the BIOS and OS interface, nnn is the BIOS disk number. The first disk in the system has a BIOS disk number of 128, the second has 129 and so on. The disk number (nnn) can be 128 through 255.

For SCSI disks accessed via the ASPI interface, n,n,n are three numbers which specify the SCSI host adapter, the Target ID, and the LUN of the specified disk. For example, the SCSI disk on host adapter #0, Target ID #1 and LUN #2 will have a disk number of 0,1,2.

The /f parameter causes PartFix.exe to perform a partition fix, if it determines that one is required. The /s parameter can be used along with the /f parameter to cause unused sectors of the disk to be nulled for security purposes. The /s parameter is ignored if the /f parameter is not also specified.

The /h parameter causes PartFix.exe to display its syntax.

The /l parameter causes PartFix.exe to write information to a log file. If a log file name is not specified with the /l parameter, PartFix.exe will write to PartFix.log by default.

The /q parameter causes PartFix.exe to run in quiet mode. Sector numbers are not displayed as they are moved or nulled. The default is to display the sector numbers as they are being processed. The /q parameter will cause the operation to run slightly faster.

The /b parameter causes PartFix.exe to save the contents of track #0 (except for sector #1 and sector #2) to the specified file. If a file name is not specified with the /b parameter, PartFix.exe will write to PartFix.bin by default.

The /r parameter causes PartFix.exe to restore the contents of track #0 (except for sector #1 and sector #2) from the specified file. If a file name is not specified with the /r parameter, PartFix.exe will read from PartFix.bin by default.

17.3.6 An Interesting PartFix.exe Side Effect

Because PartFix.exe aligns the partitions on cylinder boundaries and each partition must also end on a cylinder boundary, PartFix.exe must usually pad each partition with some number of sectors. These padded sectors are filled with nulls (binary zeroes) and the total number of sectors is on average one half of a cylinder. The thing to note about these padded sectors is that they are unusable to the file system for which the partition is formatted. PartFix.exe does not change the "formatted" size of the partition only the allocated size. Therefore, each partition aligned by PartFix.exe will contain unusable space.

To recover these unusable padding sectors at the end of each partition, each partition will have to be reformatted. However this is not a necessity since the partitions will function normally after being aligned and padded.

17.3.7 SCSI Disks Vs (E)IDE Disks

PartFix.exe realigns disk partitions on cylinder boundaries so that the MBP can access them. If your computer system has a SCSI disk that it does not need to access via the BIOS interface, there is no reason to use PartFix.exe to realign the SCSI disk's partitions. An example of this would be a UNIX operating system which is installed on one or more SCSI disks and does not use the BIOS during the boot process.

For systems that have one or more SCSI disks, most SCSI adapters have a way to map the SCSI disks into disk images that the system BIOS can understand. In such a case you can install and boot from an operating system on a SCSI disk using the BIOS interface. If a SCSI adapter can map the disk into a BIOS disk, it probably also has a way of providing disk geometry translation. Disk geometry translation causes the BIOS to see disks using a "logical" geometry rather than the real "physical" geometry of the disk.

When a SCSI disk is mapped into the BIOS, FDR/UPSTREAM (US.EXE), ULTra (ULTra.exe) and PartFix.exe can access the disk via two completely different interfaces. These being the normal BIOS interface and the SCSI standard ASPI interface. For example, a system containing 1 IDE disk and 1 SCSI disk will appear to have three disks; 2 BIOS interface disks and 1 ASPI interface disk, even though the second BIOS interface disk and the ASPI interface disk are the same disk. These disks would be represented with the following DiskIDs:

- 1,128 1st BIOS interface disk (the 1st IDE disk)
- 1,129 2nd BIOS interface disk (the 1st SCSI disk)
- 2,0,0,0 1st ASPI interface disk (the 1st SCSI disk)

Since the main purpose of PartFix.exe is to realign the partitions so that the BIOS can access them, it is suggested that the BIOS interface be used when fixing a disk with PartFix.exe. Also, when disk translation is in effect, the two different interfaces (BIOS and ASPI) will provide PartFix.exe with two different disk drive geometries (a translated geometry from the BIOS interface and the real geometry from the ASPI interface). If

PartFix.exe fixes a disk's partition using the real geometry from the ASPI interface, the BIOS (which sees only the translated geometry) will not be able to access the partitions.

17.3.8 Performing a Physical Disk Restore

Given the requirements of the various disk management software (Disk Manager and EZ-Drive) and the geometry mismatch problems for new drives, physical disk restores must be performed according to a strict procedure. The general outline of this procedure is as follows:

- ☐ 1. Start with a disk drive that is at least the size of the disk that was backed up.
- ☐ 2. Install either Disk Manager or EZ-Drive on the disk using the installation instructions provided with the software.
- ☐ 3. Run PartFix.exe /b to save track #0 to a file that is not on the disk to be restored. This step is required only for disks that have the EZ-Drive program installed.
- ☐ 4. Perform the UPSTREAM physical disk restore.
- ☐ 5. Run PartFix.exe /f to realign the partitions on cylinder boundaries.
- ☐ 6. Run PartFix.exe /r to restore track #0 from the file to which it was saved. This step is required only for disks that have the EZ-Drive program installed.

Actually, performing all of these steps is more involved than the preceding procedure states. In most cases, these steps cannot be performed manually. This is where an ULTra Disaster Recovery (ULTraDR) diskette comes in. One of the programs supplied with the Windows NT version of UPSTREAM is named MakULTra.exe. The purpose of MakULTra.exe is to create a bootable ULTraDR diskette. MakULTra.exe is described in the **Windows NT ULTra Disaster Recovery Boot Disk Creation Procedure** section of the FDR/UPSTREAM Client manual.

Once you have a disk management software installation diskette and the ULTra diskette in hand, you are ready to start the physical disk restoration process. The actual procedure for performing the restoration is as follows:

- ☐ 1. Boot from the disk management software (Ontrack's Disk Manager or Micro House's EZ-Drive) installation diskette and follow the online instructions for installing the software. Both the Disk Manager and EZ-Drive installation software will ask you to insert a bootable diskette in drive A:. At this point you should insert the ULTraDR diskette.
- ☐ 2. Remove the diskette from the A: drive and reboot the machine from the hard drive. For a disk drive that has the Ontrack Disk Manager installed, the system will display a message saying "Starting Ontrack…". For a disk drive that has the Micro House EZ-Drive installed, the system will display a message saying "EZ-BIOS: Initializing…".
- ☐ 3. When prompted press the appropriate key to inform the disk manager program that you want to continue booting from a diskette. The Disk Manager program will prompt you to press the space bar to boot from a diskette. The EZ-Drive program will prompt you to press the A key to boot from a diskette.
- ☐ 4. Insert the ULTraDR diskette in the A: drive and press the appropriate key to continue booting from the diskette. Again the Disk Manager program will prompt you to press the space bar to continue and the EZ-Drive program will prompt you to press any key to continue.

- ☐ 5. The AUTOEXEC.bat file on the ULTraDR diskette will start execution. You will be prompted to enter a valid Windows NT user account name or choose the default. In most cases the default will work, so just press the enter key.

- ☐ 6. You will then be prompted for the password for the specified Windows NT user account. Enter this password and press the enter key.

- ☐ 7. You will then be asked if you want to create a password list. Press the enter key to respond no. At this point the AUTOEXEC.bat will finish connecting to the Windows NT server and then start the actual disk restoration process by executing the following programs:

  GetDisk.exe. This program prompts you for the number of the disk drive that you want to restore to. AUTOEXEC.bat uses the return code from this program to determine the proper DiskID to be used for invoking PartFix.exe.

  PartFix.exe DiskID /b /l This will save track #0 to a file named PartFix.bin.

  Pause A message will be displayed informing you that ULTraD.exe is about to be executed and that you should press any key to continue and then start an UPSTREAM physical disk restore from another machine and target this ULTra workstation with the name provided (usually ULTRADR). Press any key to continue.

  ULTraD.exe This is the FDR/UPSTREAM workstation program. It restores the disk using the data passed to it by the main UPSTREAM program (US.EXE). Once the restore is finished, press the Esc key followed by the Y key. AUTOEXEC.bat will continue.

  PartFix.exe DiskID /f /l This realigns the partitions of the disk on cylinder boundaries.

  PartFix.exe DiskID /r /l This restores track #0 from the file named PartFix.bin.

  Once this procedure is finished, your disk has been properly restored and you are now ready to use it. Remove the diskette from the A: drive and reboot the machine.

17.3.9 Summary

PartFix.exe now completes the Disaster Recovery (DR) procedure. Using the FDR/UPSTREAM MakULTra.exe program, you can create a bootable DOS diskette from which you can run ULTra for DOS (ULTraD.exe). ULTraD.exe can then be used to restore a physical disk image, regardless of differing disk drive geometry (as long as the disk is at least as large as the backup). Once ULTraD.exe has finished restoring the disk image, PartFix.exe can be run to realign the partitions of the disk to accommodate the new disk geometry. Once this process is finished, your disk will have the same partitions (they might be slightly larger depending on the disk geometry) that it had when the original disk was backed up. You should then be able to boot off of the disk just as you were before the disk was backed up.

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18 UPSTREAM SAR

18.1 Introduction

UPSTREAM SAR (Stand-Alone Restore) is a new feature of FDR/UPSTREAM where you can use a Windows NT SCSI attached tape drive to perform disaster recovery restores without the FDR/UPSTREAM host. Some of its features include:

- Restore of backups from any system including UNIX systems.
- File-by-file or physical disk restores.
- Support of virtually all SCSI tape drives. No tape driver is required.
- Browser based interface allows remote administration.
- No tape preparation required. Request the restore from your UPSTREAM client, pop in your host tape and your restore immediately begins.
- Support of all FDR/UPSTREAM host tapes generated including vault tapes.
- Restores in locations where you do not have mainframe access or your mainframe access is slow.
- Tape drive-speed restores. For Windows NT there is no network overhead.
- Multi-tasking if you have multiple tape drives you can run multiple simultaneous restores.

Similar to FDR/UPSTREAM host, UPSTREAM SAR runs as a single task on your Windows NT machine servicing a web-browser based console as well as multiple inquiries and restores.

UPSTREAM SAR does not maintain a database of the files on the backup; it does a sequential scan whenever a client request is made. This offers the feature that you can begin your restore immediately -without a database recovery step.

18.2 Installation and Configuration

18.2.1 Installation

The SAR files are in the \UPSTREAM\SAR\WINNT directory on the FDR/UPSTREAM CD. They are also available on the Innovation FTP site (ftp.fdrinnovation.com) in the /DOWNLOAD/UPSTREAM/SAR directory as a single self-extracting executable (SAR.EXE). Merely create a \SAR directory on your server and copy the files in.

The console requires the Java browser plug-in. The Java run-time included on the UPSTREAM CD also includes the browser plug-in. The first time your run the console, if you do not have the browser plug-in, it will ask if you wish to download it. If you wish, you can download the latest version on the web site: http://java.sun.com/products/plugin.

Files included in UPSTREAM SAR are:

File Name	Description
*.class	A number of java classes used by the SAR console.
*.gif	Graphics inserted into web pages.
*.htm	Web pages.
SAR.EXE	The UPSTREAM SAR main program.
UPSTREAM.MSG	Predefined UPSTREAM messages.
USTASK.EXE	Performs the independent tasks (for internal use).

18.2.2 Configuration

Configuration is performed within your web browser and requires that SAR be operating. Simply run it from a DOS window:

```
C:\SAR> SAR
```

SAR will display a message on the screen and write to its log (SAR.LOG):

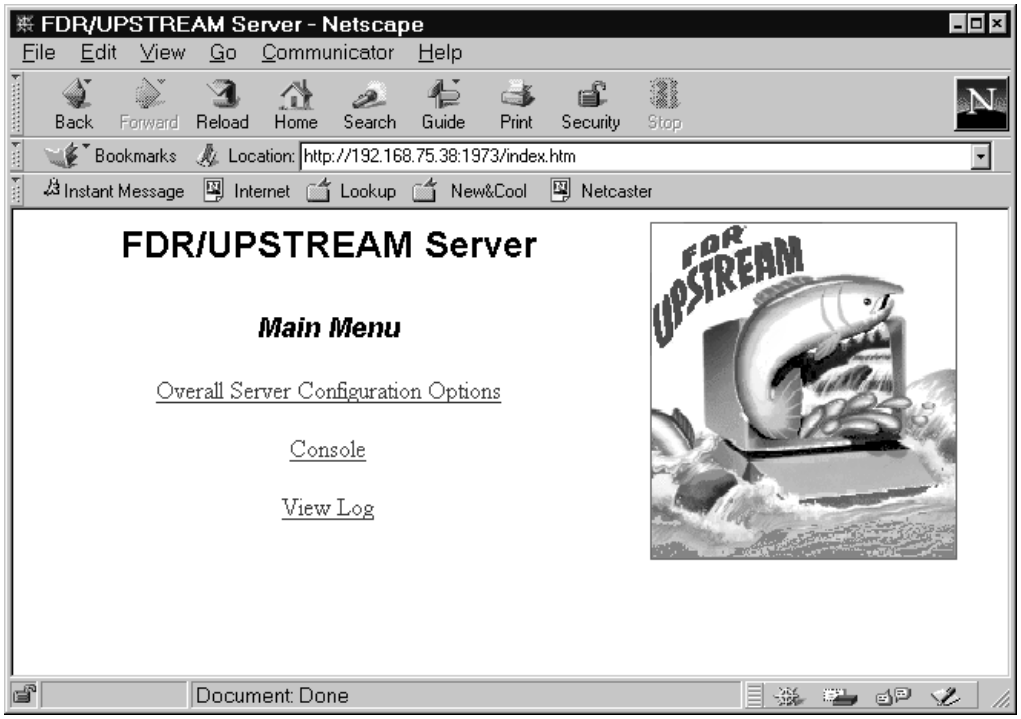
```
Thu Aug 12 17:10:03 1999
   Msg #PC9000I Entering SAR (v3.1.0)
```

The program must be kept running for UPSTREAM SAR to be available. If you wish, you can setup SAR to run as a service using the USTPCFG program. See the *Running as a Service* section of the 32-Bit Windows chapter of the FDR/UPSTREAM Workstation/Server User's Guide.

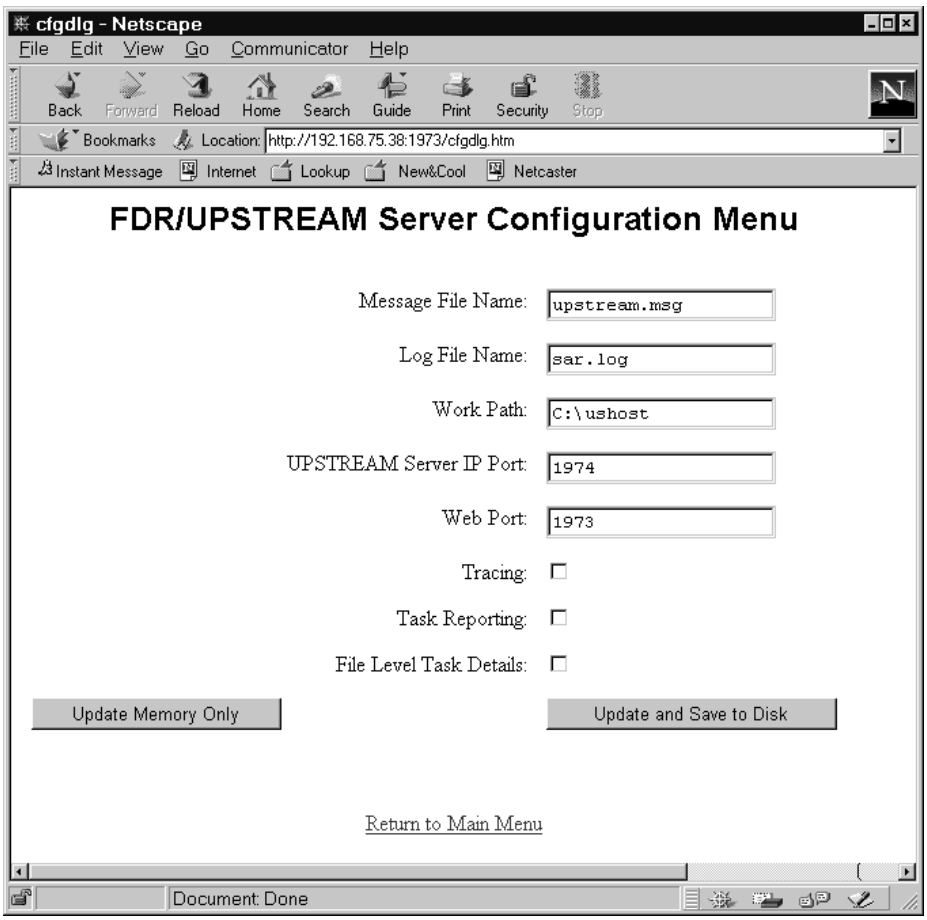
To begin configuration, go to your web browser, and enter the address:

```
http://127.0.0.1:1973/
```

It will contact SAR on your machine and display the FDR/UPSTREAM Server main menu.



To enter the configuration menu, click on the **Overall Server Configuration Options** hyperlink.



Similar in content to the UPSTREAM client configurator, the fields are:

- **Message File Name:** The name of the file where predefined UPSTREAM messages are stored. The default is **upstream.msg**
- **Log File Name:** The name of the UPSTREAM SAR log. The default is **sar.log**
- **Work Path:** Used for temporary files, the default is the current SAR directory (usually c:\SAR). You will usually use the default.
- **UPSTREAM Server IP Port:** The port number used for clients to connect. In the UPSTREAM configuration for your clients (USCFG.EXE) this is the **TCP/IP Host Port**. The default is **1974** so that it will not conflict with the default UPSTREAM client value if you are running them on the same machine.
- **Web Port:** This is the port number you used to connect to SAR with your web browser. The default is **1973**.
- **Tracing:** This check box allows you to enable/disable SAR tracing. The default is unchecked.
- **Task Reporting:** If you check this option, a report file will be created for each SAR task (inquiry, restore, etc.) which describes overall functions performed. This is in addition to the log. The name of the file is US<number>.RPT where the number is the task number displayed on the console and in the log. Checking this option can

create a large number of files. It is generally used in concert with the File Level Task Details checkbox below. The default is not checked.

- **File Level Task Details:** Displays file names and the reason why a file will be skipped or included in a file inquiry or restore. This can be useful in very large backups where you wish to only traverse the tape a single time and wish a complete file list. It can also be useful if you wish to understand why a particular file or directory was excluded or included in an inquiry or restore. Output is to the default program output (the console it was run within), or to the active report if you checked Task Reporting (above). The default is not checked.

When you have reviewed your options, you can press **Update and Save to Disk** to apply your changes immediately and save them to disk, or **Update Memory Only** to only apply the changes to the currently running SAR. If your changes are accepted, a message is displayed at the bottom of this page indicating the fields updated and whether it was written to disk.

Press the **Return to Main Menu** hyperlink to return to the previous menu.

Note: UPSTREAM SAR does not use the Windows NT tape drivers as it does direct SCSI access to the tape drive. Before using UPSTREAM SAR, verify that you do not have tape drivers installed in the Tape Devices applet of the Windows NT Control Panel.

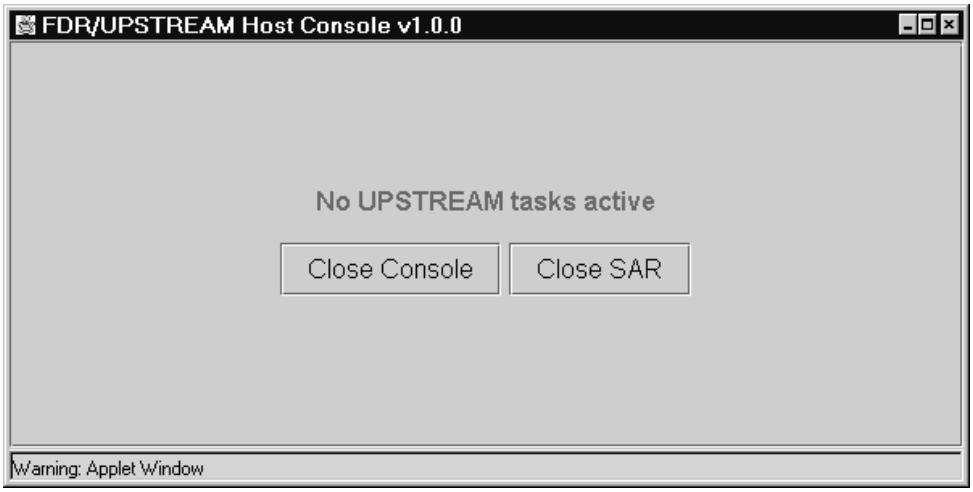
18.2.3 Install and Configure the UPSTREAM Client

Install and configure UPSTREAM on the machine where you wish to perform the restore; this can be any UPSTREAM workstation/server operating system including UNIX operating systems.

Note that you will have to specify in the UPSTREAM Configurator a **TCP/IP Host Address** of the machine where SAR is running (127.0.0.1 if it is the same machine) and a **TCP/IP Host Port** as specified in the **UPSTREAM Server IP Port** (default **1974**) in the UPSTREAM SAR configuration above.

18.3 Operations

We recommend that whenever an UPSTREAM client may be attached to SAR that you run the Console. From the main menu press the **Console** hyperlink to display the console. The console is a Java applet which will take a few seconds to load.

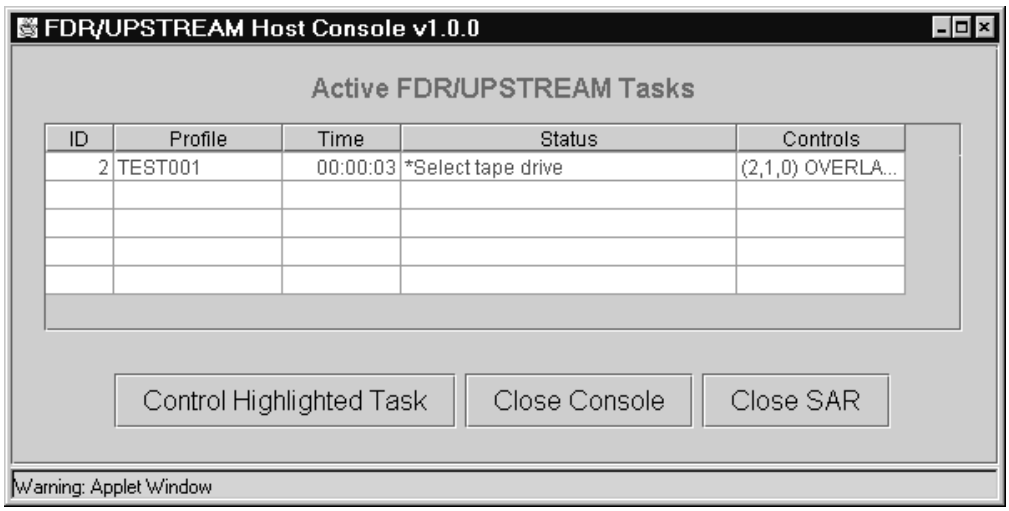


Until an UPSTREAM client is actively accessing SAR, it will display **No UPSTREAM tasks active**. The push buttons are:

- **Close Console:** This will merely close the console applet. Selecting the system menu close or pressing the Back button in your web browser has the same affect. If SAR is still running, you can redisplay the console by pressing the Refresh button on your browser.

- **Close SAR:** This will cleanly close the SAR program and then close the console applet.

When an UPSTREAM client attaches, a table is displayed on the console showing the function being performed (Inquire Versions, File Inquiry, Restore, etc.). If the item is red or has an asterisk ('*') in the first column of the Status column, then a request is being made of the console operator.



To satisfy the request, highlight the line where the request is being made and press the **Control Highlighted Task** button. This will display a dialog with choices which vary depending on the request made. If you wish to select one of the options, press the radio button and press the **Ok** button at the bottom. For example, if you have more than one tape drive on your system, the choices will include radio buttons listing the available tape drives and you will be required to select one. Press the **Cancel** button if you wish to return to the console without selecting any of the options.

The console may also ask you to mount the first or next tape you wish to do the inquiry or restore from. In this case you do not have to respond to the dialog, merely mount the tape. When SAR detects that the tape is mounted, the message in the console will change.

The choices on the dialog may vary but always include:

- ☐ **Terminate:** Press this button to have the task shut down cleanly at this time. A message will be sent to the UPSTREAM client.
- ☐ **Kill:** Use this button as a last resort; the executing task will be killed and a message sent to the UPSTREAM client.

Note that since SAR does not have a database of files stored on tapes that all inquiry and restore functions require that all tapes for a given backup be scanned. Thus you should try to limit the number of inquiries and restores that you perform.

When SAR finishes a inquiry or restore it will rewind the tape, but not eject it (in case you wish to do the next function using the same tape).

In a multi-tape inquiry or restore, when SAR has finished with a tape it will rewind the tape and eject it. You will then be requested to mount the next tape in the sequence. The tape will be ejected if it has the wrong data set name or sequence number.

UPSTREAM functions that supported at this time by SAR include:

- **Profile Management.** This is useful if you don't know the backup profile name which was used on the tape or want details about the backup stored on the tape. In UPSTREAM, enter a wildcard ('*') and press the **Inquire Profiles** button. Profile Management will scan the entire tape(s) and

may display multiple backup profiles (if this is a vault tape) and multiple backups (if there are more than one stored on the tape).

- **Version Inquiry.** Similar to Profile Management, Version Inquiry displays details about the backups stored on the tape when you know the backup profile name. Version Inquiry can be explicitly requested in *Restore and Inquiry (old)* by pressing the **Inquire Backups** button, or is implicitly performed in *List and Restore*. Again, this can be slow as it must scan all tapes.
- **File Inquiry.** File Inquiry displays the directory listing of files stored on the backup. Explicitly performed in *Restore and Inquiry (old)* when you press the **File Inquiry** button, or implicitly performed in *List and Restore* when you enter the screen or when you expand a drive or directory. File Inquiry honors the *Inquire and Restore Files From...* radio buttons (such as *Only Highlighted Backup*, *Highlighted Back to Full*, etc.). On a multi-backup tape, selecting Only Highlighted Backup can be the fastest, as it will stop when that backup is complete.

  File Inquiry operates in the same way as the FDR/UPSTREAM host. Items are sorted, with directories first and multiple versions of a particular file are displayed in a single request for Restore and Inquiry (old) and through an explicit request in List and Restore. Thus the entire tape is scanned before any files are sent to the UPSTREAM client.

  These can be quite slow as the entire backup must be scanned, which may include multiple tape mounts. You should try to do as few of these as possible.
- **Restore.** Again, available from *Restore and Inquiry (old*) or *List and Restore*, requires that the entire backup be scanned, even for single file restores. Thus, we recommend that you specify as many files or directories in a single restore request as you can to reduce the amount of clock time that the restore takes. Checkpoint restart is not supported; if you restart a restore it starts from the beginning.
- **Physical Disk Restore.** Available as the *FDRSOS/Physical Disk Restore* option of the *Physical* menu in FDR/UPSTREAM, you can **Inquire Backups** (a version inquiry) and perform Physical Disk Restores.
- **Performance:** Raw communications tests are available to allow you to tune communications performance.

18.3.1 In a Disaster

UPSTREAM SAR can perform restores over the LAN using TCP/IP. Thus the easiest way to recover a machine in a disaster situation is to have UPSTREAM SAR preconfigured on an operating Windows NT system. Then follow the disaster recovery procedures for FDR/UPSTREAM described in the Disaster Recovery chapter of the FDR/UPSTREAM Workstation/Server User's Guide and configure it to communicate to UPSTREAM SAR rather than your MVS host.

If you wish to run UPSTREAM SAR on the machine being recovered, it's requirements are:

- Windows NT operating system installed and operational.
- A SCSI attached tape drive. You must have the SCSI device driver loaded (no tape driver).
- A network adapter with the TCP/IP protocol stack bound to it.

Then follow the instructions for installing UPSTREAM SAR and FDR/UPSTREAM.

18.3.2 Problems

SAR writes all messages to its log and to the screen where it is being run. If you have problems you will want to check this log for any messages. There is a menu option for viewing the SAR log file in the FDR/UPSTREAM Server main menu. The most recent messages are at the bottom of the log. Press the **Refresh** button in your browser to update the log. Most errors are also transmitted to the UPSTREAM client.

When upgrading, note that many browsers will cache any information received from a web server (including SAR). We recommend using the browser commands to clear the cache after upgrading.

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19 UPSTREAM/SOS

19.1 Introduction

FDRSOS and UPSTREAM/SOS are designed to backup Open Systems data stored on EMC^2 Symmetrix 3000-series and 5000-series Storage Subsystems. The backups are directed to the FDR/UPSTREAM host which are then stored on host DASD or tape.

This product suite has been made possible through a teaming agreement between Innovation Data Processing and EMC Corporation. Under this agreement, EMC has produced the Symmetrix 3000-series and 5000-series ICDA (Integrated Cached Disk Array) Storage Subsystems and the Enterprise Storage Platform (ESP) option. This combination allows access to Open Systems data on the Symmetrix from both SCSI or fiber and S/390 channels.

Normal MVS access methods cannot read or write data on the Open Systems volumes via the S/390 channel. However, under its part of the teaming agreement, Innovation Data Processing has produced FDRSOS and UPSTREAM/SOS to utilize special I/O techniques to read the Open Systems volumes in the Symmetrix and transmit backup data across the S/390 channel for storage at the MVS host. The S/390 channel is used in preference to slower network links like SNA/APPC or TCP/IP.

At the end of this chapter are SOS and physical disk notes specific to a number of different operating systems including:

- Windows (page 19-38).
- Novell (page 19-56).
- AIX (page 19-61).
- HPUX (page 19-66).
- Solaris (page 19-69).
- Linux x86 (page 19-72).

19.1.1 Why Use FDRSOS and UPSTREAM/SOS

An Open System workstation/server, with data on the Symmetrix, and which has a network connection to the MVS host, could of course utilize a standard MVS-based LAN backup package (like FDR/UPSTREAM) to do its backups to MVS.

Data would be read from the Symmetrix and transmitted over to the MVS host across the SNA/APPC or TCP/IP network link. Performance would greatly depend on the bandwidth of the network connection, as well as other elements making up the network link (e.g. network card, 3172/3174/3745 control unit performance, network loading etc., etc.).

FDRSOS and UPSTREAM/SOS utilize the network connection only for the synchronization between the software running at both ends of the link. The actual backup data goes across the S/390 channel connecting the Symmetrix to the MVS host. This channel may be Escon or Parallel bus/tag.

The advantage of FDRSOS and UPSTREAM/SOS, when compared with regular FDR/UPSTREAM, is speed. The bandwidth of a S/390 channel far exceeds that of most SNA/APPC or TCP/IP connections.

19.1.2 Introducing FDRSOS

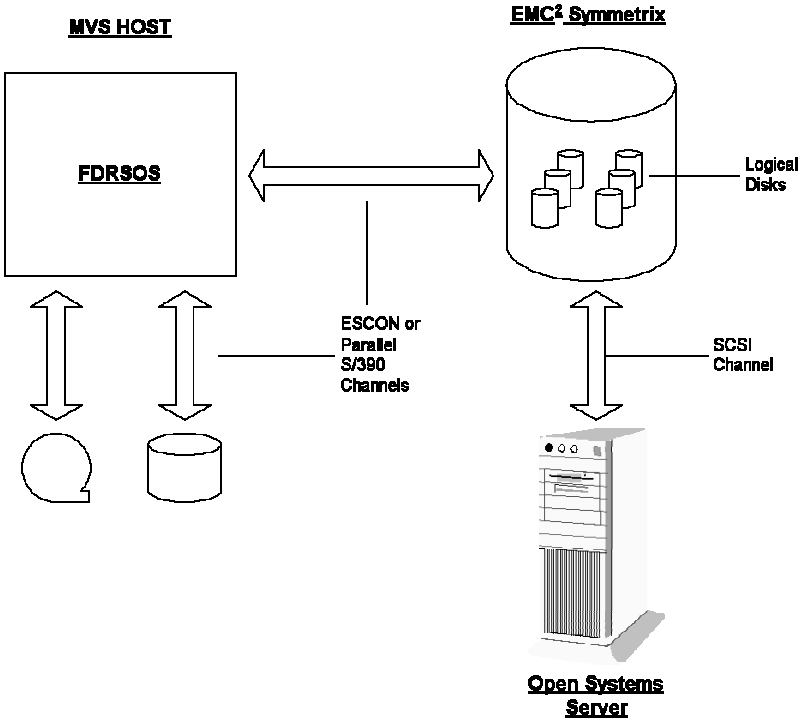
Let's first take a look at the FDRSOS component of the suite.

Running under MVS, FDRSOS can be used to backup and restore logical disk volumes in the Symmetrix, which are being used as SCSI or fiber disks by a Unix, PC/LAN Server or PC/Workstation.

As described in the Introduction, the backups/restores of this Open Systems data are transmitted at very high speeds by FDRSOS across the Symmetrix's S/390 channel (Escon or Parallel) to the MVS host. FDRSOS backups can be output directly to MVS tape or DASD.

FDRSOS uses the Data Management strengths of IBM's S/390 hardware and MVS software to provide high-speed, well-managed backups of Open System's data.

The following diagram shows FDRSOS components:



For FDRSOS to be able to read the Open System logical disk volumes in the Symmetrix via the S/390 channel, the following tasks need to have been carried out

- The Enterprise Storage Platform (ESP) option installed on the Symmetrix.
- The S/390 channel connection (Escon or Parallel) made to the MVS host.
- The Open Systems Logical Disk Volumes 'defined' to MVS.

Normally (but not always) the 9/23Gb physical disk drives in the Symmetrix are sub-divided into smaller Logical Volumes for use by the Open Systems. Volumes of 2-4Gb in size are often created and it is these Logical Volumes which FDRSOS is able to backup and restore.

Each separate Logical Volume must first be defined to the MVS I/O configuration (IOGEN). This is a simple one time task. The Logical Volume is given a standard MVS address and it can be generated as either a 3380 or 3390 (it is not important to FDRSOS). The OFFLINE keyword is specified so that the volume remains OFFLINE to MVS during an IPL.

MVS itself cannot recognize an Open System Logical Volume and any attempt to bring one ONLINE would produce various MVS error messages. However, once a Logical Volume has been generated into the MVS I/O Configuration, FDRSOS is then able to access it (by its MVS address) using the special I/O techniques mentioned in the Introduction. FDRSOS is essentially able to access the volume - even though it remains OFFLINE to MVS.

FDRSOS is then able to write a label/volser, with a 'LABEL' command, to a reserved area on the Logical Volume. The 'LABEL' command also places the label/volser into the MVS UCB for the Logical Volume. The label, which is a standard MVS 6-character volser, is not used or recognized by the Open System. However, the presence of the volser in the UCB allows FDRSOS (through JCL) to access the offline volume referencing the volser instead of the MVS device address.

After an MVS IPL, the volser would be removed from the UCB (which is recreated at each IPL), so FDRSOS also provides a 'VARYON' command (not to be confused with MVS Vary On) which re-reads the volser from the Logical Volume and places it back into the UCB.

So, in summary, a Logical Volume must be LABEL'd before it can be accessed for backup/restore by FDRSOS. Then, after each IPL (or before each backup/restore) the FDRSOS 'VARYON' command must be run to ensure that the volser has been placed into the MVS UCB.

Once these functions have been completed, FDRSOS is then capable of backing up and restoring either the whole Logical Volume or selected tracks (not datasets – see FDR/Upstream/SOS later). FDRSOS can also ERASE and PRINT the data on the volume.

19.1.3 FDRSOS - Summary

To summarize FDRSOS's benefits:

- FDRSOS backups/restores can be taken at very high-speed – without suffering from traditional network connection bottlenecks. And, often more importantly, FDRSOS backups/restores can be taken without themselves further adding to network utilization and congestion.
- The Logical Volume backups, which are taken by FDRSOS, are ideal for Disaster Recovery protection. FDRSOS provides a truly viable Disaster Recovery solution for Open Systems data stored on the Symmetrix.
- FDRSOS backups can be written to MVS DASD or Tape. If on tape, the backups can be controlled by the MVS Tape Management System (TMS) that can optionally control offsite vaulting and retention requirements for these backups.

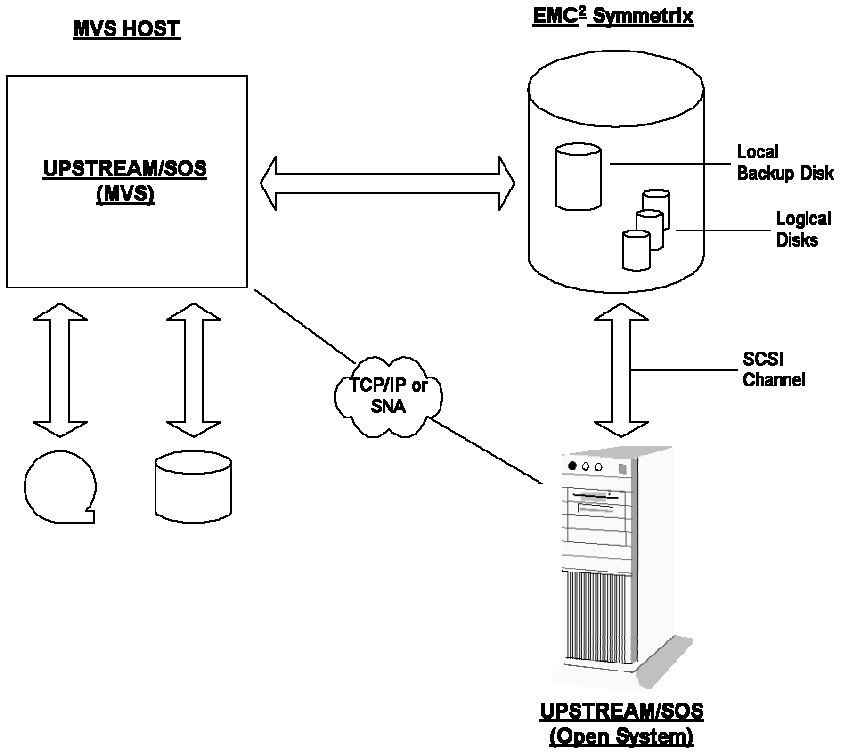
The FDRSOS backups of Open Systems data effectively become integrated into the corporate Disaster Recovery plan, along with existing MVS DASD backups. This allows for a consolidated and controlled Disaster Recovery Plan – the Open Systems data can be restored at the same time (and with the same well-documented procedures) as the MVS data.

19.1.4 Introducing UPSTREAM/SOS

FDR/Upstream/SOS provides FILE LEVEL support to the suite. It introduces an Incremental Backup scheme in addition to the Logical Volume backups taken by FDRSOS.

Like FDRSOS, UPSTREAM/SOS utilizes the S/390 channel between the Symmetrix and the MVS host for its data transfer. This differentiates it from other MVS-based LAN backup systems (like FDR/UPSTREAM) which utilize slower SNA/APPC or TCP/IP network connections for their data transfer.

The following diagram summarizes UPSTREAM/SOS operations:



NOTE: UPSTREAM/SOS only uses the network connection for sending control/communication information between its MVS and Workstation/Server components. All data transfer goes across the S/390 channel connection.

As you can see from the diagram, UPSTREAM/SOS consists of the following two components:

- **UPSTREAM/SOS (MVS), which resides on the MVS host.**
- **UPSTREAM/SOS (Open System)**, which resides on the Workstation/Server that owns the data on the Symmetrix.

The MVS component controls the creation, retention and expiration of UPSTREAM/SOS backups that reside on MVS Tape or DASD. The recording mechanism used by UPSTREAM/SOS for its backups is also resident on the MVS host and is controlled by the MVS component.

The Workstation/Server component, running under the Open System, carries out the incremental selection (and subsequent handling of Archive bits etc) of the Open System data stored on the Symmetrix. It uses the specialized file handling services inherent in the various Open Systems to select and process the files for daily incremental backup.

Once it has selected the relevant files for backup, the Workstation/Server component writes its backup data across a SCSI or fiber connection to a specially formatted 'FDRSOS Local Backup Disk' in the Symmetrix. You can see an example of this Local Backup Disk in the previous diagram. It is created by an FDRSOS job using the 'LOCALBACKUP TYPE=INIT' command.

While the Workstation/Server component is writing to the Local Backup disk, the MVS Component 'follows behind' and reads the backup data from the Local Backup disk via the S/390 channel. It does this using the same special I/O techniques employed by FDRSOS. It then writes the backup to MVS Tape or DASD, as required.

When the backup begins, the FDR/UPSTREAM host allocates the space on the local backup disk for the backup to be stored. Since each backup has its own space, multiple backups can be stored in the local backup disk. Multiple backups can be run simultaneously and can even come from different machines which have access to that disk.

Space for the backup is allocated based on:

- The estimated size of the backup.
- The maximum size specified for that profile (a default will be used if there is no specific profile definition).
- If space is short, then the size can be reduced based on a specified percentage.

UPSTREAM/SOS will wrap through the space allocated, reusing the space after the host has written the data to host disk or tape, if the amount of space allocated is insufficient for the backup (and you don't disallow it). There are some performance disadvantages in wrapping (generally 2 seconds in each wrap), wrapping allows you to backup data which is much larger than the local backup disk. If your backup wraps, the backup is deleted from the local backup disk when the backup has completed.

NOTE: Data written to the local backup disk is always written to host disk or tape.

Space on the local backup disk is freed when:

- The backup is complete if you specified that backups not be retained.
- The restore is complete. Restores are never retained.
- You have exceeded the specified number of backups to store on the local backup disk (by profile)
- If you are short on space and have allowed UPSTREAM/SOS to delete prior backups (oldest first).

Restores work somewhat differently than backups. If the data exists on the local backup volume, it is restored directly from it without having to come from host disk or tape resulting in the fastest possible performance. If the data is no longer on the local backup volume, the process is reversed with the data transiting from host disk or tape through the local backup volume.

You can specify the UPSTREAM/SOS parameter defaults when you format the UPSTREAM/SOS volume (using FDRSOS). You can later manage and maintain values for individual backup profiles and system defaults using UPSTREAM on the Workstation/Server.

19.1.5 UPSTREAM/SOS - Summary

To summarize UPSTREAM/SOS:

- The use of the FDRSOS Local Backup Disk and the S/390 channel means that it is truly viable to take regular (daily) incremental backups of very large Open Systems Volumes in the Symmetrix and store them on the MVS host.
- The UPSTREAM/SOS incremental backups can be used to complement the weekly Full FDRSOS backups – allowing both Volume Restores and File Restores at the home site, as required.
- UPSTREAM/SOS backups can also be included, along with FDRSOS backups, in the corporate Disaster Recovery plan. This allows for a more comprehensive (i.e. up-to-date) recovery of Open Systems data in the event of a disaster.
- UPSTREAM/SOS offers performance and feature advantages that may make it the viable solution for all of your full and incremental backup needs.

The following section describes the setup of UPSTREAM/SOS using both FDRSOS and UPSTREAM. Subsequent sections describe the use of UPSTREAM/SOS for backups and its integration with FDRSOS for fulls and incrementals.

19.2 UPSTREAM/SOS Setup

There are a number of steps in the setup of UPSTREAM/SOS.

- Get FDR/UPSTREAM installed and operational on both the host and workstation/server platform. This is described earlier in this manual (in the platform chapters) and the FDR/UPSTREAM MVS manual.
- Planning the Local Backup Disk
- Identify, from both the host and open systems side the disk you wish to use as your local backup disk.
- Use FDRSOS to format that disk.
- Identify the workstation/server name for the disk.
- Identify the local backup disk.
- Test and automate your backups.

19.2.1 Planning the Local Backup Disk

Planning the number of local backup disks and their sizes can be a somewhat complex matter which can be affected by the type and size of backups you perform, the availability of resources, etc.

In a perfect world with no monetary or resource constraints and for maximum performance we would recommend that:

- Each concurrently operating copy of UPSTREAM would have its own local backup disk on separate controller. This reduces controller and head contention when you have multiple simultaneous backups running.
- The local backup disk be large enough so that it never needs to wrap during a backup and that it can be large enough to hold an entire cycle (full and all incrementals).

However, since this perfect scenario is often not possible, some reasonable compromises include:

- When possible, multiple concurrently running copies of UPSTREAM have their own local backup disk. Head contention is the largest offender in performance degradation with UPSTREAM/SOS.
- Allow wrapping in all cases where recovery times are not critical. We generally recommend that a single backup allocation be at least 100MB, and 500MB to 1000MB is better for large backups.

When in doubt about sizing and disk allocation questions feel free to contact UPSTREAM technical support.

Generally the biggest performance bottleneck with UPSTREAM/SOS is reading the data from the disk. Thus we recommend that whenever possible that UPSTREAM be run on the machine that is physically attached to the disk. Also, UNC names will degrade performance on PC backups; use the drive letter for best performance.

The local backup disk does not have an open systems file system on it; it has a file system proprietary to Innovation. If you are going to convert a disk which currently has a file system on it, you must remove the file system in such a way so that the operating system does not step on the local backup data. Contact Innovation tech support if you have questions.

WARNING: EMC Metavolumes can not be used as local backup disks.

19.2.2 Identify and Label the Local Backup Disk

It is quite important that you identify the disk you wish to use for local backups correctly from both the host and open systems side to be sure that you are not overwriting any existing data. Your EMC representative should be able to help identify the disk on both sides.

Note that on the open systems side you will need to know the disk number (for Windows NT and OS/2), the location in the /dev directory for UNIX; for Novell, the volume can only be determined after it has been formatted (see the *Novell Considerations* chapter for more information).

The local backup disk can not be a member of a metavolume. Metavolumes are seen by FDRSOS and the FDR/UPSTREAM host as multiple volumes and are not suitable for use as local backup disks.

For Windows NT, the disk can be identified after it has been labeled using the HOSTDISK program (described below).

The FDRSOS LABEL command includes an option, PRINT=STATUS, which can help in identifying the type of existing data on the disk. We recommend that this option be used before labeling and strongly recommend its use before formatting.

Use the FDRSOS LABEL command (TYPE=SOS) label the disk. The following information is from the FDRSOS manual and describes the LABEL command, we recommend that you see the FDRSOS manual for any updates.

FDRSOS LABEL STATEMENT

```
LABEL                    TYPE=SOS
                         ,BCV=IGNORE
                         ,PRINT=STATUS
                         ,PRINT=(STATUS,DIR)
                         ,PRINT=UCB
```

This statement requests a volume labeling operation. It must be the first statement in the input; only one LABEL statement is allowed per execution. LABEL must be followed by one or more MOUNT statements with the UNIT= and SETVOL= operands to specify the Open System volumes to be labeled.

The LABEL function must be executed against each Open System volume before it can be used by other FDRSOS functions. It assigns a volume serial to a volume and records that serial in an area of the volume reserved by EMC for FDRSOS use. You only need to execute LABEL against each Open System volume when:

- the Open System volume has not previously been used by FDRSOS
- you need to change an Open System volume serial
- the EMC hardware has been reconfigured changing the size or location of the Open System volumes so that the original volume serials have been lost
- a new EMC Symmetrix subsystem is replacing the original system (such as a replacement subsystem at a disaster site).

LABEL also stores the volser in the UCB of the Open System device so that it can be used in a DISKx DD statement in other FDRSOS steps. However, that volser is lost when your MVS system is reIPLed; after an IPL, the FDRSOS VARYON function must be executed before any FDRSOS backup, restore or print is performed.

The LABEL function is also useful as a diagnostic tool, to verify that your hardware and software configuration is correct so that the Open System volume can successfully be accessed by FDRSOS. Compared to other FDRSOS functions, LABEL will give additional diagnostic messages if it cannot access the volume. In fact, if a LABEL statement is used with a MOUNT statement with only UNIT= on it (no SETVOL= operand), it will validate access to the volume but will not change its volume serial.

Note: LABEL is not normally used with BCVs. Since BCVs are exact duplicates of their associated primary volume, they will have the same internal volser as that primary. However, it is possible to LABEL a BCV (with BCV=IGNORE) so that it can be used as a spare volume, e.g., a target for restore of an FDRSOS backup.

Operands:

- **TYPE=SOS** Must be specified on the LABEL Statement.
- **BCV=IGNORE** Normally, FDRSOS will identify all Symmetrix devices which are BCVs (Business Continuance Volumes). Since their usual purpose is to act as a mirror of another standard volume which can be detached for backup, they usually do not have their own volume serials and LABEL has no effect if executed against them. However, BCVs can be used as spare primary volumes.
- **BCV=IGNORE** will allow BCVs to be labeled with a volume serial you specify and used as a normal Open System volume.
- **PRINT= STATUS** requests that FDRSOS attempt to identify the type of Open System volume being labeled. If possible, it will display the type of Open System which created it, and other pertinent information about the format and contents of the volume.
- **PRINT=(STATUS,DIR)** in addition to the PRINT=STATUS displays, for some Open System platforms it will display the files and subdirectory names in the root directory of each volume or logical volume.
- **PRINT=UCB** prints the MVS UCB (Unit Control Block) and associated control blocks for each unit address specified. This is a diagnostic tool, used primarily to investigate disk access problems.

  Note: PRINT=STATUS and PRINT=UCB must be specified separately if both are required, e.g., PRINT=(STATUS,DIR),PRINT=UCB

  Note that the disk must be varied pseudo-online before it can be accessed by UPSTREAM/SOS.

19.2.3 HOSTDISK (Windows, UNIX AIX)

HOSTDISK is a console program that helps you to take a look at your EMC configuration.

What it does is use EMC specific SCSI commands to retrieve logical volume configuration and read the CE (customer engineer) specific tracks. These tracks consists of disk area which is not used by programs, but is for EMC specified use. EMC has allocated a range of space on these tracks for Innovation which FDRSOS uses to hold the host volume name.

See the chapter on **HOSTDISK** in the following **FDRSOS** platform **Considerations** sections for details.

19.2.4 Format the Local Backup Disk

After you have identified the disk it must be formatted for use by FDRSOS using the FDRSOS LOCALBACKUP statement.

We highly recommend the use of the FDRSOS LABEL PRINT=STATUS command to verify that it is the correct disk.

The following description of the LOCALBACKUP FDRSOS statement is from the FDRSOS manual. See the FDRSOS manual for updates and additional information:

LOCALBACKUP STATEMENT

```
LOCALBACKUP TYPE=INIT|UPDATE          ,MAX#PROF=nnn
LB          ,BCV=IGNORE               ,MAXBACKUPSIZE=nnnn
            ,DELMIGRATED=YES|NO       ,MAXFILESIZE=nnn|UNLIMITED
            ,DYNADDPROF=YES|NO        ,RETAINLB=YES|NO
            ,MINALLOC%=nnn            ,WRAP=YES|NO
```

This statement is used to initialize EMC Symmetrix disk volumes for use with FDR/UPSTREAM as FDRSOS local backup volumes, or to update default parameters on an existing FDRSOS local backup volume.

The disk(s) to be processed are identified by one or more MOUNT statements which follow. These disks must have been previous labeled by a FDRSOS LABEL statement. You must not change the volume serial of a local backup volume once it is in use; if you do so, all existing backups on the volume will be lost.

The operands on the LOCALBACKUP statement set options stored on the FDRSOS local backup volume which control FDR/UPSTREAM use of the local backup volume. For TYPE=INIT, all the operands (or their defaults) are used to set the options on the new local backup volume; TYPE=UPDATE will update options on an existing local backup volume and only those operands which appear on the LOCALBACKUP statement will be modified (other options keep their previous values).

Except for DYNADDPROF= and MAX#PROF=, all the LOCALBACKUP operands provide defaults for processing the FDR/UPSTREAM profiles which have backups on the FDRSOS local backup volume. Any profile newly added to the local backup volume will get these defaults. Facilities are provided with FDR/UPSTREAM on the Open System to add and delete profiles, change the values associated with any profile and change the defaults.

TYPE=INIT will normally initialize the entire volume for FDRSOS local backup use, but you can specify a SIZE= operand on each MOUNT statement to limit the space used to less than the physical size of the volume. The volume is initialized as a DOS disk partition with additional data used by local backup; SIZE= causes only the first part of the volume to be formatted as a DOS partition; the remainder of the disk can be defined from the Open System as additional partitions for other uses.

To avoid overlaying valid data, TYPE=INIT will fail if the disk currently has any file system format which is recognized by FDRSOS, including local backup data. If you want to take a volume which previously held data and use it for FDRSOS local backups, you will need to ERASE at least the first 1000 blocks of data (see ERASE in Section 210.05).

TYPE=UPDATE will not normally change the size of the existing FDRSOS local backup volume. However, if you specify a SIZE= operand on a MOUNT statement, and the value is larger than the SIZE= used to initialize the volume, the local backup volume will be updated to use the new size for local backups. Note that there is no checking to be sure that the additional space is not already used for other data. TYPE=UPDATE will fail if the disk is not already formatted for local backups.

SUN SPARC SYSTEMS:

When the local backup disk is attached to a SUN SOLARIS system running on a SUN SPARC processor, there are special procedures (they do not apply to SUN SOLARIS on an INTEL-type system):

- Unless the disk is brand new, never before used, you should erase the disk completely with the FDRSOS ERASE function.
- Use the “format” command to format the disk. “format” will list the disks available to the system; select the disk to be used for local backups. The following bullets use subcommands of the “format” command.
- Use the “volname” subcommand to assign a volume name of “FDRSOS” to the volume.
- Use the “partition” subcommand to delete all partitions on the volume except the “backup” partition which must be partition 2. For every partition whose “tag” is other than “unassigned”, you must modify that partition to mark it “unassigned” and change its starting and ending cylinders to 0 (zero). You must delete the partitions in reverse numeric order (highest numbered partition first).
- Use the “label” subcommand to write the new format to the disk.
- When done you can use the “verify” subcommand to verify that the volume is correctly initialized. The output will look something like this:

```
format> verify

Primary label contents:

Volume name = <  FDRSOS>
ascii name  = <EMC-SYMMETRIX-5264 cyl 1103 alt 2 hd 15 sec 64>
pcyl        = 1105
ncyl        = 1103
acyl        =    2
nhead       =   15
nsect       =   64
Part      Tag    Flag     Cylinders         Size            Blocks
  0 unassigned    wm       0                 0          (0/0/0)           0
  1 unassigned    wm       0                 0          (0/0/0)           0
  2     backup    wu       0 - 1102       517.03MB      (1103/0/0) 1058880
  3 unassigned    wm       0                 0          (0/0/0)           0
  4 unassigned    wm       0                 0          (0/0/0)           0
  5 unassigned    wm       0                 0          (0/0/0)           0
  6 unassigned    wm       0                 0          (0/0/0)           0
  7 unassigned    wm       0                 0          (0/0/0)           0
```

- Use the FDRSOS LOCALBACKUP function to make the formatted disk as a FDRSOS local backup.

Warning: if you do not follow this procedure, in this order, the local backup disk will be usable from non-SUN systems but not from the SUN system. Disks initialized with this procedure will be usable on the SUN and most other Open Systems.

Operands include:

☐ **TYPE=** Identifies the type of operation and must be specified on the LOCALBACKUP Statement.

- **INIT** – performs a full initialization of a new FDRSOS local backup volume. The operands on this statement, or their defaults, are used to set defaults on the local backup volume for use with new FDR/UPSTREAM profiles.

- **UPDATE** – updates an existing FDRSOS local backup volume with new default values. Only values for the operands you specify are changed; omitted operands will retain their previous values.

☐ **BCV=IGNORE** If the volume you are trying to initialize is defined as a BCV (Business Continuance Volume) in the Symmetrix configuration, even if it is not currently ESTABLISHed as a copy of any primary volume, FDRSOS will normally reject any attempt to initialize the BCV for local backups. If you are sure that you want to use the BCV for local backups, and will never ESTABLISH that BCV as a copy of another volume, specify BCV=IGNORE to bypass the check and initialize it for local backups.

Note: if a BCV was initialized for local backups with BCV=IGNORE, all subsequent VARYON statements executed against that volume must also specify BCV=IGNORE. Innovation recommends that the Symmetrix configuration be updated to make the volume a non-BCV to avoid these requirements.

☐ **DELMIGRATED=** If UPSTREAM/SOS is unable to find sufficient space on the FDRSOS local backup volume for a new backup, this controls what action it will take.

- **YES** –delete backups on the volume for the current profile which have been copied (migrated) to MVS tape or disk by FDR/UPSTREAM, then try the allocation again.
- **NO** – migrated backups will not be automatically deleted. If there is insufficient free space on the local backup volume you may need to manually delete backups. Default is NO.

☐ **DYNADDPROF=**

- **YES** – if you do a backup to this FDRSOS local backup volume under an UPSTREAM/SOS profile which has not previously been used on this volume, it will be automatically added to the control records on the volume. The backup characteristics of the profile will be initially set to the values specified by other operands on the LOCALBACKUP statement, but they can be modified by FDR/UPSTREAM on the Open System in the FDRSOS Local Backup Admin panel.
- **NO** – Only UPSTREAM/SOS profile names which have been manually added to the control records on this FDRSOS local backup volume can do backups to the volume. Profile names are added by UPSTREAM/SOS on the Open System in the FDRSOS Local Backup Admin panel. Default is YES.

☐ **MINALLOC%=** When UPSTREAM/SOS allocates space for a backup on a FDRSOS local backup volume, the actual space required is not known since compression will reduce the requirement but cannot be predicted. If available, the uncompressed size is allocated and any unused space released at the end. But if that much space is not available, it may allocate a smaller backup file anticipating that the backup may fit. This operand controls the minimum percentage of the uncompressed size which can be allocated. You may need to adjust it depending on your results with the FDR/UPSTREAM compression.

nnn – specifies the minimum percentage of the total uncompressed size which must be allocated for the backup to the local backup volume. Valid values are 10 to 100.

Default is 50.

☐ **MAX#BACKUPS=** This controls the maximum number of backups which may be retained on the FDRSOS local backup volume for a given UPSTREAM/SOS profile. Under a given UPSTREAM/SOS profile, backups older than the maximum will automatically be deleted to reclaim space when a new backup is created.

nnn – specifies the number of backups per profile allowed. Valid values are 1 to 255.

Default is 10, unless RETAINLB=NO then 0.

☐ **MAX#PROF=** This controls the maximum number of FDR/UPSTREAM profiles which may have backups recorded on this FDRSOS local backup volume. Profiles are added automatically the first time that they do a backup to this local backup volume if DYNADDPROF=YES was specified or defaulted; profile names can also be added

manually using FDR/UPSTREAM on the Open System.

nnn – specifies the number of backups per profile allowed. Valid values are 1 to 100.

Default is 100.

- **MAXBACKUPSIZE=** This specifies the maximum size in megabytes (MB) of a backup that will be allowed on this FDRSOS local backup volume. If the total uncompressed size of the backup exceeds this size, FDR will allocate the maximum size on the local disk. If WRAP=YES is specified or defaulted, FDR will reuse the backup internally to send all the remaining files through the local disk to MVS. If WRAP=NO is specified, the remaining files will be sent over the network.

  Note: If RETAINLB=NO is specified, MAXBACKUPSIZE need not be over the default of 100MB. Performance may suffer if a value under 50MB is specified for a large backup.

  nnnn – the maximum backup size in megabytes (MB). The value must be from 1 to 4095.

  Default is 100 MB.

- **MAXFILESIZE=** This specifies the maximum size in megabytes (MB) of an individual Open System file that will be allowed on this FDRSOS local backup volume. Files which exceed the size will be transmitted to FDR/UPSTREAM over your network instead, although smaller files may be written to the local backup.

  nnnn – the maximum file size in megabytes. The value must be from 0 to 4096. A value of zero indicates no limit.

  Default is 0 MB (unlimited).

- **RETAINLB=** specifies whether the local backup is to be retained after the backup completes. As a default the local copy will be retained if the backup was not restarted and it was large enough to contain all the files written (did not wrap).
  - **YES** – specifies to keep the local backup.
  - **NO** – specifies that the local backup is to be deleted after a successful backup. If the backup fails and is restartable the local backup will be retained for the first restart.

    Default is YES.

- **WRAP=** specifies whether FDR/UPSTREAM on the PC/Open System can re-use the backup file on the local disk if there is insufficient space to contain the entire backup.
  - **YES** – FDR/UPSTREAM can re-use the backup. The backup will be deleted at the end of the backup if it wraps.
  - **NO** – FDR/UPSTREAM cannot re-use the backup. If the backup fills up, all the remaining files will be sent through the network.

    Default is YES.

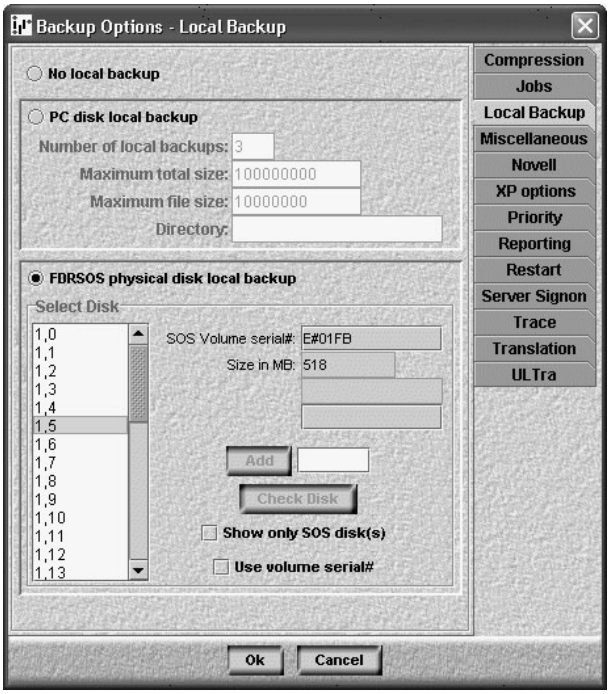
19.2.5 Identify the Local Backup Disk

When requesting backups or restores, the local backup disk can be specified on either the host or the workstation by the UPSTREAM/SOS local backup disk name. You can specify the local backup disk on the host either by the local backup disk name or by the host VOLSER. For UNIX systems we discourage the use of the VOLSER as it may hang UPSTREAM for a long time if a disk has a reserve on it.

For PC and UNIX operating system the best way to determine this name is in the UPSTREAM program. For Novell (NLM), you must use the LSTDSK2 program (see the *Novell Considerations* chapter for the description of this program).

For UNIX you must be the root user to verify, specify or use FDRSOS Local Disks as only root as direct disk access privileges.

The local backup disk name can be specified and selected in many of the Director screens by selecting a target system, and then pressing the **Options** button and pressing the **Local Backup** tab:



Press the **FDRSOS physical disk local backup** radiobutton. If you do not have a target system selected the Director will not be able to display the list of disks and it will warn you that you need to select a target system first.

The *Select Disk* list will show all of the disks on the system. You can press the **Show only SOS disks** to limit the list to only local backup disks.

Highlight the disk in the list you wish to use. When you highlight a disk, information about the disk will be displayed in the fields to the right of the list.

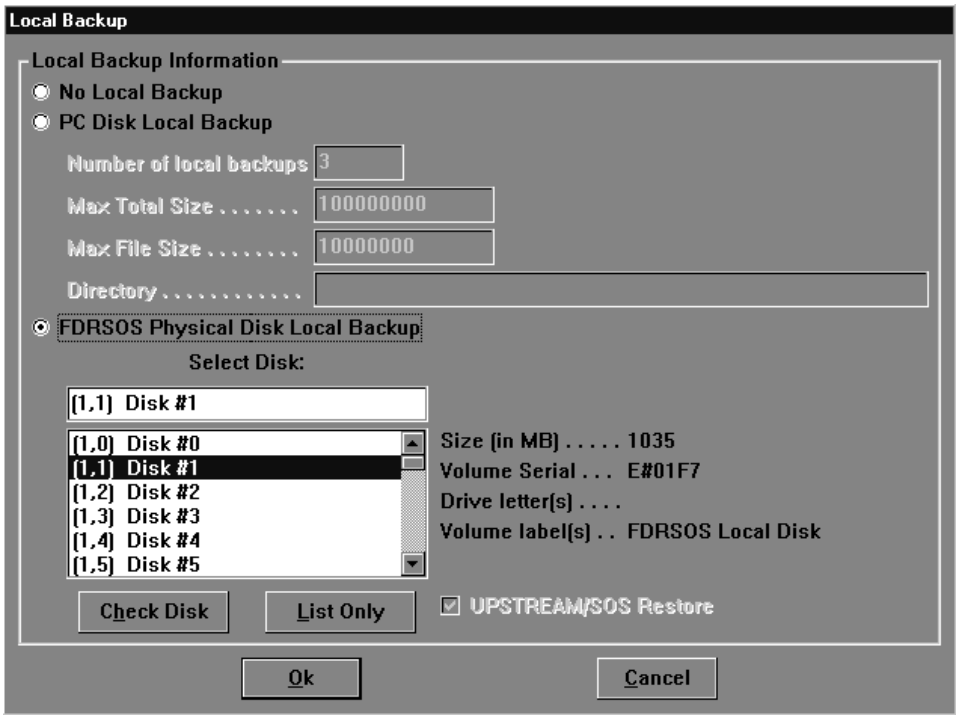
You can check the **Use volume serial #** checkbox to force UPSTREAM to use the disk's host VOLSER rather than the operating system name for the disk. If you check this, UPSTREAM will be able to find the local backup disk even if disks are reorganized on your system, but there will be a slight delay in starting the backup or restore and there may be extra error messages displayed.

You can manually add disks to the list by pressing the Add button and then highlighting the disk. You can add disks by their mainframe VOLSER, using the '*' to indicate first disk found, or '!' to indicate the first empty disk found. Press the **Ok** button to save your selection.

The local backup disk name can be specified and selected in many of the UPSTREAM program (us) screens by pressing the **Local Bkp...** button. For this example, we'll use the one in the backup panel. When you enter UPSTREAM:

- Pull down the **Action** menu and select **Backup**.
- Press the **Local Bkp..**. Button.

On PC platforms, you'll see the following panel:



Press the **FDRSOS Physical Disk Local Backup** radio button. This will activate the Select Disk... list which contains the list of disks on the system. As you highlight each disk, some information about the disk will appear on the right of the list box.

The **Volume Serial** field is the host volume serial number and will contain a value only if this is a formatted FDRSOS Local Backup Disk. You can press the **Check Disk** button to validate that this is a usable local backup disk.

The value in parens, which for most PC operating systems is a {number},{number} is the Disk Name which must be entered in the host ISPF panel (the parameter title is LOCALBACKUPDIR). In the example above, the value is 1,8.

For UNIX you'll see the following panel:

```
                    Local Backup...

  ( ) No Local Backup
  ( ) Local Disk Backup
      Number of local backups..[3  ]
      Max. total size.....[10000000]
      Max. file size......[10000000]
      Directory...........[                    ]
  (x) FDRSOS Physical Disk Local Backup
             Select Disk...
       (4,/dev/rhdisk8)  /dev/rhdis
       (4,/dev/rhdisk9)  /dev/rhdis
       (4,/dev/rhdisk10)  /dev/rhdi
       (4,/dev/rhdisk11)  /dev/rhdiv
             <  Check Disk  >

      <   Ok   >              < Cancel >
```

The local backup disk name is the number 4 followed by a comma (,) followed by it's directory entry. Press the **FDRSOS Physical Disk Local Backup** radio button, tab into the Select Disk... list box, highlight the disk you believe is the correct FDRSOS local backup disk and press the **Check Disk** button. If the disk is an FDRSOS Local Backup Disk, the message will say "This disk can be used for local backups."

The complete value in parens (such as 4,dev/rhdisk8 in the AIX example above) is the Disk Name which must be entered in the host ISPF panel (the parameter title is LOCALBACKUPDIR).

As an alternative to the internal disk name, you can o use the local backup VOLSER as assigned on the mainframe, the wildcard '*' which indicates the first disk found or the wildcard '!' which indicates the first empty disk found. These alternatives are generally prefereable as they allow you independence from the location that the disk is assigned locally.

19.2.6 Test and Automate Your Backups

We always recommend that your first local backup test be performed from the UPSTREAM Workstation/Server rather than from the host as this reduces the number of steps to the process.

In the prior step you selected the local backup disk to be used. You can press the Ok button to return to the backup dialog and select a few files to be included in the backup. You know that the backup worked correctly and that the local backup disk was used based on the UPSTREAM log file entry. If it gives you a number of files and bytes stored in the local backup file then you have been using it correctly.

If you will be host initiating the backup, you can now take the local backup disk name and enter it in the USTBATCH, Backup, More dialog in the **Disk Name** field (note that you must also select the **FDRSOS Physical Disk Local Backup** option).

19.2.7 Restores

The speed and the reduced network overhead of UPSTREAM/SOS is also available for restores as well as backups. By specifying the local backup disk for your restore in the same way that you do for your backups, the local backup disk will automatically be used as a transfer device for your restores.

If you do not specify local backup and the disk to be used, the entire restore will be through the network.

You can force the restore to use the network for data not already stored on the local backup disk if you wish by specifying the parameter **LOCALRESTORE N**. This parameter is also available in the Local UPSTREAM local backup restore dialog as a checkbox **UPSTREAM/SOS** restore and in the Director in the Local Backup dialog as **Use disk for restore to transfer data**. In both cases the default is checked to use the local backup disk.

UPSTREAM will allocate a data area on the local backup disk using the smaller of the mainframe estimate of the size of the restore or the MAXBACKUPSIZE defined for the backup profile on the local backup disk in the same way as for backups. If this estimate is too small (and it will be for a number of UPSTREAM database agent restores including SQL-BackTrack, DB2 and Oracle), there will be excessive wraps through this area and thus a reduction in performance. You can use the DASDOVERRIDE to increase the size of the transfer area and thus reduce the number of wraps. As for backups, the upstream.log file logs the space allocated for the local backup and the number of wraps which were used.

UPSTREAM will allocate a new "backup" for the restore. If you are currently retaining backups on your local backup disk to speed your restores, this will cause an extra backup to roll-off if you exceed the MAXBACKUPS value specified for your backup profile on the local backup disk. You may need to account for this and update the MAXBACKUPS value or specify LOCALRESTORE N to not create a new transfer area on the local backup disk.

19.2.8 Performance Tuning

There are only a limited number of things you can tune for UPSTREAM/SOS. Some of these include:

- Reducing the number of wraps. The UPSTREAM log will display the number of times that a backup wrapped through the data. Note that each wrap costs around 2 seconds of time. Thus a 5 minute backup that wrapped 20 times could be made significantly faster by increasing the amount of space available in the local backup disk.
- Reducing head contention. Try to run only one backup through the local backup disk at a time.
- Differing levels of compression. High compression may speed up backups or it may slow them down. You should try testing with None, Fast and High3 (high1 and high2 perform at almost the same speeds as high3).
- Get close to the data. UPSTREAM/SOS performance is most frequently bottlenecked by disk access. It is often better to run regular UPSTREAM on LAN attached disks than use UNC names or shares to access them with UPSTREAM/SOS.

Your best tool for performance tuning is the UPSTREAM log. At the end of a backup or restore it will report:

- Bytes per second. This is bytes from the source disk transported to the host. Our experience has shown that good performance is 2-3 MB/sec for PCs and 2-5 MB/sec for UNIX systems. As always, your performance will vary based on the type of the data, average file size, contention for disk and CPU resources, etc.
- Number of wraps. Each wrap costs a minimum of 2 seconds. Whenever possible try to reduce the number of wraps.
- Number of files and data bytes. Bytes divided by Files results in the average file size.

...and see the *Performance* chapter for other useful suggestions for optimizing performance.

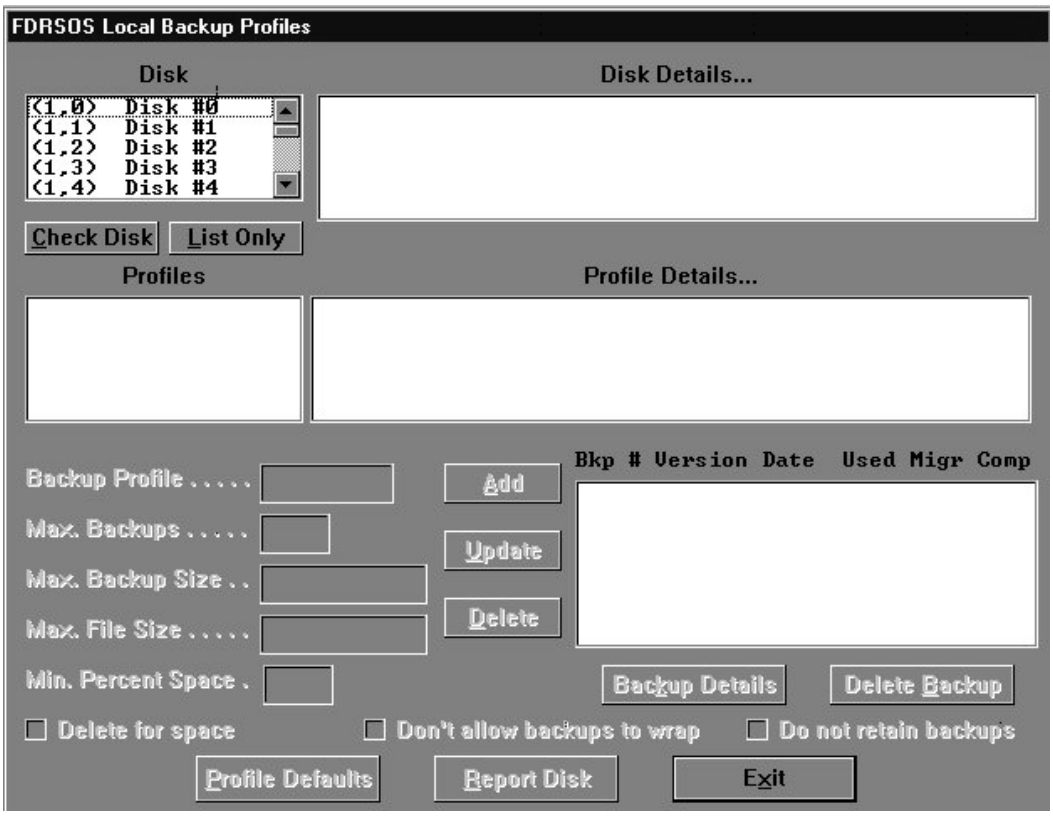
19.3 FDRSOS Local Backup Admin

The FDRSOS Local Backup Admin option allows you to:

- List your physical disks and determine the disks that are configured for FDRSOS Local Backups.
- Display information about a given FDRSOS Local Backup disk.
- Display/add/modify/delete local backup parameters for given backup profiles.
- Define the defaults for unconfigured backup profiles.
- Display the list of backups for a given backup profile.
- Delete the local backup, without deleting the actual backup on host disk.
- Display storage details about a local backup.

You must use Local Backup Admin to add new profiles to the FDRSOS local backup volume if the FDRSOS operand DYNADDPROF=NO was specified when the volume was formatted. Only if DYNADDPROF=YES was given or defaulted will new profiles be added automatically using the global defaults.

To use it, pull down the **Management** menu in FDR/UPSTREAM and select the **FDRSOS Local Backup Admin** option.



- **Disk:** Highlight the physical disk (they are automatically listed using the FDR/UPSTREAM format) that you wish to view/administer. Double-clicking a disk with the mouse has the same affect as pressing the <Check Disk> button.

- **Check Disk:** Press this button to check to see if the highlighted disk is an initialized FDRSOS local backup disk. If it is, Disk Details, Profiles, Profile Details and backup information is automatically filled in.

- **Disk Details:** Automatically filled in when you press the <Check Disk> button, this list displays information about the disk including free space, MVS VOLSER, when it was last updated, volume size, and various internal information.

- **Profiles:** This is a list of profiles currently defined for this disk. Whenever you change the highlighted profile, the Profile Details, Backup information and definitions will change to reflect the highlighted profile.

- **Profile Details:** Automatically filled in with the highlighted profile information including last backup date, number of backups and various internal information.

- **Backups:** This list box contains some information about individual backups stored for a profile including the backup number, version date, space used and whether it has been migrated. Details about space allocation for a highlighted backup can be displayed by pressing the <Backup Details> button or by double-clicking a backup entry. The backup highlighted in this list can be deleted by pressing the <Delete Backup> button.

The following fields are used to allow you to add/view/modify definitions for specific profiles.

- **Backup Profile:** Enter the backup profile name you wish to add. This field is filled in when you highlight a profile.

- **Max. Backups:** Enter the maximum total number of backups you wish to store on local disk. When this number has been exceeded, the oldest backup is deleted. Ignored if you check *Do not retain backups*.

- **Max. Backup Size:** Enter the maximum number of bytes for a given backup that you wish to store on the local backup disk. When this size has been exceeded, the backup will wrap unless you check *Don't allow backups to wrap.*

  UPSTREAM will take the smaller of the PC estimate, and Max. Backup Size and attempt to allocate this space on the local backup disk. If this amount of space is not available, then it will reduce it up to the Min. Percent Space (below) and retry the allocation. If there is still insufficient space, the backup will fail.

- **Max. File Size:** Enter the maximum size of a file in bytes (before compression) of files you wish to store on the local backup disk. If a file is larger than this size, it is transmitted to the host over the network. If you specify 0, a maximum is not enforced. We only recommend specifying a non-zero value if you are using local backups storage to reduce restore time and wish to keep a few large files from taking all available space.

- **Min. Percent Space:** Enter the minimum percentage of space that must be available for the backup to proceed. If this amount of space is not available or cannot be made available the backup will be denied. Enter any value from 10 to 255 percent.

- **Delete for space:** Check this box if you wish to have backups deleted when space is required, even if the maximum number of backups has not been reached. The default is not checked.

- **Don't allow backups to wrap:** If you check this box, and the amount of space allocated is exceeded then the remaining data is transmitted and the local backup is retained. If you do not check this box and if the amount of space allocated is exceeded then the space allocated is reused (wrapped), no data is transmitted over the network and the

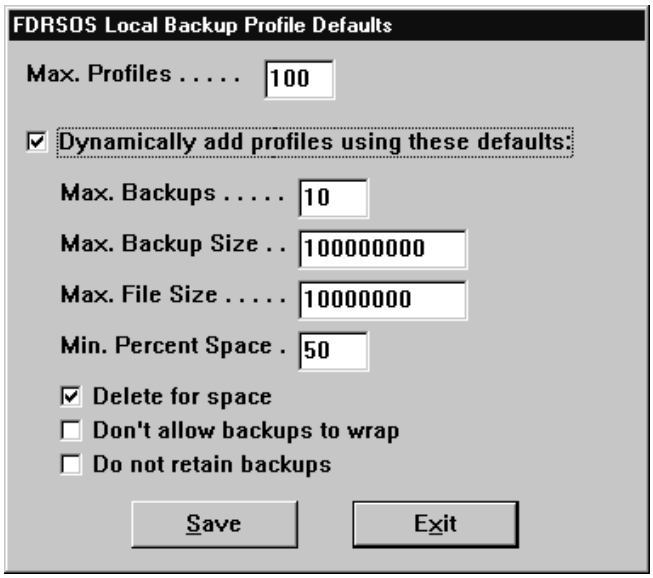
local backup is deleted when complete. Not checking this box can significantly improve performance. The default is not checked.

- **Do not retain backups:** If you check this box and a backup does not wrap, then it is deleted anyway. This preserves the maximum amount of storage for local backups, thus slightly optimizing for best backup performance at the cost of restore performance. The default is not checked.

Use of the push buttons requires that host communications be active:

- **Add:** Allows you to add a profile definition to the disk.
- **Update:** Allows you to update an existing profile definition. The profile must be highlighted in the Profile list.
- **Delete:** Allows you to delete an existing profile definition. The profile must be highlighted in the Profile list.
- **Backup Details:** This button is enabled when you highlight a backup in the backup list. When you press it or double-click a backup in the backup list, information about space allocation for a specific backup is written to a file, USLCLBKP.TMP in the work path and the file viewer is displayed to view its contents. In most cases the information in this file is of use only to UPSTREAM technical support.
- **Delete Backup:** This button is enabled when you highlight a backup in the backup list. When you press it, the SOS local disk storage for the backup is deleted, but the host disk/tape is not deleted and the backup remains cataloged. We recommend that you only delete backups which have been migrated or merged forward (with the COPYINCR option). Before the backup is deleted you are warned about the dangers.
- **Profile Defaults:** Press this button to set the definitions for profiles which are not explicitly added in this screen. See below for more on Profile Defaults.
- **Exit:** Press this button to leave the dialog.

When you press the **Profile Defaults** you see the following dialog:



- ☐ **Max Profiles:** Specify the maximum number of profiles that can be added to this disk. If there are more than this number currently, no more can be added, but the current ones will continue to work.

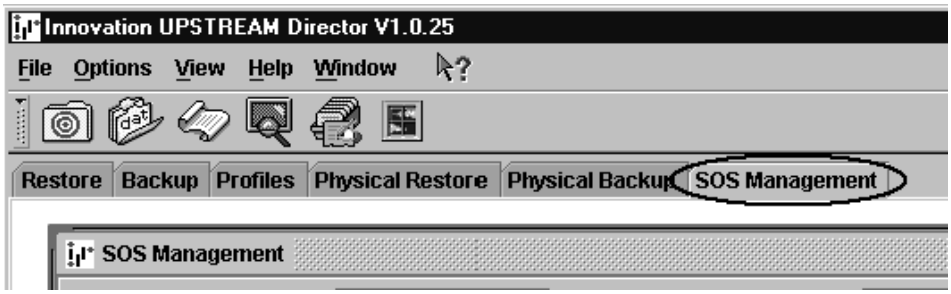
- ☐ **Dynamically add profiles using these defaults:** Check this box if you wish to allow profiles which have not been specifically defined to be added. The remaining fields on this dialog will be enabled only if you check this box.

  The remaining fields work as described above for defining specific profiles.

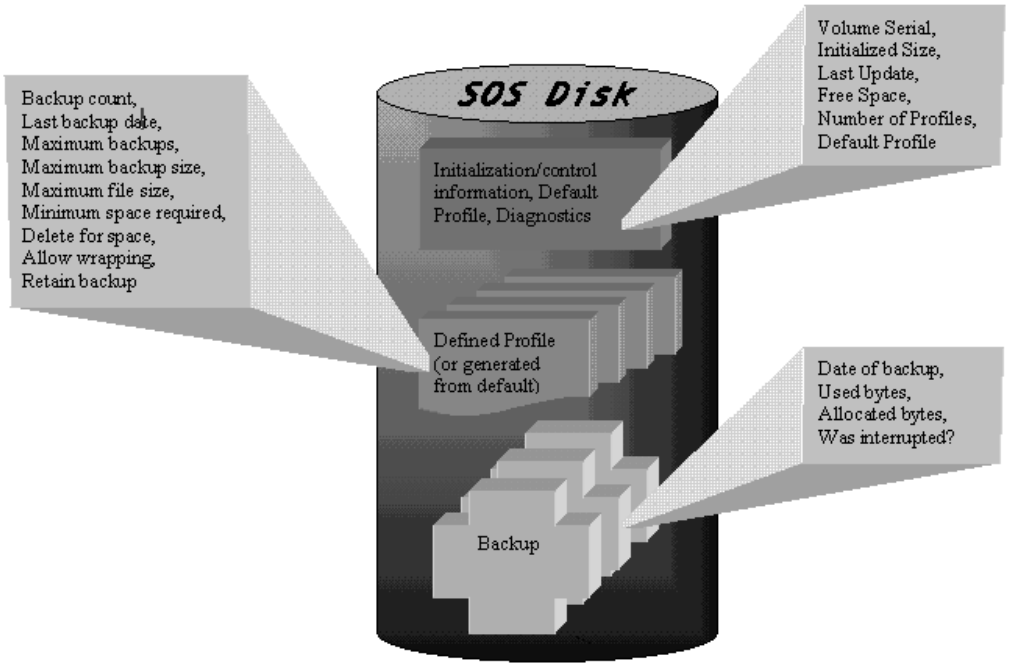
19.4 Director Local Backup Disk Management

19.4.1 Introduction

For those who have licensed UPSTREAM/SOS, a feature which uses EMC disks shared between a server and the host to transmit/store backup data, this tab panel manages the SOS Initialization information, default profile, profiles and backups on these UPSTREAM/SOS disks. To use SOS Management in the Director you must have v1.0.25 of the UPSTREAM Director (or higher) and be connecting to v3.1.4e of UPSTREAM (or higher).



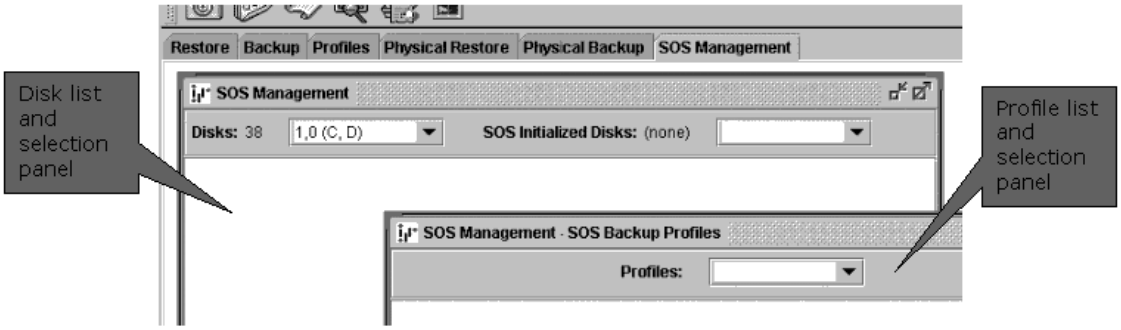
Actually, all disk drives on the server can be viewed and listed, but only the SOS initialized disks are managed and operated on. So, what exactly do we need to manage and control on an SOS disk?....the following figure shows three areas that we are interested in: Initialization/control and default (profile) information, Defined/generated profiles and the Backups themselves:



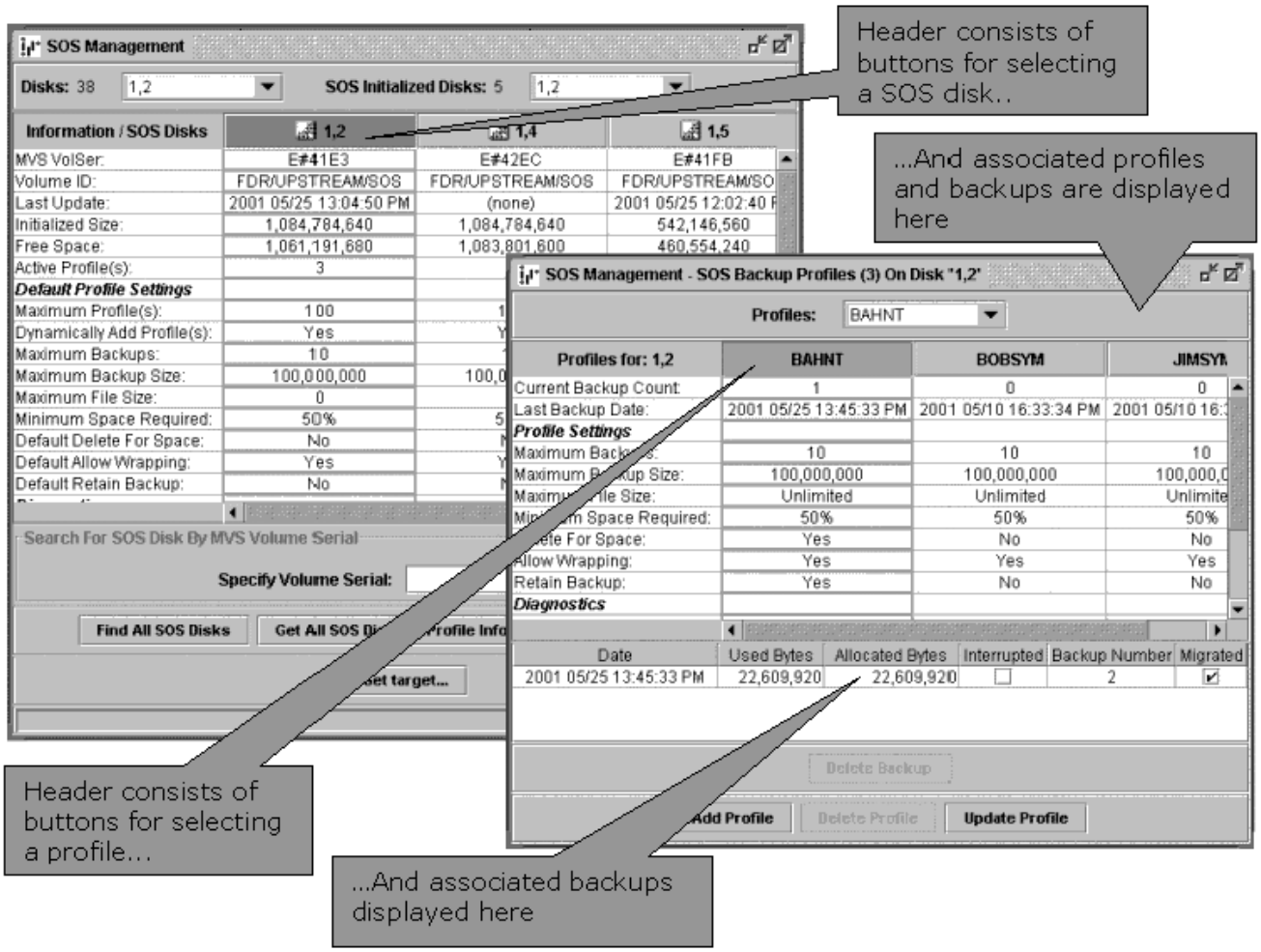
Using the SOS Management panels you can list your physical disks and see which ones are initialized for FDRSOS Local Backup, display all the above information about an SOS Disk, update the profile defaults for un-defined (generated from these defaults) backup profiles, display, add, delete and update the parameters of any backup profile, display and delete (without deleting the actual backup in the repository) the backups by profile.

19.4.2 First Look

SOS Management consists of two panels that work together to present the information on an SOS disk. The first panel is used to list the physical disks, SOS disks and the information on an SOS disk including the initialization information, default profile values and some diagnostics.

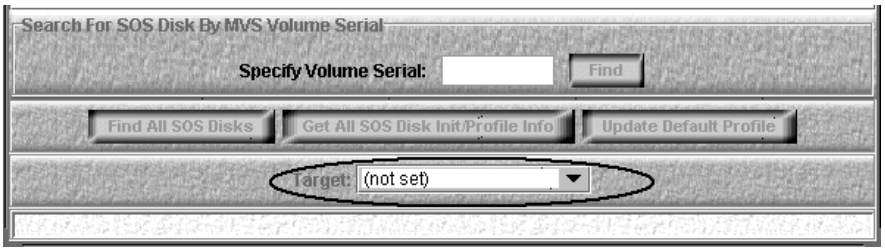


Selecting an particular SOS disk from this panel retrieves and displays the profiles and backups for that disk in the second panel:



19.4.3 Setting Target - Gets The List Of Physical Disks

As with most tab panel actions, we must first set a target server for SOS Management where we will get the list of physical disks and manage the SOS disks:

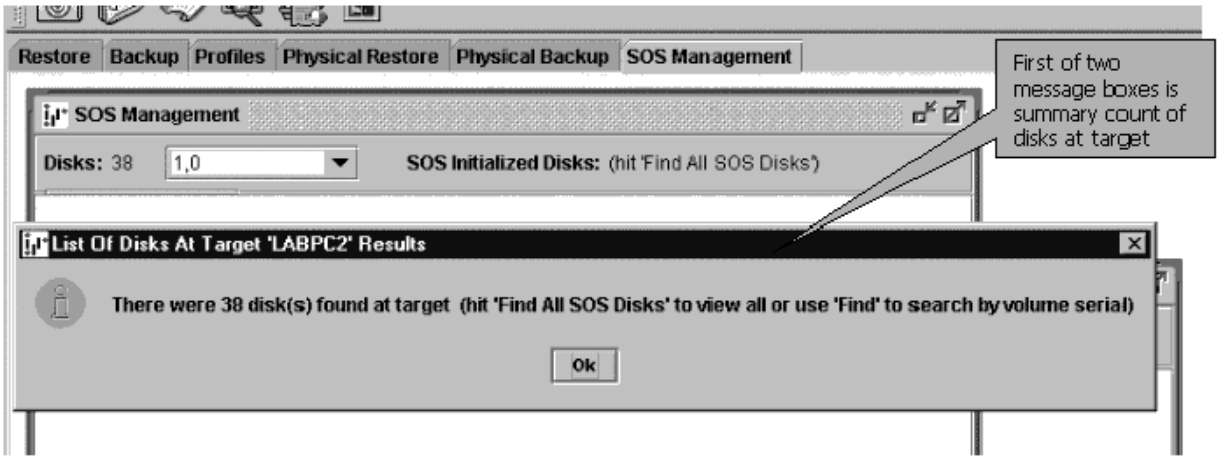


From the list of available system, select the system you wish to manage local backup disks for.

The two SOS Management panels are designed to get and display information in stages from the target server after a target is set. Information is gathered by doing read operations against the physical disks installed at the

target server. Before you select your target systemyou should be aware of the two preliminary operations this will initiate automatically.

The first operation performed after the target is set is to get the list of physical disks itself - with this list the drop down combination box labeled “Disks” on the top left side of the SOS Management panel is filled in and becomes available for selecting a particular disk to interrogate and display information about. A summary of the number of disks found is displayed in a message window displaying the results of this operation:



Once the combination box is filled in, the first entry or disk is automatically selected - so information about that disk is retrieved from the server next. You will see the results of this after you dismiss this message window by clicking on OK. Another message window now displays showing the results of the selected disk (the first entry in the “Disks” drop down combination box). This disk is interrogated (read) to determine if it is an SOS Disk or not and if so the SOS information is gathered. The message window that pops up informs you which is the case.

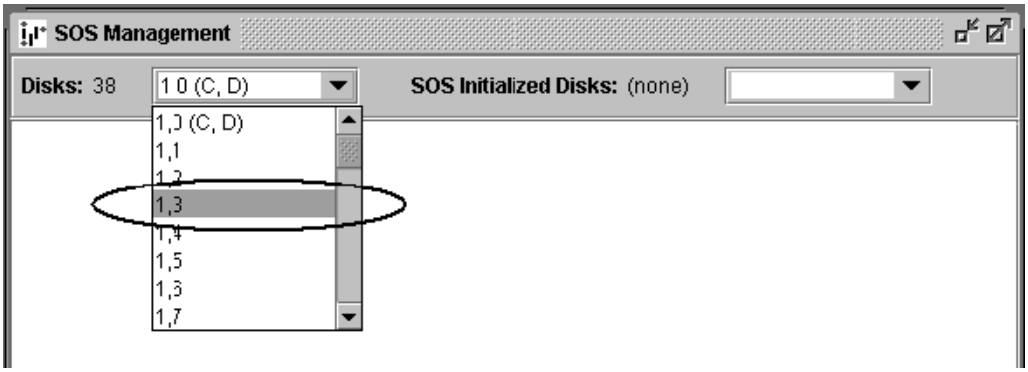
Once you dismiss this last message window if the first disk is not an SOS Disk (almost always the case), the drive letter or name (depending on the OS type of the target server) is filled in next to the disk number in the drop down combination box.

19.4.4 Disk Selection, Finding and Displaying SOS Information

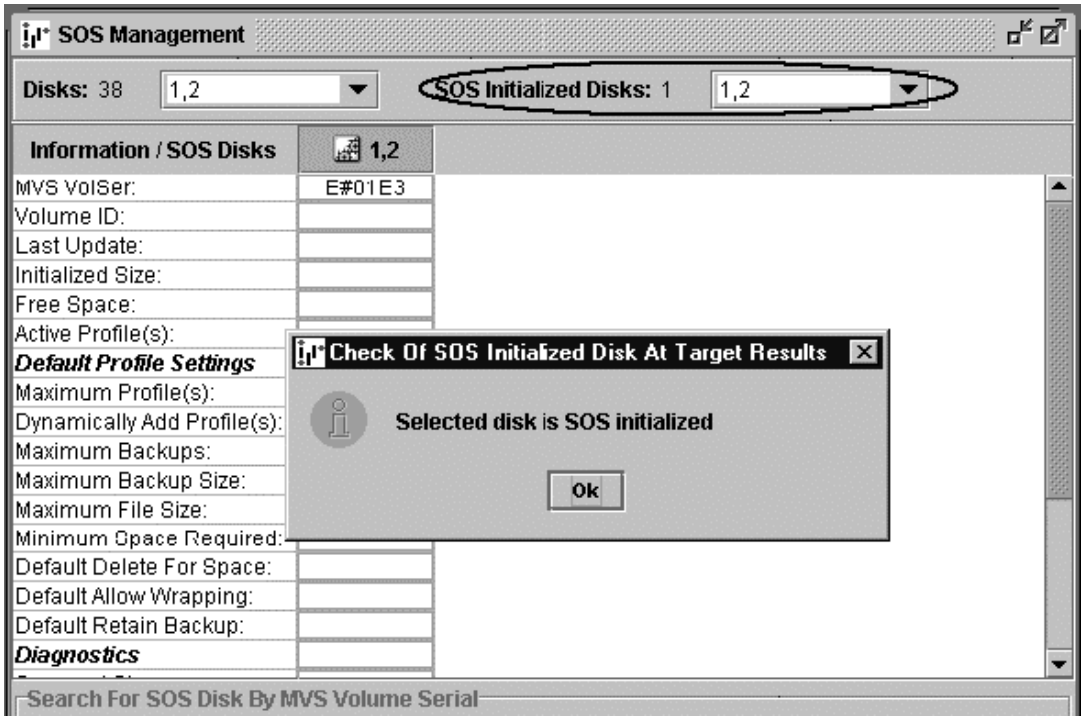
Remembering that the SOS Management panels are designed to get and display information in stages, after the target has been set, the only information available is the list of physical disks at the target server. Only the first one has been interrogated and this is probably not an SOS disk and therefore no SOS disk information is displayed.

Next we might follow one of the two suggestions of the message box displaying the physical disk count which were either: to hit “Find All SOS Disks” or use “Find” to search for an SOS Disk by volume serial name. Either of these may be appropriate but there is yet another alternative: that is to merely use the Disks drop down combination box list to select a particular physical disk that will be interrogated. This was done automatically to the first disk in the list when the target was set. This selection results in reading the particular physical drive to discover whether it is or is not an SOS disk and if so, the SOS information is read and displayed. So there are actually three different ways to discover what physical disks are SOS disks and to display the SOS information on them.

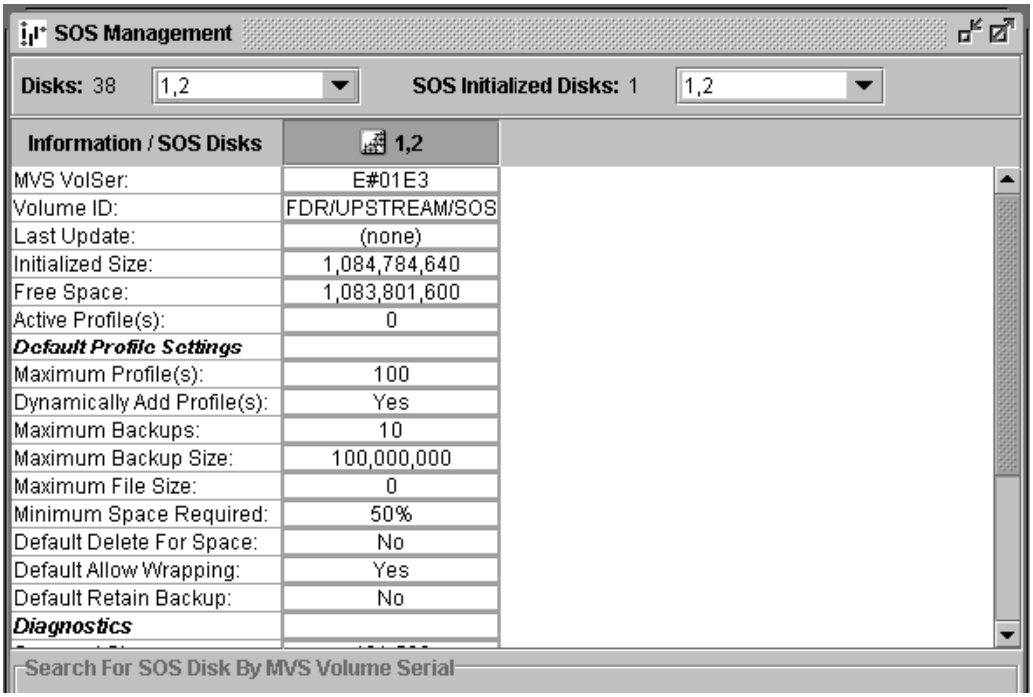
Lets look at this last method, which is to just select one of the disks from the Disks drop down combination box list. This is useful when we know which physical addresses are SOS Disks and we only want to interrogate that particular disk. Selecting a disk results in discovering if the physical address is an SOS Disk or not and then displays SOS information if it is:



Depending on the target system operating type, additional information is added when possible; in this case the target was a Windows system so the drive letter was filled in. If the disk we select is in fact an SOS Disk we would get the message box reporting this and the disk will be added to the list below:

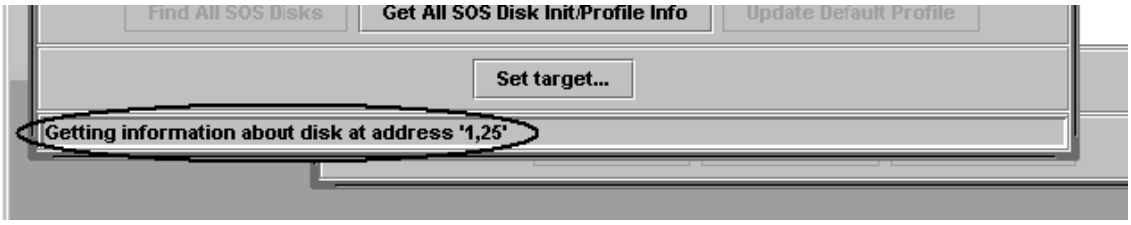


The third physical disk selected is an SOS Disk and is reported as such. It is added to the SOS Initialized Disks drop down combination box list and added to the display list below. Notice how in the display list the SOS information is not yet filled in, this is because as stated earlier, information is interrogated from the disk at the target in stages. When the message box is dismissed by hitting “Ok”, the SOS Information will be gathered and filled in:



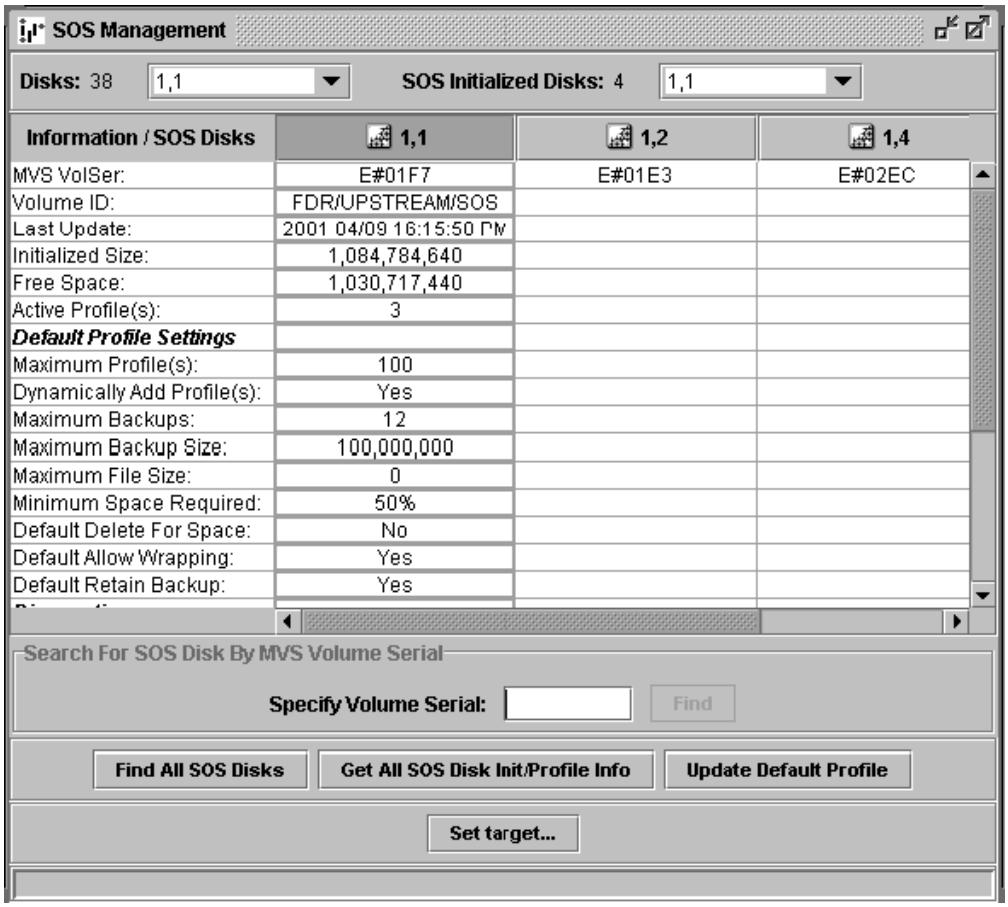
As we will see, whenever we find an SOS Disk to put in the list, the actual detailed SOS information is not filled in unless the disk is selected using either of the combo boxes or by clicking on the header line "Information/SOS Disks" along the top. This line is a row of buttons that can be selected by clicking once on them.

Next lets look at the second and most convenient method which is to just find all the SOS disks in one operation. Hitting the "Find All SOS Disk" causes all the drives to be interrogated to discover which ones are indeed SOS initialized disks. This operation ONLY builds the list of SOS Disks but does not yet read and display SOS information for any disk but the first (selected) one at this point. The progress of interrogating all the drives at the target server is shown in a status line at the bottom of the panel:

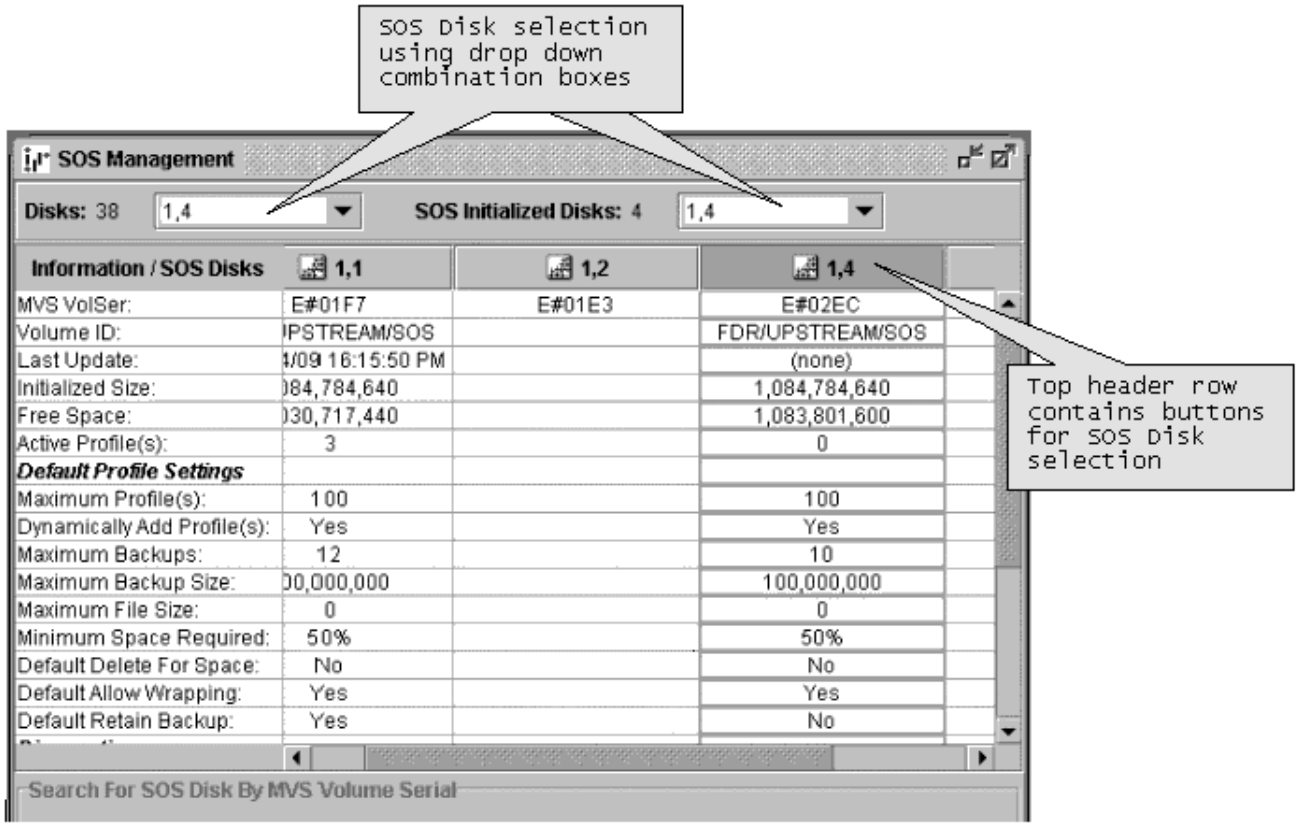


When finished, a message box is displayed giving the results (count of SOS Disks):

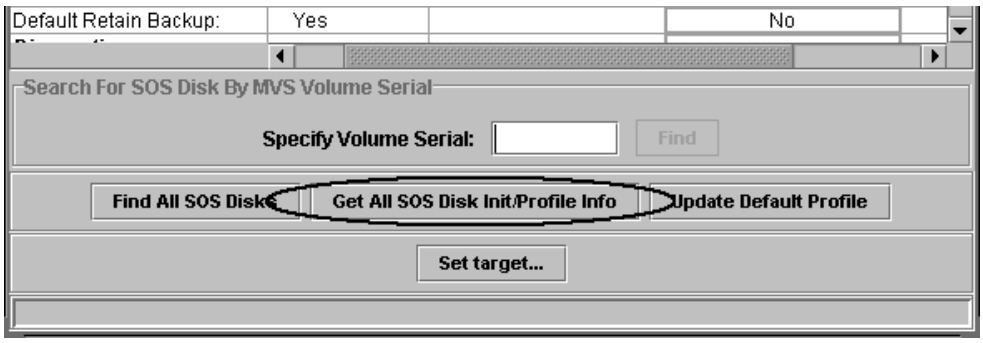
After dismissing this message by hitting “Ok”, the list of SOS Disks is shown and the SOS Disk information for the first SOS Disk is displayed:



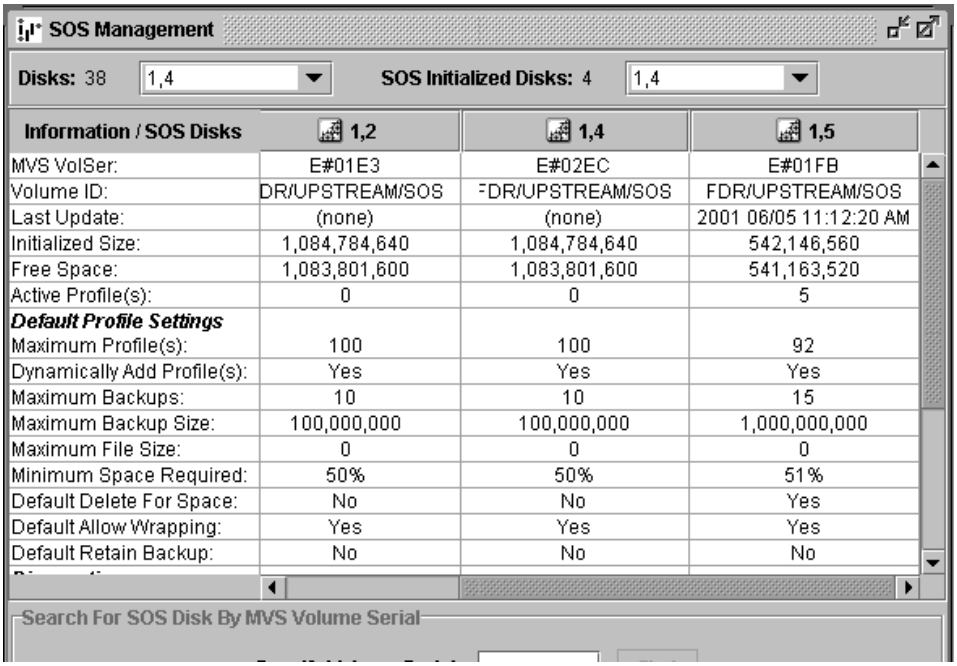
As noted before, the row header titled “Information / SOS Disk” contains a set of buttons for each SOS Disk to select. Once selected, the SOS detail information is filled in:



Whenever a SOS Disk is selected, the SOS information is filled in. Also the corresponding Profiles and backups are displayed in the partner panel "SOS Backup Profiles". Instead of selecting each SOS Disk to fill in the information, you can have all the information for every disk filled in by hitting the "Get All SOS Disk Init/Profile Info" button:

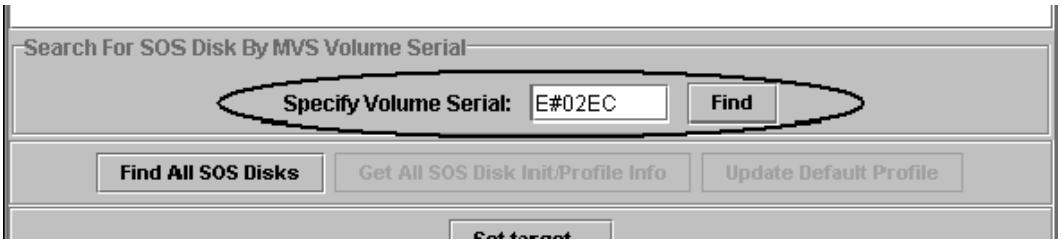


This will cause all the information to be gathered from every disk and filled in:

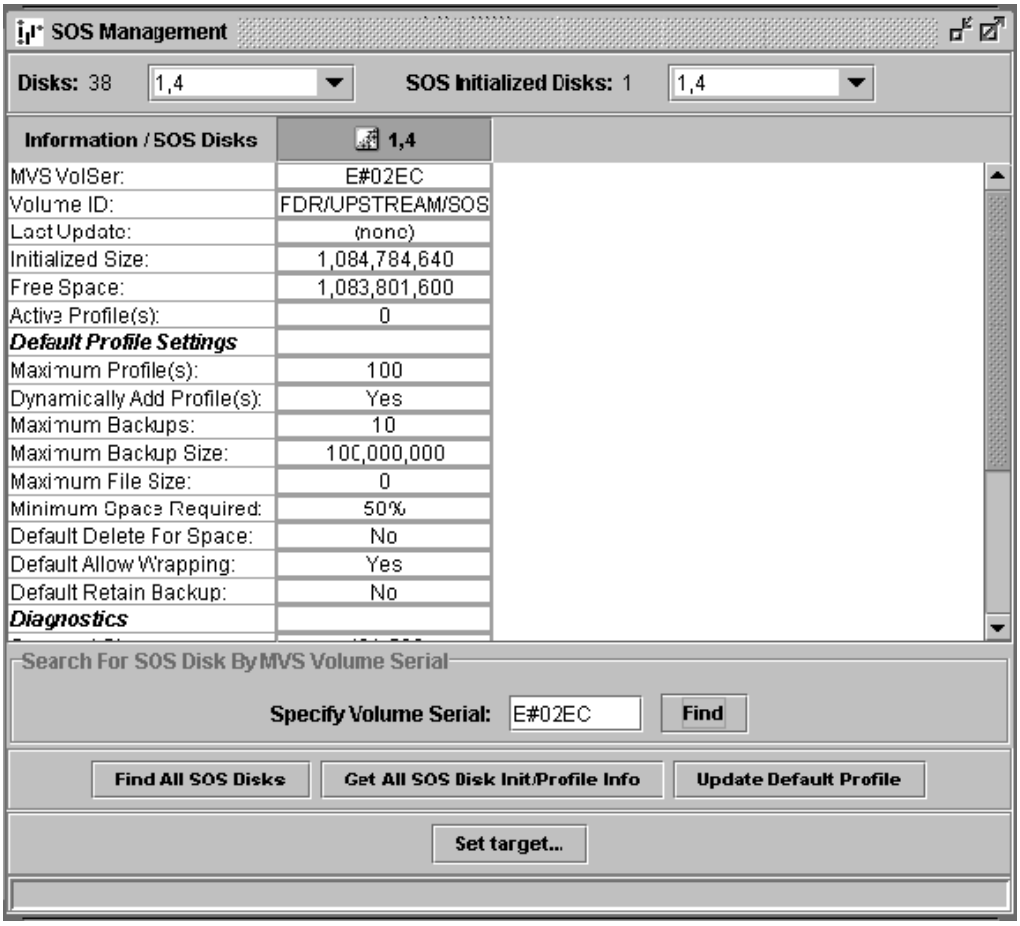


Information / SOS Disks	1,2	1,4	1,5
MVS VolSer:	E#01E3	E#02EC	E#01FB
Volume ID:	DR/UPSTREAM/SOS	FDR/UPSTREAM/SOS	FDR/UPSTREAM/SOS
Last Update:	(none)	(none)	2001 06/05 11:12:20 AM
Initialized Size:	1,084,784,640	1,084,784,640	542,146,560
Free Space:	1,083,801,600	1,083,801,600	541,163,520
Active Profile(s):	0	0	5
Default Profile Settings			
Maximum Profile(s):	100	100	92
Dynamically Add Profile(s):	Yes	Yes	Yes
Maximum Backups:	10	10	15
Maximum Backup Size:	100,000,000	100,000,000	1,000,000,000
Maximum File Size:	0	0	0
Minimum Space Required:	50%	50%	51%
Default Delete For Space:	No	No	Yes
Default Allow Wrapping:	Yes	Yes	Yes
Default Retain Backup:	No	No	No

The last method we have for displaying SOS Disk information is to search for it by the MVS Volume Serial name given to a disk when it was initialized as an SOS Disk. We most often know the SOS Disk by its initialized volume serial name and so we can search for it by this name:



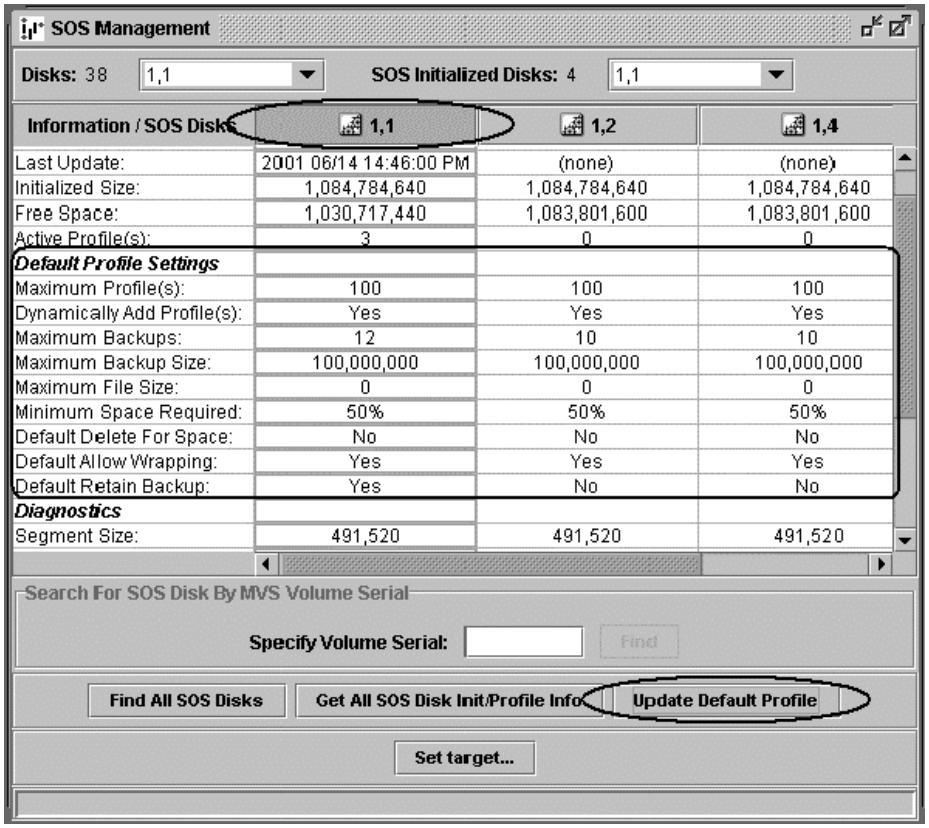
Once you type in a name to search for, the “Find” button is enabled for you to click it and start the search:



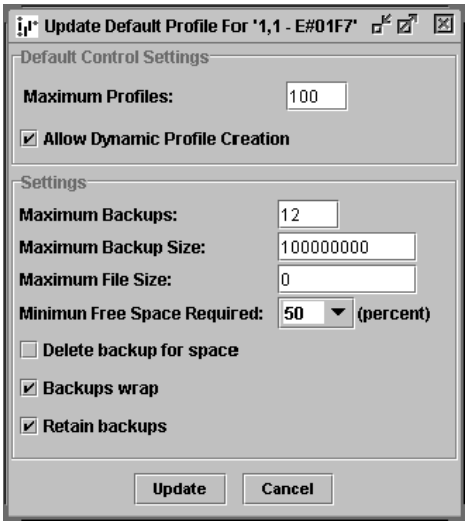
If found, the SOS Disk information is displayed.

19.4.5 Default Profile Settings, Profile and Backup Display and Management

The default profile control and settings are displayed in the rows following the row titled “Default Profile Settings” and are shown outlined below.

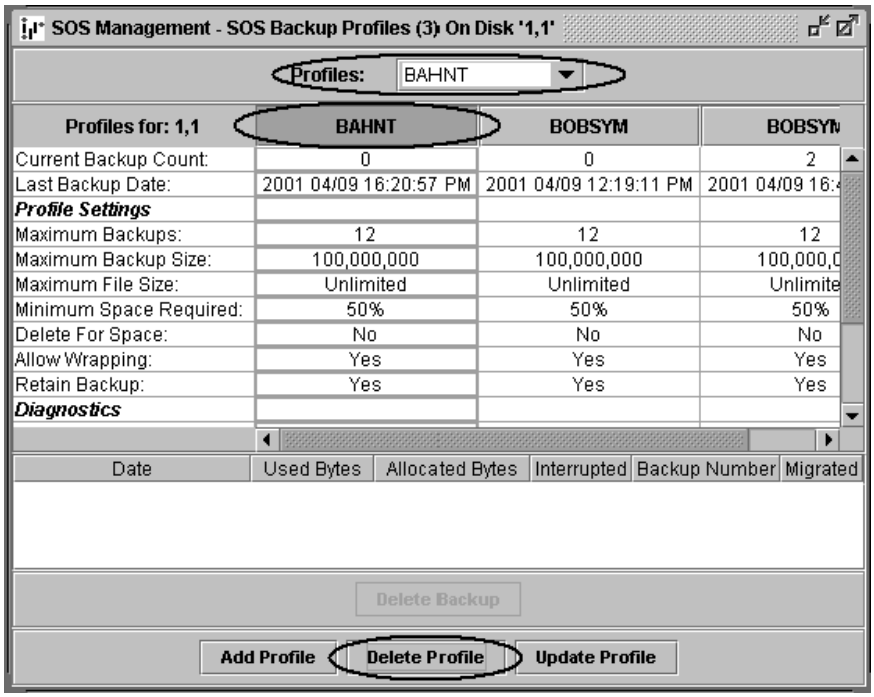


Whenever the control setting “Dynamically Add Profile(s)” is “Yes” and an SOS backup is performed with an un-defined profile, a new profile is created with these settings. You can update the control settings and these default parameter settings by selecting an SOS Disk and hitting the “Update Default Profile” button - the following dialogue is displayed:

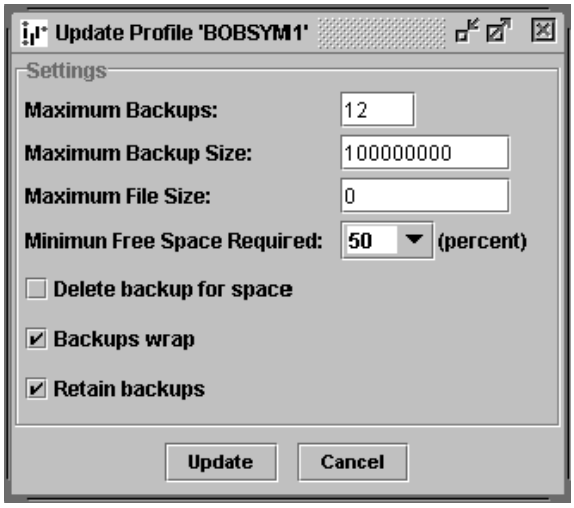


You can hit “Update” to make the changes or “Cancel” to abort and changes.

Whenever a SOS Disk is selected with either the “Disks” or “SOS Initialized Disks” drop down combination boxes or by hitting the header button for the SOS Disk, the current defined profiles and profiles dynamically added are displayed in the partner panel “SOS Backup Profiles” for that selected disk:

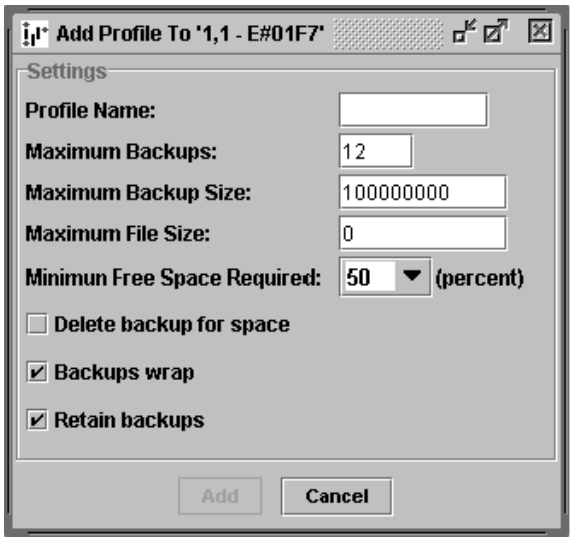


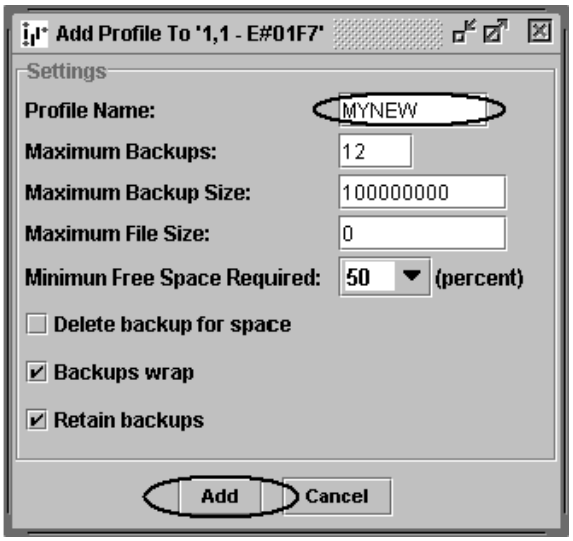
This panel also uses a drop down combination box (labeled “Profiles”) and a header row of buttons for profile selection. The backups done with the selected profile are displayed in a list below. In this case there are none and so the “Delete Profile” button is enabled for you if you care to delete the selected profile. You may update the profile selected (“Update Profile” button) or you may define a new profile (“Add Profile” button):



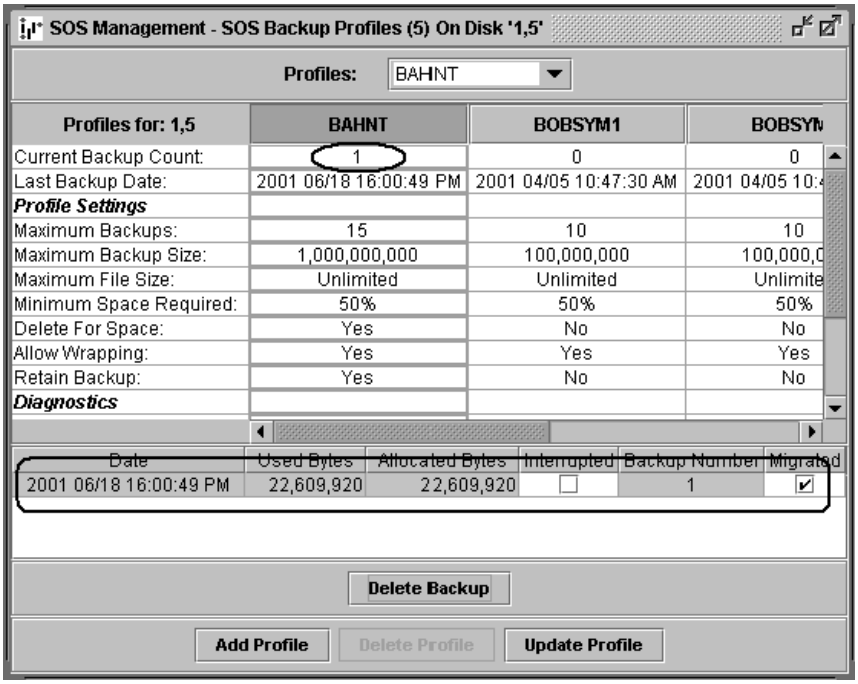
To update a profile, make the desired changes and hit the “Update” button or hit the “Cancel” button to abort any changes.

To add a new profile, you must first type in a name (1-8 characters) which will enable the “Add” button which you can hit after you have set all the profile settings you desire. The “Cancel” button aborts any profile creation.





Any backups taken with the selected profile are listed in the table in the lower half of the panel. In the following case there was one backup taken (and kept) with the profile “BAHNT”:



Any backup displayed may then be selected by clicking on the row to high-light it and then hit the “Delete Backup” button.

19.5 UPSTREAM and FDRSOS

19.5.1 Introduction

FDR/UPSTREAM can be used in concert with FDRSOS to utilize FDRSOS' ability to provide high speed backups and restores of complete EMC attached disk drives with FDR/UPSTREAM's ability to provide incremental backups and restores.

In the recommended scenario, FDRSOS is used regularly (generally weekly) to provide a backup of your EMC drives. FDR/UPSTREAM incrementals are run daily to provide recovery to a given point.

Whenever possible, we recommend the regular use of FDR/UPSTREAM full merge backups so that selective file restores as well as FDRSOS high speed disaster recovery restores can be performed. However, if tape drive or time issues force it, you can use FDR/UPSTREAM incremental merges exclusively.

When a disaster occurs, you restore, using FDRSOS, the entire drive. Using FDR/UPSTREAM, you then restore the files modified since the FDRSOS backup.

Two options in FDR/UPSTREAM have been added to facilitate this feature:

- A backup option in the File Spec More dialog allows you to create a "FDRSOS Timestamp File".
- A restore option allows you to specify a restore back to this timestamp file.

To complement the FDRSOS facility, FDR/UPSTREAM can be used to:

- Create physical disk backups for later physical disk restore.
- Restore FDRSOS backups over the network.

19.5.2 FDRSOS Timestamp File

There is an option in the Backup, File Spec, More dialog: **Write FDRSOS Timestamp**. If checked, FDR/UPSTREAM will place a FDRSOS Timestamp file in the directory specified for the backup spec, or in any user specified directory.

A FDRSOS Timestamp file is zero length, has standard system attributes, and is of the form:

```
<Backup Profile>.SOS
```

Where <Backup Profile> is the specified backup profile name.

If you do not specify a FDRSOS Timestamp directory the file will be placed in the directory specified for the backup. For example, if you specify C:*.*, the FDRSOS Timestamp file will be placed in C:\. For UNIX systems the Timestamp file will be placed in the top level of each file spec as well as in the top level any file systems mounted below each file spec.

For restores, FDR/UPSTREAM searches for the FDRSOS Timestamp file in the directory specified for the restore, and works it's way upwards until it reaches the root. For example, if you wish to restore C:\Dir1\Dir2\Dir3\File.DAT, FDR/UPSTREAM will search for the FDRSOS Timestamp file in C:\Dir1\Dir2\Dir3, then C:\Dir1\Dir2, then C:\Dir1, and finally C:\ until the file is found. If you specify a particular directory, that directory will be used exclusively.

The important information stored in a FDRSOS Timestamp file is its modification date/time. The date of the file is the host defined version date of the backup and it is used during a restore as the date/time of the last UPSTREAM backup before the disaster recovery FDRSOS restore.

You should check this box for all disks which are included in both FDR/UPSTREAM and FDRSOS backups. The user specified path can be left blank in most cases except those where security or other reasons make it difficult to store files in the directory specified for the backup. In this case you will need to verify that this directory is properly specified for both the backup and the restore.

19.5.3 Highlighted Back to FDRSOS Full

There is a radio button option in the restore parameters dialog, **Highlighted Back to FDRSOS Full**. If selected, the workstation/server software will extract the modification date/time of the FDRSOS Timestamp file and the host software will transmit files in backups which were performed since that date.

Thus, the FDRSOS Timestamp file is a signature on the disk of the last FDR/UPSTREAM backup. When FDRSOS is run, it will place this signature back as part of its normal processing and FDR/UPSTREAM will use it to determine the date/time of it's last backup.

Note that the FDRSOS Timestamp file should not be removed. FDR/UPSTREAM will not include these files in normal backups. If you perform a non-UPSTREAM restore of files which would include the FDRSOS Timestamp file, you should either specifically exclude it or recognize that you are placing the FDRSOS state of the disk for FDR/UPSTREAM at an earlier date.

There is a personalization option to disallow FDRSOS features.

19.5.4 UPSTREAM and Physical Disks

FDR/UPSTREAM can be used to restore FDRSOS created backups as well as create its own physical disk backups. See the *Physical Disk* chapter for more information about these features.

19.6 FDRSOS Windows Considerations

19.6.1 Introduction

FDRSOS includes a facility where a Windows attached EMC drive (one or more) can be locked throughout an FDRSOS backup or restore. This facility also assures that if the operating system definition of the drive is changed because you have restored a different drive to it, the operating system information about the drive is refreshed.

This facility is useful when implementing FDRSOS during:

- A backup when you wish to assure that the drive(s) are not being accessed and you wish to guarantee the integrity of the data
- A restore when you wish to assure that no users are going to be affected during the restore process.
- A restore when you are restoring an older version of an entire drive (or drives) or when you are moving the backed up contents of a drive to a different drive and wish the operating system to be notified without having to shut down the operating system.

The drive can remain locked until:

- A user presses a key.
- A predefined timeout occurs.
- Another program is run that tells the first program to unlock the drive.

Note that when restoring a drive to a different location, the drives must be of the same size.

There are two programs in this facility: UNMOUNT and REMOUNT.

NOTE: During a restore, UNMOUNT must be running and the drive must be locked to assure that the operating system definitions for the drive are reset. If the program is abnormally closed, the drive will be unlocked.

There is also a program to determine the host volume name of an EMC disk labeled by FDRSOS. This program, HOSTDISK displays the host volume label when supplied the Windows NT physical disk number.

19.6.2 Installation

The FDRSOS disk consists of only a few files. Merely create a directory and copy the files into them:

```
md \sos
copy a:\nt\*.* c:\sos\*.*
```

or for a CD installation:

```
md\sos
copy d:\sos\nt\*.* c:\sos\*.*
```

The files are (relative to the root of the diskette or the \SOS directory on the CD):

File Name	Description
GENDATA.EXE	A test data generation program provided to help you generate a large amount of data quickly.
NT\HOSTDISK.EXE	Displays the host volume, as labeled by FDRSOS when supplied the Windows NT physical disk number.
NT\REMOUNT.EXE	Allows you to, from a separate program at a later time, unlock a previously locked set of drives.
NT\UNMOUNT.EXE	Allows you to lock and dismount one or more drives.
NT\UNMOUNTX.EXE	An internal program, not to be called directly.

FDRSOS Windows NT Drive Locking
Diskette Contents

The newest version of all Innovation Data Processing workstation/server software is available on the FDRSOS diskette, FDR/UPSTREAM CD or by request from your sales representative.

19.7 Windows NT Volume Sets

Windows NT provides a facility where a number of disk partitions across one or more physical disks can be grouped together to form a single logical drive. Microsoft calls this a volume set.

The definition of a volume set is not stored on the volume, but in the Windows NT registry, in the DISK subkey (HKEY_LOCAL_MACHINE\SYSTEM\DISK). Thus, when using FDRSOS to backup a volume set, you must be sure to:

- Backup all the physical drives in the set. Note that HOSTDISK.EXE (described below) may help you to identify these disks. We recommend that the volume set be UNMOUNTed (see the UNMOUNT program below) or the system be down when the volume set is backed up. This is not required but recommended to assure file and system integrity.
- Backup the Windows NT registry.

To backup the Windows NT registry you can use the Windows NT program RDISK, or a full featured Windows NT backup product such as FDR/UPSTREAM.

There are a number of different scenarios for restoring volume sets:

- Restoring to their original location. This assumes that you are restoring to the same system and have registry backups.
- Restoring to a different machine.
- Restoring to a different location on the same machine. On the original machine, restoring the disks of a volume set to a different group of physical disks. This procedure allows you to be able to copy files off of an FDRSOS backup without having to backlevel your existing disks.

WARNING: This entire process is VERY DANGEROUS and should be practiced on non-production machines by trained personnel before using it on production systems.

19.7.1 Restoring to their original location

To restore a volume set to its original machine use the following procedure:

- Restore the registry. You must at the minimum restore the DISK subkey of the SYSTEM registry hive. You can use the Windows NT setup utility and your emergency repair disks, or a full featured backup/restore product such as FDR/UPSTREAM. If you are using FDR/UPSTREAM you should restore the %SystemRoot%\system32\config\SYSTEM file and reboot your machine.
- With the machine powered off, perform the FDRSOS restore of all the disks in the volume set.
- Restart your machine. Your volume set drive letter should be restored.

If you have any questions, you should contact Innovation Technical Support.

19.7.2 Restoring to a different machine

The following procedure can be used to restore a set of disks to a different machine than the one it was backed up from or to restore them to the original machine if you do not have a backup of the DISK key in the registry.

The target disks must be exactly the same size as the source disks. Note that the Windows NT Disk Administrator may display these disks with slightly different sizes. If the disks appear to be different sizes, use the FDRSOS PRINT=STATUS to verify that the sizes are the same.

Note that this procedure is very similar to the procedures described in Chapter 22 of the *Microsoft Windows NT Workstation Resource Kit*, in the section titled *FTEdit - Recovering Volume Sets and Stripe Sets*. You will need the programs included on the Resource Kit CD including DISKMAP, FTEDIT and DSKPROBE.

On the machine which contains the original backup, you will need to know the following:

- The physical disk numbers of the disks in the volume set.
- The signatures of each of the disks.
- Their order in the volume set by partition and signature.
- The DISK key disk number.

There are a number of steps to this process.

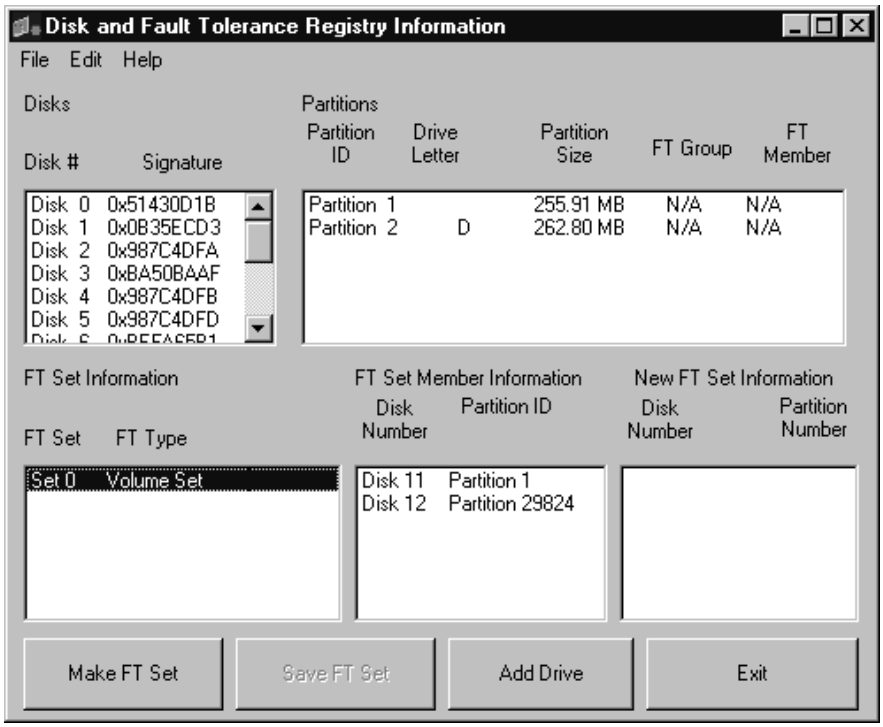
Run the **Windows NT Disk Administrator** by selecting it from the Administrative Tools group of the Programs menu of the Start button. If the Disk Configuration button is pressed, you will see the physical disks on your system. Note the Physical Disk number of the disks in your volume set.

The Windows NT Resource Kit CD contains a number of programs which are used in this process. The command line program **DISKMAP** is used to be able to obtain the disk signature (which Windows NT places on a disk to uniquely identify it) for a given physical disk number. From a DOS prompt, run the program DISKMAP, with the physical drive number of the disk you wish to examine. For example, obtain the signature for disk #13, enter:

```
DISKMAP /D13
```

The signature is on the 4th line, left justified. You will need the signatures for all the disks in the volume set.

Next, execute the Windows NT Resource Kit program **FTEDIT**.



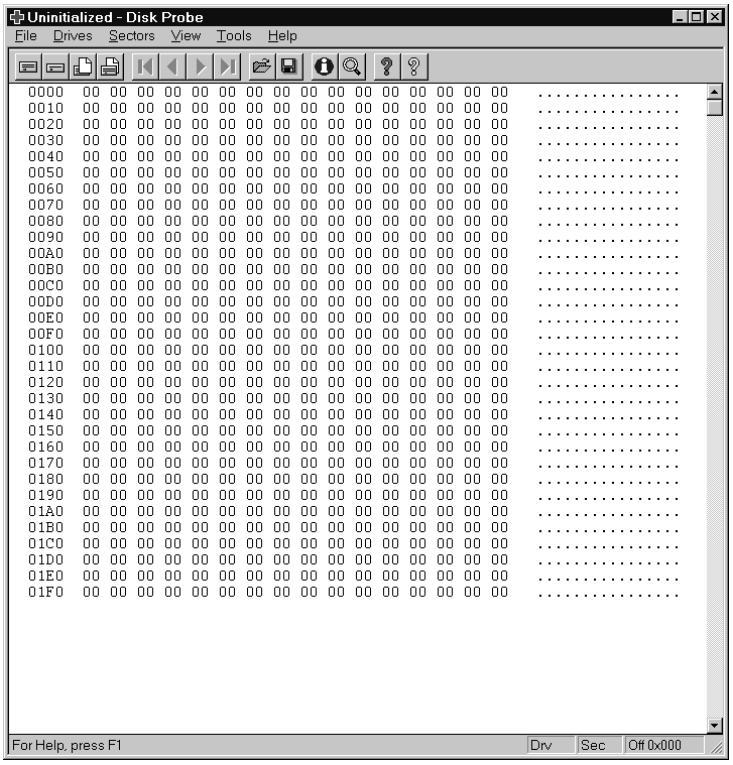
In the top left listbox (Disks), disks are listed by their order in the DISK key in the registry - not by their physical disk number on your system. In the bottom left list box (FT Set Information) highlight a volume set. The bottom center listbox (FT Set Member Information) will list the disk number (by registry DISK number) and the partition that the disk is in. From the FT Member Set Information you get the DISK key disk number, which you then use to obtain the Signature for the disk from the Disks list.

You will need the order of the disks and partitions in the volume set by their signature.

On the machine that you are restoring to, we recommend that BEFORE you perform the restore, you clear out the boot sectors/partition tables on the disks and run Disk Administrator to have the DISK key reflect that the disk is uninitialized. This is an optional step but one which will assure that the system is not confused by prior disk information.

Run the Disk Administrator, and note the physical disk numbers of the target disks and verify that they are the same size as the original disk. If they are slightly different sizes, this may be due to the way that Windows NT calculates sizes; use the FDRSOS PRINT=STATUS command to obtain their exact sizes.

Run the Windows NT Resource Kit program DSKPROBE from a DOS prompt. DSKPROBE will be used to initialize the boot sector/partition table to all zeros.



Pull down the **Drives** menu and Select **Physical Drive**. Highlight the Physical Drive you wish to initialize, **uncheck** the **Read only** box in the Handle 0 frame, and press the **Set Active** button. Press the **Ok** button to return to the edit screen. Pull down the **Sectors** menu and select **Read**. Enter a Starting Sector of **0**, a number of sectors as **1** and press the **Read** button. On the DSKPROBE main screen, type in 00 for every byte in the sector. When all bytes are zeroed out, pull down the **Sector** menu, select **Write**, validate that the handle and all other parameters are correct and press the **Write it** button. Exit DSKPROBE.

Run Disk Administrator, do **not** allow it to write a signature for the modified disks and exit the program normally to have it update the DISK key in the registry with the modified information.

Run the FDRSOS restore of all the disks in the Volume Set. You must either not specify a VOLRESET statement or specify it as VOLRESET=YES (which keeps the data on the volumes from being modified by FDRSOS).

Run the Disk Administrator to have it update the DISK key with the new disk signatures.

Run FTEDIT from a DOS prompt to create the volume set. Press the **Make FT Set** button and press the **Volume Set** radio button. Identify the first disk by signature in the Disks list and highlight the disk. In the Partitions list, double-click the partition of the disk used for the volume set which will add it to the Volume Set Information frame. Repeat this process for all the disks in the volume set. It is critical that they be added in the same order as they were in their initial configuration. Press the **Save FT Set** button to save your changes to the registry. Exit FTEDIT.

Restart your system.

Enter the disk administrator, highlight the volume set, and using the right mouse button, select **Assign Drive Letter** on the pop-up menu. Assign a drive letter to the volume set.

The Volume Set should now be created successfully. You should verify that files from a variety of locations on the disk are fully accessible.

19.7.3 Restoring to a different location on the same machine

The procedure is almost the same as Restoring to a different machine with the following exceptions:

- When you run Disk Administrator after running the DSKPROBE and before performing the FDRSOS restore, allow it to write the signature to the disk.
- In the FDRSOS restore, you must specify VOLRESET=NO to assure that the volumes are restored with different signatures.

19.7.4 Notes

Some notes on this facility:

- The DISK key in the registry (HKEY_LOCAL_MACHINE/SYSTEM/DISK) can actually get so mangled that backups and restores of it will not work correctly. In these cases you will need to use the registry editor to delete the DISK key, enter Disk Administrator to rebuild the key, and then use FTEDIT to rebuild the volume sets.
- You may need to activate/deactivate extended LUN support in the SCSI BIOS on your target system to have it match the original system to have the disks be visible with the correct size.

19.8 UNMOUNT.EXE

This is the program that can lock one or more drives and then forces an operating system refresh of the drive information when it is unlocked. It is a 32-bit Console program. If you wish this program can be run as a service; contact Innovation Data Processing for more information.

Unless you specify the /p option, UNMOUNT must be left running during the backup or restore to assure that the drive is locked. During testing you should verify that the drive is locked during SOS operations by attempting an access to the drive on the Windows NT machine (with a DIR command for example) and you should get an "Access is denied" error.

This program will fail if **ANY** programs are accessing the drive. You must assure that all users and programs have closed all open files on the drive to be locked before running the program. The program will write an error to the screen and return a non-zero program return code if there are any errors.

Run this program from an MS-DOS prompt or a batch file. It's format is:

UNMOUNT <drive letter:> ... [/n<name>] [/k] [/w<time>] [/p[<pgm>]

Where:

- **<drive letter:>** is a list of one or more space separated drives to be locked. For example: **C:** or **E: F: G:**. You must specify at least one drive letter.
- **/n<name>** is an optional parameter which allows you to specify the semaphore name used when running REMOUNT. You only need to specify this parameter if you will be running REMOUNT and you wish to run, simultaneously, more than one copy of UNMOUNT.EXE at a time. For example: **/nREMOUNT2**.
- **/k** is an optional parameter that locks the drive until the user presses a key.
- **/w<time>** is an optional parameter that locks the drive for a given number of seconds. For example, for 5 minutes, specify **/w300**.
- **/p[<pgm>]** is an optional parameter that causes UNMOUNT to terminate when the drive is locked. The drive will remain locked until REMOUNT is run. The optional program parameter (<pgm>) allows you to specify a different program name than UNMOUNTX; for example, to specify UNMOUNTX on the D: drive, specify /pD:\UNMOUNTX.EXE. Most user will not use the optional <pgm> parameter and will specify **/p** alone.

  The /p option is particularly useful, as UNMOUNT will return a program return code which can indicate to you whether the drive was successfully locked.
- **/f** is an optional parameter which will have UNMOUNT merely open the drives specified, flush all the buffers to disk and return. This is useful if you know that you can't actually unmount the drive but wish to get all the integrity you can.

If you wish to lock the drives D, E and F until REMOUNT is run, specify:

```
UNMOUNT D: E: F:
```

If you wish to lock the drive D: until a user presses a key, specify:

```
UNMOUNT D: /k
```

If you wish to lock D and E, but unlock them with REMOUNT at separate times, specify:

```
UNMOUNT D: /nDDRIVE
UNMOUNT E: /nEDRIVE
```

If you wish to create a batch file that unmounts the C: drive, checks the return code and returns, it might look like:

```
UNMOUNT C: /p
if ERRORLEVEL 1 goto ERROR
Echo Successful lock - can begin SOS backup
goto SOS
:ERROR
Echo Unsuccessful lock - perform the SOS backup later
goto SOSLATER
...
```

19.9 REMOUNT.EXE

Run this program when you have run UNMOUNT and wish UNMOUNT to unlock the drive and refresh the operating system's view of it. It must be run in a separate MS-DOS prompt session as UNMOUNT.

Its form is:

REMOUNT [/n<name>]

Where:

- **/n<name>** is an optional parameter and is the same name specified when UNMOUNT was run.

In the example above, where UNMOUNT was run to lock D: E: F:, to unlock the drive, run:

```
REMOUNT
```

If the example above where you wish to unmount the drives separately run:

```
REMOUNT /nDDRIVE
REMOUNT /nEDRIVE
```

Both UNMOUNT and REMOUNT return 1 if they fail and 0 if they succeed.

19.10 HOSTDISK.EXE

HOSTDISK.EXE is a program which displays the host volume, as labeled by FDRSOS, for a disk which can be seen both by AIX and the host. In the UPSTREAM distribution, HOSTDISK for Windows NT is in the \SOS\NT directory; for AIX it is installed by the installation script into the UPSTREAM directory.

What it does is use EMC specific SCSI commands to read the CE (customer engineer) specific tracks. These tracks consists of disk area which is not used by programs, but is for EMC specified use. EMC has allocated a range of space on these tracks for Innovation which FDRSOS uses to hold the host volume name.

WARNING: When run on BCV volumes, HOSTDISK may either hang or report the label for the last disk it was connected to. Thus, we recommend that it not be used for BCV volumes.

HOSTDISK is a Windows NT console program. There is a variety of ways to run it. If you run it without parameters you'll get this help information:

```
HostDisk 3.1.3 - Determines host information for EMC drives

Invalid number of parameters
Format:
 - for information on a single device
      hostdisk #<disk number>  [/Detail]
 - for information on locally available devices
      hostdisk /l[ocal]
 - for a brief look on EMC configuration
      hostdisk /a[ll]
 - for a full information on EMC configuration
      hostdisk /f[ull]
 - to set an output page size for /l and /a add /p=nn (24 is a default)
      hostdisk /a /p=50 |more  - for 50 lines on page
```

- For information on a specific device specify

  ```
  hostdisk #<disk number>
  ```

  If you specify the /D (or /d) switch, Symmetrix details are displayed.

- For information on all your local EMC logical disks and (including the FDRSOS label for each one):

  ```
  hostdisk /l
  ```

- For information on all the EMC logical disks on the array that this system is connected to:

  ```
  hostdisk /a
  ```

- For full report with extensive details for all the disks on the array that this system is connected to:

  ```
  hostdisk /f
  ```

- Output for /l and /a switches is formatted as a table with the default of 24 lines per page. To change the page size add /p=*nn*, where *nn* is the number of line in your page.

For example, if you wish to see the labels for all the Symmetrix disks attached to your system, enter:

```
hostdisk /l
```

Which would display:

```
HostDisk 3.1.3 - Determines host information for EMC drives
 - local view:
 Device      Symm Num   MetaVolume       Type      FDRSOS   Emulation
 ------------------------------------------------------------------------
 #01(F:T:)   11(0x000b)                     shared E#01F7  FBA 1.01 GB
 #02         89(0x0059)                     shared E#01E3  FBA 1.01 GB
 #03(J:)     20(0x0014)                     shared E#01EF  FBA 1.01 GB
 #04         98(0x0062)                     shared E#02EC  FBA 1.01 GB
 #05         37(0x0025)                     shared E#01FB  FBA 0.51 GB
 #06        110(0x006e)                     shared E#02F7  FBA 0.51 GB
 #07         62(0x003e) 4 vols,strp.sz 2    shared E#02FB  FBA 0.51 GB
 #08         21(0x0015)                 BCV shared E#01EF  FBA 1.01 GB
 #09(H:)     22(0x0016)                 BCV shared E#01EF  FBA 1.01 GB
 #10         23(0x0017)                 BCV shared E#0285  FBA 1.01 GB
 #11         24(0x0018)                 BCV shared E#0286  FBA 1.01 GB
 #12         25(0x0019)                 BCV shared E#01EA  FBA 1.01 GB
 #13         26(0x001a)                 BCV shared E#0287  FBA 1.01 GB
 #14         27(0x001b)                 BCV shared E#0288  FBA 1.01 GB
 #15         28(0x001c)                 BCV shared E#0289  FBA 1.01 GB
 #16(T:)     99(0x0063)                 BCV shared E#01EB  FBA 1.01 GB
 #17        100(0x0064)                 BCV shared E#02AD  FBA 1.01 GB
 #18        101(0x0065)                 BCV shared E#02AE  FBA 1.01 GB
 #19        102(0x0066)                 BCV shared E#02AF  FBA 1.01 GB
 #20         66(0x0042)                 BCV shared E#01F1  FBA 0.51 GB
 #21         67(0x0043)                 BCV shared E#029E  FBA 0.51 GB
 #22         68(0x0044)                 BCV shared E#029F  FBA 0.51 GB
 #23         69(0x0045)                 BCV shared E#02A0  FBA 0.51 GB
 #24        111(0x006f)                 BCV shared E#01F8  FBA 0.51 GB
 #25        112(0x0070)                 BCV shared E#02B0  FBA 0.51 GB
 #26        113(0x0071)                 BCV shared E#02B1  FBA 0.51 GB
 #27        114(0x0072)                 BCV shared E#02B2  FBA 0.51 GB
 #28        115(0x0073)                 BCV shared E#01FF  FBA 0.51 GB
 #29        116(0x0074)                 BCV shared E#02B3  FBA 0.51 GB
 #30        117(0x0075)                 BCV shared E#01FA  FBA 0.51 GB
 #31        118(0x0076)                 BCV shared E#02B4  FBA 0.51 GB
 #32        119(0x0077)                 BCV shared E#02B5  FBA 0.51 GB
 #33        120(0x0078)                 BCV shared E#02B6  FBA 0.51 GB
 #34        121(0x0079) 4 vols,strp.sz 2 BCV shared E#02B7  FBA 0.51 GB
 #35        125(0x007d) 4 vols,strp.sz 2 BCV shared E#02BB  FBA 0.51 GB
 #36        129(0x0081) 4 vols,strp.sz 2 BCV shared E#02BF  FBA 0.51 GB
```

For example, if you are looking for the local FDRSOS disk E#01EF, you will find it on #09 which is H: drive.

If you want details on the EMC MetaVolume attached on #07, specify:

```
hostdisk #07 /d
```

Which would display:

```
HostDisk 3.1.3 - Determines host information for EMC drives
Drive: #07 ()

Drive details:
   Removable       : No
   Wide 16-bit     : Yes
   Wide 32-bit     : No
   Vendor ID       : EMC
   Product ID      : SYMMETRIX
   Revision Level  : 5266
   FDRSOS MVS label: E#02FB

EMC Symmetrix configuration:
   SymmNumber 62 (0x003e),   EMC label: SYM03E
   System ID 0x00
   Shared
   Cylinders 1106, FBA IBM 3370 (1.6GB) 0.51GB
   Mirror1
   Mirror2
   MetaVolume info: number 0 in group (head)
                    group head symm number 003e
                    group size 4
                    stripe size 2
```

19.11 Non Disruptive Backups Using BCVs

TimeFinder is an EMC Symmetrix feature which supports a fast point in time copy of volume onto a mirrored disk. In TimeFinder there is a standard volume which contains the data to be backed up. A Business Continuance Volume (BCV) is a mirror of the standard volume which is set "not ready" while it's an active mirror. A TimeFinder command can cause the volume to be split, at which point it becomes addressable as a separate volume.

This section discusses using a BCV to perform a file level backup on Windows using basic disks. See the EMC documentation for a description of the techniques for dynamic disks. All the BCV operations can be performed using batch files, thus making the entire operation automated.

Before beginning:

- ☐ You must have EMC Control Center and Solutions Enabler with the TimeFinder component installed on your system. You also need the EMC ResourcePak for Windows which includes the System Integration Utilities. The TimeFinder component must also be installed on the Symmetrix box as well. See your EMC representative for details concerning the Symmetrix configuration.

  You'll need to add the EMC CLI and Utilities directories to the your PATH environment variable. Assuming you installed EMC Control Center and Solutions Enabler on the C: drive:

  - C:\Program Files\EMC\SYMCLI\binaries
  - C:\Program Files\EMC\Utilities for Windows NT

- ☐ You also must have certain information about your EMC disks. You must know which disks are configured as 'standard data volumes', and which are configured as BCVs. Your EMC CE generally configures the Symmetrix array. We supply a program that will give you this information called 'hostdisk'. Using the /l (local) option will show you all the Symmetrix disks that are seen by your system, and will tell you which ones are configured as a BCV volumes.

  The following is a sample output from the hostdisk /l command:

```
HostDisk 3.1.3 - Determines host information for EMC drives
 - local view:
   Device          Symm Num     MetaVolume       Type     FDRSOS   Emulation
 ------------------------------------------------------------------------------
 #01              11(0x000b)                     shared   E#01F7  FBA 1.01 GB
 #02              89(0x0059)                     shared   E#01E3  FBA 1.01 GB
 #03(J:)          20(0x0014)                     shared   E#01EF  FBA 1.01 GB
 #04              98(0x0062)                     shared   E#02EC  FBA 1.01 GB
 #05              37(0x0025)                     shared   E#01FB  FBA 0.51 GB
 #06             110(0x006e)                     shared   E#02F7  FBA 0.51 GB
 #07              62(0x003e)  4 vols,strp.sz 2   shared   E#02FB  FBA 0.51 GB
 #08              21(0x0015)      BCV            shared   E#01EF  FBA 1.01 GB
 #09              23(0x0017)      BCV            shared   E#0285  FBA 1.01 GB
 #10              24(0x0018)      BCV            shared   E#0286  FBA 1.01 GB
 #11              25(0x0019)      BCV            shared   E#01EA  FBA 1.01 GB
 #12              26(0x001a)      BCV            shared   E#0287  FBA 1.01 GB
```

Note: The commands discussed below are detailed in the following EMC manuals.

- "EMC Solutions Enabler, SYMCLI Base Component Product Guide"
- "EMC Solutions Enabler, SYMCLI TimeFinder Component Product Guide"
- "EMC Control Center, Symmetrix Manager for Windows NT Product Guide"

- "EMC ResourcePak for Windows Product Guide"

19.11.1 Setup Procedures:

You need to create a device group and associate the disks you'll be using to that group, once after you've chosen the disks you'll be using.

☐ **Prepare the disks.** Using the output from the hostdisk program determine, by physical disk and SYM number, which disk you will be using as standard volume and which one is the BCV. Both disks must be the same size. Using the NT Disk Administrator verify that the BCV disk has assigned a drive letter. If it does not, create a single large partition for the disk, format it and assign it a NT drive letter to the volume.

☐ **Create a device group** An EMC Device Group is simply one or more Symmetrix logical disks, which you then operate on using a single command. Many of the EMC commands require that the disks be in a device group. The procedure is to create the device group and then associate the standard volume and the BCV with the device group name.

Device groups are created at a command prompt using the EMC **symdg** program. It's syntax is:

```
symdg create groupname
```

For example, to create the device group labtest, enter from a command prompt:

```
symdg  create labtest
```

You can verify the group was created using the command **symdg list**

☐ **Add the standard volume to the device group** After creating the device group you need to add the standard volume to it, using it's Windows NT device name.

The Windows NT device name uses the format:

```
\\.\PHYSICALDRIVE<number>
```

<number> is the Disk Administrator number for the disk (or the first column in HOSTDISK). You can optionally add a logical name to the disk; one will be created for you if you do not. Use the **symld** program. It's syntax is:

```
symld -g groupname add pd physical_disk_name logical_name
```

For example, to add the physical disk #3 as the standard volume to the device group labtest with the logical name real_data:

```
symld -g labtest add pd \\.\PHYSICALDRIVE3 real_data
```

☐ **Associate the BCV volume to the device group** In similar fashion to adding a standard volume, you must associate the BCV volume to the device group. You can optionally add a logical name to the disk. One will be created for you if you do not.

Use the program **symbcv**, which has the following syntax:

```
symbcv associate pd physical_disk_name logical_name -g groupname
```

For example, to associate physical drive #9 to the device group labtest with the logical name bcv_data:

```
symbcv associate pd \\.\PHYSICALDRIVE9 bcv_data -g labtest
```

- **Verify the device group** You can verify which disks make up the device group as well as the status of the group with the following commands:

```
symld –g groupname list
symmir –g groupname query
symmir –g groupname verify
```

The above procedures only need to be done once, unless you change disks or the group configuration becomes corrupt.

19.11.2 Performing Backups

The following procedures will need to be performed for each backup.

- **Save the Windows NT disk signature** Before you synchronize the disks, it is necessary to save the Windows NT disk signature. Once the 'establish' command is performed, the BCV will be an exact replica of the standard volume, including the disk signature. Windows NT was not designed to have two disks with the same signature therefore you must save the signature so you can later restore it before bringing the volume back on line. In fact, saving and restoring the disk signature must be part every 'Split-establish' operation.

The EMC command line program **symntctl** is used to save the signature. Its syntax is:

```
symntctl signature –pd disk<number> -save
```

For example, to save the signature for disk #9.

```
symntctl signature –pd disk9 -save
```

- **Unmount the BCV disk** Before synchronizing the disks, the BCV volume should be unmounted. At this point, the disk will not be addressable from the operating system. Again, use the **symntctl** command line program. For the unmount command, use the drive letter rather than the physical disk number. The syntax is:

```
symntctl umount drive_letter:
```

For example, to unmount the h: drive:

```
symntctl umount h:
```

- **Establish the disks as a 'BCV Pair'** At this point, the disks are ready to be synchronized, making the BCV an off-line mirror of the standard volume. The first time a 'BCV Pair' is synchronized, it must be done with the 'symmir establish' command, using the '–full' option, which causes all the data on the standard volume to be written to the BCV. You can also use the Control Center GUI.

Subsequent establish actions will not need the –full option as long as the 'symmir split' command uses the –diff option, which causes a differential split. When the –diff option is used during a split, and the -full option is NOT used during the subsequent establish command, only the changed tracks are synchronized, thus making the operation faster.

The syntax of the symmir command line program is:

```
symmir  -g  groupname establish  [-full] -noprompt
```

For example, to perform the establish on the group labtest:

```
symmir -g labtest establish -noprompt
```

- **Split the BCV Pair** At this point you have a fully functioning BCV Pair. The BCV volume is not addressable from the NT system. The Windows explorer program does not see the disk, and the Windows Disk Administrator will list it as 'off-line, no configuration information available'. In order to back up the data on the BCV volume, you must make it addressable to the operating system.

  This is performed using the split command with the symmir program. This will break the 'mirror', which is the first step in making the disk addressable to the operating system. Use the –diff option to perform a differential split, which will make subsequent establish and split operations more efficient by only updating the changed tracks. The syntax of this command is:

  ```
  symmir -g groupname split -diff -noprompt
  ```

  For example, to split the volume group labtest:

  ```
  symmir -g labtest split -diff -noprompt
  ```

- **Restore the Disk Signature** You must restore the original disk signature, as Windows NT was not designed to handle two disks with the same signature. Use the signature command with the symntctl program. It's syntax is:

  ```
  symntctl signature -pd disk<number> -restore
  ```

  For example, to restore the signature of disk #9 saved previously:

  ```
  symntctl signature -pd  disk9 -restore
  ```

- **Mount the BCV Volume** This is the last step to make the BCV volume addressable to the operating system. You must mount the disk and associate it with a Windows NT drive letter. Use the mount command with the symntctl program. It's syntax is:

  ```
  symntctl mount drive_letter -pd  disk<number>
  ```

  For example, to mount the h: drive on disk #9:

  ```
  symntctl mount h: -pd disk9
  ```

  At this point the disk is fully addressable from the operating system. You can see the disk in the Windows Explorer program and the Disk Administrator. You can now back up the data using UPSTREAM or UPSTREAM/SOS on this disk by targeting the NT drive letter used to mount the disk.

  The archive bit can not be used as a reliable technique to determine changed files as the archive bits, along with all other data is constantly being refreshed from the primary. So we recommend using the MODIFYFILE technique (the incremental determination technique used by UPSTREAM in UNIX) rather than archive bits and we recommend that you disable resetting archive bits in your backup. Thus in your parameter files, in the overall specs, specify:

```
MODIFYFILE Y
```

To disable resetting archive bits, in each file spec, specify:

```
ARCHIVEBIT N
```

After the backup is complete, you can re-establish the disks as a 'BCV Pair'

19.11.3 Samples

You can automate this process by putting the commands in a batch job and using UPSTREAM's PREJOB and POSTJOB options. The following are sample batch jobs to do this. This assumes that there are no databases being backed up. Database backups require additional handling; see the EMC documentation for more information. These samples also assume that the disks have been fully established at least once using the '-full' option and generally remain established except while being backed up.

UPSTREAM pre and post processing jobs require that the program name to execute be fully qualified. The examples below assume the default directory for the EMC programs.

- **Sample preprocess job** This batch job splits the BCV Pair, restores the NT disk signature to its original value and mounts the volume to a NT drive letter. This is done before performing the backup.

  Note that this job assumes that the disk signature from the BCV has been saved, the BCV unmounted, and the disks established. In other words, that the steps above and those in the postprocess job have been done previously. Thus if you are running this for the first time, you should independently run the post-process job before running the backup (with it's embedded pre-process job).

```
@echo off
symmir.exe -g labtest split -diff -noprompt
symntctl.exe signature -pd disk9 -restore
symntctl.exe mount h: -pd disk9
```

- **Sample post process job** This batch job saves the NT disk signature, un-mounts the volume and re-establishes the disks as a 'BCV Pair'

```
@echo off
symntctl.exe signature –pd disk9 -save
symntctl.exe umount h: -pd disk9
symmir.exe –g labtest establish –noprompt
```

19.11.4 Restores

Assuming that you used UPSTREAM to perform file-level backups of the data, you'll similarly use UPSTREAM to perform restores. Files should be restored to the source volume rather than the BCV. Note that the drive letter as stored in UPSTREAM will likely be different than the destination.

19.12 FDRSOS NetWare Considerations

19.12.1 Introduction

This appendix describes the procedures for the backup and restore of NetWare volumes for NetWare v4x and v5x.

FDRSOS includes a facility where Novell NetWare attached EMC drives (or any type of drive) can be mounted/dismounted throughout an FDRSOS backup or restore. While you can always manually mount/dismount a volume from the system console, this facility allows the process to be automated from a workstation and/or from the server. This facility also allows a workstation to load or unload an NLM and run an NCF server batch file on NetWare v4.x and v5.x servers.

This facility is useful when implementing FDRSOS during:

- A backup when you wish to assure that the drive(s) are not being accessed.
- A restore when you wish to assure that no users are going to be affected during the restore process.

There is an NLM which allows a mount or dismount without user intervention (regardless of open files): NWMOUNT.NLM and a workstation program (available for Windows NT and OS/2 at this time and other operating systems in the future) NWSERVER which allows you to run server functions from a workstation.

19.12.2 Programs

The FDRSOS NetWare disk consists of only a few files in directories appropriate to the operating system they are to be run in. The files are (relative to the root of the diskette or the \SOS directory on the CD-ROM):

File Name	Description
GENDATA.EXE	A test data generation program provided to help you generate a large amount of data quickly.
NOVELL\NLM\NWMOUNT.NLM	Allows you to mount or dismount from the server a volume without user prompts. This file must be installed in the server's SYS:SYSTEM directory or some directory in the SEARCH path.
NOVELL\NLM\VOLLIB.NLM	A Novell supplied library which loads facilities required by NWMOUNT.
NOVELL\NT\NWSERVER.EXE	A 32-bit Windows NT program which allows NLMs and NCF files to be executed as well as volumes mounted and dismounted on NetWare v4.x servers.
NOVELL\OS232\NWSERVER.EXE	A 32-bit OS/2 program which allows NLMs and NCF files to be executed as well as volumes mounted and dismounted on NetWare v4.x servers.

FDRSOS NetWare Drive Management Files

19.13 Backups and Restores

We recommend that backups of NetWare volumes be performed with all the volumes in a disk dismounted for maximum integrity. However, as this is not always possible, in most cases you can still perform backups which will restore correctly. We recommend, however, that you perform periodic baseline backups with the volumes dismounted.

If you have multi-disk volumes you must backup and restore all the disks in the volume at the same time.

For restores you must always dismount the volumes before performing restores. It is not necessary, nor is it recommended that the volume be defined to NDS before the restore. This will force NetWare, when the restore has completed, to refresh it's internal image of the volume.

If you wish, you can restore a volume to a new name by specifying VOLRESET=NO. In this case, the volume will be renamed by FDRSOS by adding a "_S" suffix. Once the restore is complete, the volume can be mounted, even if it is a multi-disk volume.

19.14 NWMOUNT.EXE

This is a VERY DANGEROUS program which allows, from the console, the ability to mount or dismount a volume without any user prompts. If you run the server console command DISMOUNT <volume> and there are open files, you will be prompted and given an opportunity to not dismount the volume at this time. NWMOUNT allows you to dismount the volume without the prompt, facilitating automation.

Run this program from the system console (or from a workstation using NWSERVER described below). VOLLIB.NLM must be loaded before NWSERVER. It's format is:

LOAD NWMOUNT <volume> [/Mount] [/Dismount]

Where:

- **<volume>** Is the NetWare server's volume name that you wish to mount or dismount. Do not include the trailing colon.
- **/Mount** requests that the specified volume be mounted. You should be sure that the SOS backup/restore has completed before performing this function.
- **/Dismount** requests that the specified volume be dismounted. As stated above, this is very dangerous.

For example, if you wish to dismount the VOL1 volume from the server console, specify:

```
LOAD NWMOUNT VOL1 /Dismount
```

If you wish to remount the volume, specify:

```
LOAD NWMOUNT VOL1 /Mount
```

You may need to load the system module VOLLIB.NLM before NWMOUNT will load successfully.

Note that if you have dismounted the SYS volume, you can not run NWMOUNT to remount it as the NWMOUNT.NLM is not available (it is on an volume that is currently unavailable). However, you can use NWSERVER (described below) to remount the SYS volume from a workstation.

NWMOUNT creates a separate screen to display messages in. If there is an error, this screen remains displayed until a key is pressed to give you an opportunity to read the messages. All significant messages are also written to the system console (for console logging purposes).

There are other advanced switches including:

- **/List** allows you to list all the volumes on the server (whether mounted or not, whether valid or not) with a significant amount of detail. Do not specify <volume> with this option.
- **/One** allows you to list volume detail for a single, specified volume.
- **/F<file name>** allows all output to be written to the specified file name instead of the screen. The file name should be specified in NetWare format immediately after the /F option (for example: /FSYS:NWMOUNT.OUT). This option can be combined with any other option.
- **/R<new volume name>** allows you to rename <volume> to <new volume name>. Since this option does not interact with directory services, and since there are problems renaming a volume which has a duplicate volume name, we recommend using this option only after consultation with Innovation Technical Support.

19.15 NWSERVER.EXE

NWSERVER.EXE is a Windows NT or OS/2 program which allows you to perform a number of server related functions from a workstation.

Its form is:

NWSERVER <server> <function> ...parameters... [/t]

Where:

- **<server>** Is the NetWare server name that you wish to access. This must always be the first parameter and is required.
- **<function>** One of the function types below. Subsequent parameters are specific to the function type.
- **[/t]** An optional parameter that you can specify after the last function parameter to enable tracing.

The functions supported are:

- **NCF** Specify this function if you wish to run an NCF batch file on the server. The single required parameter is the fully qualified path name of the NCF file that you wish to run. For example:

  ```
  NWSERVER SERVER1 NCF SYS:SYSTEM\TEST.NCF
  ```

- **NLM** Specify this function if you wish to load an NLM on the server. The single required parameter is the fully qualified path name of the NLM that you wish to load. Note that you can not pass parameters to the NLM. For example:

  ```
  NWSERVER SERVER1 NLM SYS:SYSTEM\USNDS.NLM
  ```

- **UNLOAD** Specify this function if you wish to unload a pre-loaded NLM on the server. The single required parameter is the name of the NLM that you wish to unload (this parameter is not usually fully qualified). For example:

  ```
  NWSERVER SERVER1 UNLOAD USNDS.NLM
  ```

- **MOUNT** Specify this function if you wish to mount a specified volume. The single required parameter is the volume name (without the trailing colon). This function is particularly useful for automating the mounting of the SYS volume when you used NWMOUNT to dismount it. For example:

  ```
  NWSERVER SERVER1 MOUNT SYS
  ```

- **DISMOUNT** Specify this function if you wish to dismount a specified volume. The single required parameter is the volume name (without the trailing colon). Note that this function is not terribly useful, as if there are ANY open files on the volume, the console will display a list of these files and wait for user intervention to acknowledge the breaking of the connection to these files. For example:

  ```
  NWSERVER SERVER1 DISMOUNT VOL1
  ```

Note that all NWSERVER functions require that you be logged in with console operator rights.

NWSERVER returns a zero program return code if the function could be initiated. For MOUNT, DISMOUNT and UNLOAD, this indicates whether the actual function was successful. For NCF, and NLM this indicates whether the function was started, but not the final return code.

19.16 Automation

To automate the process of dismounting, a volume for backup most users will create two batch files on their workstation (one for mounting and one for dismounting), and one NCF batch file on their server (for dismounting).

For example, through host automation which can run an application on a workstation (FDR/UPSTREAM is such a facility) you wish to run a job which will dismount a volume before beginning an EMC backup. Create a batch file on the workstation similar to the following:

```
Echo This batch file DISMOUNTs VOL1 on SERVER1
Echo It should only be called from the host.
NWSERVER SERVER1 NCF SYS:SYSTEM\VOL1DOWN.NCF
```

Sample batch file to dismount a volume

Note that your host facility should check the program return code from NWSERVER to see if the NCF file was correctly executed.

You would then write an NCF file on the server which would unmount the volume:

```
NWMOUNT VOL1 /Dismount
```

Sample VOL1DOWN.NCF

When the SOS backup has completed, run a batch file to remount the dismounted volume:

```
Echo This batch file remounts VOL1 on SERVER1
NWSERVER SERVER1 MOUNT VOL1
```

Sample batch file to remount a volume

Again, you will want to check the program return code to verify that the mount was successful; if not you will want to take manual action to examine the problem.

19.17 FDRSOS AIX Considerations

19.17.1 Introduction

To use FDRSOS to back up or restore AIX attached EMC drives there are recommended procedures which help to guarantee that the data is complete and correct and that the operating system is properly notified.

Recommended procedures are provided for:

- Backup.
- Restoring disks to their original locations.
- Restoring one or more physical disks to different locations and scratching the original disks.
- Restoring a single volume volume group as a copy on the same system.
- Restoring a multiple volume volume group as a copy on the same system.

Note that coordination for the sequencing of host and workstation/server automated procedures is provided by FDR/UPSTREAM. FDR/UPSTREAM's USTBATCH host facility allows you to integrate workstation/server batch jobs into your host scheduling facilities. And FDR/UPSTREAM's host job execution facility allows host batch jobs to be executed from workstation/server automation. This allows you to coordinate the workstation/server procedures below with the execution of FDRSOS on the host. See chapter 8 (USTBATCH) in the FDR/UPSTREAM MVS manual and chapter 23 (Advanced FDR/UPSTREAM) in the FDR/UPSTREAM Workstation/Server manual for more information.

19.17.2 Recommended Backup Procedure

☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volume(s) on the physical disk(s) in RAW mode. You can use smit **umountfs** or the **umount** command to unmount file systems.

If the file systems can not be dismounted, you should insure that all cached I/O has been flushed out to the disk. Also, you should insure that no one is writing to the file system during the backup.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use smit **varyoffvg** or the **varyoffvg** command to deactivate a volume group. Again, if you can not deactivate the volume group, flush all I/Os to disk and verify that no users are writing to the file system.

☐ Run the SOS backups.

☐ Activate the volume group if the physical disk(s) are in a volume group. You can use smit **varyonvg** or the **varyonvg** command to activate a volume group.

☐ Remount the file systems. You can use smit **mountfs**, smit **mountg** (if the file systems have been assigned to a group), or the **mount** command to mount a file system.

- ☐ Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.17.3 Restoring one or more physical disks to original locations

- ☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volume(s) on the physical disk(s) in RAW mode that are to be used for the restore. You can use smit **umountfs** or the **umount** command to unmount file systems.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

- ☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use smit **varyoffvg** or the **varyoffvg** command to deactivate a volume group.
- ☐ Run the SOS restore. If you are restoring a multiple volume volume group, you MUST restore all of the volumes in the volume group.
- ☐ Activate the volume group if the physical disk(s) are in a volume group. You can use smit **varyonvg** or the **varyonvg** command to activate a volume group.
- ☐ Remount the file systems. You can use smit **mountfs**, smit **mountg** (if the file systems have been assigned to a group), or the mount command to mount a file system.
- ☐ Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.17.4 Restoring one or more physical disks to different locations and scratching the original disks.

- ☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volume(s) on the physical disk(s) in RAW mode. You can use smit **umountfs** or the **umount** command to unmount file systems.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

- ☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use smit **varyoffvg** or the **varyoffvg** command to deactivate a volume group.
- ☐ If the physical disk(s) are in a volume group, export the volume group. You can use smit **exportvg** or the **exportvg** command to export a volume group.
- ☐ Clear the physical volume id's (PVID's) from both the original and target physical disk(s) BEFORE running the restore. This is VERY important. AIX will not tolerate duplicate physical volume id's. To clear a PVID, use the following form of the chdev command:

```
chdev -l hdisk# -a pv=clear
```

hdisk# represents the name of the physical volume such as hdisk5.

- ☐ Run the SOS restore. If you are restoring a multiple volume volume group, you MUST restore all of the volumes in the volume group.

- ☐ If the physical volume(s) are in a volume group, you must assign the physical volume id's of the restored physical volume(s). Note that physical volume id's will be the physical volume id's of the original volumes. Use smit **chgdsk** for EACH target volume. Make sure you change ***ASSIGN physical volume identifier*** to **yes**. AIX will use the physical volume identifier found on the restored volume.

- ☐ If the physical volume(s) are in a volume group, import the volume group. You can use smit **importvg** or the **importvg** command to import a volume group.

- ☐ Remount the file systems. You can use smit **mountfs**, smit **mountg** (if the file systems have been assigned to a group), or the **mount** command to mount a file system.

Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.17.5 Restoring a single volume volume group as a copy on the same system.

- ☐ Ensure that target volume has been assigned a physical volume id BEFORE running the restore. Use smit **chgdsk** to display the physical volume id of the target volume. If it already has one, then cancel out of this smit screen. If not, change ***ASSIGN physical volume identifier*** to **yes** and perform the change.

- ☐ Run the SOS restore using the VOLRESET=NO option. SOS will preserve the physical volume id. To allow you mount the file systems on the copy at the same time as the originals, SOS will change the mount points of all file systems during the restore by appending _sos to the original mount point.

  For example, if the original volume group had a file system with a mount point of /myfilesys, SOS will change it to /myfilesys_sos. This change will be picked up by AIX when the volume group is imported.

- ☐ Import the volume group. You can use smit **importvg** or the **importvg** command to import a volume group. Note that you can not use the name of the original volume group. You must assign a new name.

- ☐ You can now mount the file systems on the new volume group. Remember that the mount points will be have _sos appended to the original mount point.

19.17.6 Restoring a multiple volume volume group as a copy on the same system.

- ☐ Clear the physical volume id's (PVID's) from target physical disk(s) BEFORE running the restore. To clear a PVID, use the following form of the chdev command:

```
chdev -l hdisk# -a pv=clear
```

  hdisk# represents the name of the physical volume such as hdisk5.

- ☐ Run the SOS restore using the VOLRESET=NO option. You MUST restore all of the volumes in the volume group. SOS will assign new physical volume id's to all of the volumes in the volume group. To allow you to mount the file systems on the copy at the same time as the originals, SOS will change the mount points of all file systems during the restore by appending _sos to the original mount point.

  For example, if the original volume group had a file system with a mount point of /myfilesys, SOS will change it to /myfilesys_sos.

This change will be picked up by AIX when the volume group is imported.

- ☐ You must assign the physical volume id's of the restored physical volume(s). Note that physical volume id's will be the physical volume id's set by SOS. Use smit **chgdsk** for EACH target volume. Make sure you change ***ASSIGN physical volume identifier*** to **yes**. AIX will use the physical volume identifier found on the restored volumes.

- ☐ Import the volume group. You can use smit **importvg** or the **importvg** command to import a volume group. Note that you can not use the name of the original volume group. You must assign a new name.

- ☐ You can now mount the file systems on the new volume group. Remember that the mount points will be have _sos appended to the original mount point.

19.17.7 hostdisk

hostdisk is a program which displays the host volume, as labeled by FDRSOS, for a disk which can be seen both by AIX and the host.

What it does is use EMC specific SCSI commands to read the CE (customer engineer) specific tracks. These tracks consists of disk area which is not used by programs, but is for EMC specified use. EMC has allocated a range of space on these tracks for Innovation which FDRSOS uses to hold the host volume name.

WARNING: When run on BCV volumes, HOSTDISK may either hang or report the label for the last disk it was connected to. Thus, we recommend that it not be used for BCV volumes.

hostdisk is an AIX command line executable; you must be root to run it. There is a variety of ways to run it. If you run it without parameters you'll get this help information:

```
HostDisk 3.1.3 - Determines host information for EMC drives
Invalid number of parameters
Format:
 - for information on a single device
      hostdisk /dev/<device name> [/Detail]
 - for information on locally available devices
      hostdisk /l[ocal]
 - for a brief look on EMC configuration
      hostdisk /a[ll]
 - for a full information on EMC configuration
      hostdisk /f[ull]
 - to set an output page size for /l and /a add /p=nn (24 is a default)
      hostdisk /a /p=50 |more  - for 50 lines on page
```

- For information on a specific device specify

  ```
  hostdisk /dev/<device>
  ```

  If you specify the /D (or /d) switch, Symmetrix details are displayed.

- For information on all your local EMC logical disks and (including the FDRSOS label for each one):

```
hostdisk /l
```

- For information on all the EMC logical disks on the array that this system is connected to:

```
hostdisk /a
```

- For full report with extensive details for all the disks on the array that this system is connected to:

```
hostdisk /f
```

- Output for /l and /a switches is formatted as a table with the default of 24 lines per page. To change the page size add /p=*nn*, where *nn* is the number of line in your page.

For example, if you wish to see the labels for all the Symmetrix disks attached to your system, enter:

```
hostdisk /l
```

Which would display:

```
HostDisk 3.1.3 - Determines host information for EMC drives
 - local view:
  Device        Symm Num   MetaVolume      Type   FDRSOS  Emulation
 ____________________________________________________________________
 /dev/hdisk3    8(0x0008)                 shared E#01E0  FBA 1.01 GB
 /dev/hdisk4   86(0x0056)                  shared E#01E4  FBA 1.01 GB
 /dev/hdisk5   17(0x0011)                  shared E#02E6  FBA 1.01 GB
 /dev/hdisk6   95(0x005f)                  shared E#02ED  FBA 1.01 GB
 /dev/hdisk7   34(0x0022)                  shared E#01FC  FBA 0.51 GB
 /dev/hdisk8  107(0x006b)                   shared E#02F4  FBA 0.51 GB
 /dev/hdisk9   50(0x0032) 4 vols,strp.sz 2  shared E#02FC  FBA 0.51 GB
```

For example, if you are looking for the local FDRSOS disk E#01E4, you will find it on /dev/hdisk4.

If you want details on the EMC MetaVolume attached, specify:

```
hostdisk /dev/hdisk9 /d
```

Which would display:

```
HostDisk 3.1.3 - Determines host information for EMC drives
Drive: /dev/hdisk9

   FDRSOS MVS label: E#02FC

EMC Symmetrix configuration:
   SymmNumber 50 (0x0032),   EMC label: SYM032
   System ID 0x00
   Shared
   Cylinders 1106, FBA IBM 3370 (1.6GB) 0.51GB
   Mirror1
   Mirror2
   MetaVolume info: number 0 in group (head)
                    group head symm number 0032
                    group size 4
                    stripe size 2
```

19.18 FDRSOS HP-UX Considerations

19.18.1 Introduction

To use FDRSOS to back up or restore HP-UX attached EMC drives, there are recommended procedures which help to guarantee that the data is complete, correct and the operating system is properly notified.

Recommended procedures are provided for:

- Backup.
- Restoring disks to their original locations.
- Restoring one of more physical disks to different locations or as a copy on the same system.

Note that coordination for the sequencing of host and workstation/server automated procedures is provided by FDR/UPSTREAM. FDR/UPSTREAM's USTBATCH host facility allows you to integrate workstation/server batch jobs into your host scheduling facilities. And FDR/UPSTREAM's host job execution facility allows host batch jobs to be executed from workstation/server automation. This allows you to coordinate the workstation/server procedures below with the execution of FDRSOS on the host. See chapter 8 (USTBATCH) in the FDR/UPSTREAM MVS manual and *Advanced FDR/UPSTREAM* chapter in the FDR/UPSTREAM Workstation/Server manual for more information.

19.18.2 Recommended Backup Procedure

☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volumes(s) on the physical disk(s) in RAW mode. You can use SAM utilities or 'umount' command to unmount the file systems.

If the file systems cannot be dismounted, you should insure that all cached I/O has been flushed out to the disk. Also, you should insure that no one is writing to the file system during the backup.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use SAM utilities or the 'vgchange' command to deactivate a volume group. Again, if you cannot deactivate the volume group, flush all I/Os to disk and verify that no users are writing to the file system.

☐ Run the SOS backups.

☐ Activate the volume group if the physical disk(s) are in a volume group. You can use SAM utilities or the 'vgchange' command to activate a volume group.

☐ Perform 'file check' on the unmounted file systems to insure integrity. For example:

```
fsck -F vxfs -o full ......
fsck ............
```

☐ Remount the file systems. You can use SAM utilities or the 'mount' command to mount a file system.

☐ Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.18.3 Restoring one or more physical disks to original locations

- ☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volume(s) on the physical disk(s) in RAW mode that are to be used for the restore. You can use SAM utilities or the 'umount' command to unmount file systems.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

- ☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use SAM utilities or the 'vgchange' command to deactivate the volume group.
- ☐ Run the SOS restore. If you are restoring a multiple volume 'volume group', you MUST restore all of the volumes in the volume group.
- ☐ Activate the volume group if the physical disk(s) are in a volume group. You can use SAM utilities or the 'vgchange' command to activate a volume group.
- ☐ Perform 'file check' on the unmounted file systems to insure integrity. For example:

```
fsck -F vxfs -o full ......
fsck ............
```

- ☐ Remount the file systems. You can use SAM utilities or the 'mount' command to mount a file system.
- ☐ Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.18.4 Restoring one or more physical disks to different locations

- ☐ Unmount ALL active file systems in the volume group and/or shutdown any applications using the physical disk(s) or logical volume(s) on the physical disk(s) in RAW mode that are to be used for the restore. You can use SAM utilities or the 'umount' command to unmount file systems.

WARNING: If you do not unmount the file system before a backup or restore, the data will be corrupt.

- ☐ If the physical disk(s) are in a volume group, deactivate the volume group. You can use SAM utilities or the 'vgchange' command to deactivate the volume group.
- ☐ If the physical disk(s) are in a volume group, export the volume group. You can use SAM utilities or the 'vgexport' command to remove the volume group. The use of the 'vgexport' 'mapfile' parameter is recommended to retain the logical volume names for the 'vgimport'. Otherwise the system will create default logical volume names of 'lvol1, lvol2, etc.'.

```
vgexport -v -m mapfilename vg_xxx
```

- ☐ Run the SOS restore. If you are restoring a multiple volume 'volume group', you MUST restore all of the volumes in the volume group.
- ☐ Recreate the target volume group directory and target group file using the following commands:

```
cd /
mkdir dev/vg_xxxx                        vg_xxxx is volume group name
mknod /dev/vg_xxxx/group c 64 0xNN0000  NN is unique 'minor number'
                                         relating to volume group number
```

- ☐ Import volume group using SAM or the following command:

```
vgimport -v -m mapfilename /dev/vg_xxxx /dev/dsk/cxtydz /dev/dsk/cx2ty2dz2 ...
```

- ☐ Activate the volume group if the physical disk(s) are in a volume group. You can use SAM utilities or the 'vgchange' command to activate a volume group.

- ☐ Perform 'file check' on the unmounted file systems to insure integrity. For example:

```
fsck -F vxfs -o full ......
fsck ............
```

- ☐ Remount the file systems. You can use SAM utilities or the 'mount' command to mount a file system.

- ☐ Restart the applications (if any) that were using the physical disk(s) or logical volume(s) in RAW mode.

19.19 FDRSOS Solaris Considerations

19.19.1 Warning

WARNING: ALL BACKUPS OF SUN VOLUME MANAGER DISKS SHOULD BE DONE WITH THE FILE SYSTEMS UNMOUNTED!

This is required to "harden" the data and insure that all data is written to the disk, as described in Section 220.11 in the FDRSOS manual. If a backup is done with a file system then a restore of that backup may result in downlevel data or other errors.

19.19.2 Restoring to an alternate volume

If you wish to restore backups of SUN Volume Manager disks to spare disk volumes (as described in Section 220.14 of the FDRSOS manual), use this procedure:

☐ 1. If the spare volumes are currently known to the SUN volume manager, usually because you have previously used them as the target of a FDRSOS restore, you must unmount the file systems on those volumes and deport the volumes before doing the restore.

☐ 2. Do the FDRSOS restore, to the spare disk volumes, with the VOLRESET=NO parameter. FDRSOS will change the internal volume name and volume group ID to make them unique. It will also make the volume group name unique by overlaying the first character of the volume group name with an underscore; for example, if the group name was "testgroup", VOLRESET=NO will change it to "_estgroup".

If the underscore is not acceptable or does not result in a unique group name, you can specify the FDRSOS parameter "SUNGROUPID=xxx" on the MOUNT statement for the output volume. "xxx" is 1 to 3 characters; these characters will be made lower case (even if entered in upper case) and used to overlay the beginning of the group name. For example, SUNGROUPID=TMP will change "testgroup" to "tmptgroup". You must use the same SUNGROUPID value while restoring all volumes in the group.

If you specify PRINT=STATUS on the RESTORE statement, FDRSOS will display the group and volume names before and after the restore; the after display will show the modifications described above.

☐ 3. If the spare volumes were not previously managed by the SUN volume manager, you must refresh the volume manager so that it will recognize the new volumes. From the root user, issue:

```
vxdctl enable
```

☐ 4. Import the volume group using the new group name set by FDRSOS (step 2 above). You can use the GUI interface of the volume manager (vxva), the menu interface (vxdiskadm), or the vxdg command. For the latter, issue from the root user:

```
vxdg import _estgroup
```

☐ 5. Start the volumes in the group you just imported. You can either start specific volumes or all the volumes. You can use the GUI or menu interfaces of the volume manager, or the vxvol command. For the latter, issue from the root user:

```
vxvol -g _estgroup volume_name    (for a specific volume)
vxvol -g _estgroup startall       (for all volumes)
```

☐ 6. Mount the file system(s) on the started volume(s). You can use either the GUI interface of the volume manager, or the mount command.

To use the mount command, you should refer to /etc/vfstab for the options used to mount the original file system.

You will need to create a new mount point and use the new device name and new mount point to mount the file system. Volume manager device names for a given volume will be:

```
/Dev/vx/dsk/diskgroup/volumename
/dev/vx/rdsk/diskgroup/volumename
```

To mount a SUN (Veritas) file system on a volume named "vol01" which is in the disk group restored as _estgroup at mount point /test, issue this command:

```
mount -F vxfs /dev/vx/dsk/_estgroup/vol01 /test
```

At this point the files on the restored volumes should be accessible.

19.19.3 WARNING ON USE OF RESERVE=YES

We have found that the use of RESERVE=YES on DUMP statements may cause problems if the Open System using the volumes you are backing up is sensitive to a long term RESERVE on the volume. If the volume may still be in use on the Open System during the FDRSOS backup, you may need to omit RESERVE=YES (or specify RESERVE=NO). This is most likely to be a problem if the Open System volume involved is a system volume to the Open System (e.g., the boot volume).

In particular we have found that Sun Solaris systems will fail if their system volumes are reserved for long periods of time.

However, this may also be true for other Open System or for application-type volumes (such as data bases).

Certainly it will be true that doing a long-term RESERVE on a system or application volume will probably cause that system or application to hang until the backup is complete.

The default on a DUMP is RESERVE=NO.

19.19.4 Initializing the Local Backup disk on Sun SPARC

In order to use FDRSOS local backup volumes with FDR/UPSTREAM/SOS on a SUN SOLARIS system running on a SUN SPARC platform, a special procedure must be followed. This does not apply to SOLARIS running on an Intel-type platform.

☐ 1. the disk is brand new, never before used, you should erase the disk completely with the FDRSOS ERASE TYPE=FULL function.

☐ 2. from the SUN system, you must format the disk volume and specify a volume name of "FDRSOS". To do so:

- Use the "format" command to format the disk. "format" will list the disks available to the system; select the disk to be used for local backups.
- Use the "volname" subcommand to assign a volume name of "**FDRSOS**" to the volume. The volume must be named FDRSOS; using any other name will result in FDR/SOS being unable to initialize the volume.
- Use the "partition" subcommand to delete all partitions on the volume **except the "backup" partition** which must be partition 2. For every partition whose "tag" is other than "unassigned", you must modify that partition to mark it "unassigned" and change its starting and ending cylinders to 0 (zero).
- When done you can use the "verify" subcommand to verify that the volume is correctly initialized. The output will look something like this:

```
format> verify

Primary label contents:

Volume name   = < FDRSOS>
ascii name    = <EMC-SYMMETRIX-5264 cyl 1103 alt 2 hd 15 sec 64>
pcyl          = 1105
ncyl          = 1103
acyl          =    2
nhead         =   15
nsect         =   64
Part   Tag           Flag   Cylinders         Size                    Blocks
0      unassigned    wm     0             0             (0/0/0)             0
1      unassigned    wm     0             0             (0/0/0)             0
2      backup        wu     0 - 1102      517.03MB      (1103/0/0)    1058880
3      unassigned    wm     0             0             (0/0/0)             0
4      unassigned    wm     0             0             (0/0/0)             0
5      unassigned    wm     0             0             (0/0/0)             0
6      unassigned    wm     0             0             (0/0/0)             0
7      unassigned    wm     0             0             (0/0/0)             0
```

☐ 3. use the FDRSOS LOCALBACKUP function to make the formatted disk as a FDRSOS local backup.

Warning: if you do not follow this procedure, in this order, the local backup disk will be usable from non-SUN systems but not from the SUN system. Disks initialized with this procedure will be usable on the SUN and most other Open Systems.

19.20 Linux x86 Local Backup Support

You can now use FDR/UPSTREAM's UPSTREAM/SOS local backup disks on most x86 Linux systems. Previous versions of FDR/UPSTREAM did not support local backup disks because character disk devices, required for application access to physical disk drives, are not part of the standard Linux kernel. To use this facility you must be running a Linux distribution that includes *rawio*.

Linux distributions based on the 2.2 kernel will only have *rawio* if the *rawio* patch was applied to the base Linux kernel; some of these include recent versions of RedHat, SuSE and TurboLinux. Linux distributions based on the 2.4 kernel should have *rawio* support built in.

To verify if you have *rawio* support installed, run the **raw** command. This command is part of *rawio* and is used to set and query block devices bound to a raw (character) device. When run with no arguments, the **raw** command will display its usage. If the command is not found you probably do not have *rawio* incorporated into the kernel on your system.

However, some distributions may not install the **raw** command if you do a minimal installation and the **raw** command is in a package that is not part of that distribution's minimal package set. In this case you should look on the installation media for a package with a likely name of **rawio**. The package containing the **raw** command must be installed, as this command is required to setup the device that will be used as the local backup device.

19.20.1 Linux *rawio* notes

Unlike UNIX operating systems, Linux does not create character device files for disk devices. To access a raw disk, the disk block device file must be bound to a raw character device file with the **raw** command. It should be noted that these bindings are not persistent and must be established every time the system is booted. It should also be noted that the *rawio* patch incorporated into the 2.2 kernels probably does not contain support to unbind a raw device. You must reboot a system without unbind support in order to clear unwanted or incorrect raw device bindings. If a recent kernel update is available for your Linux distribution (dated after January 2001) that you have not installed, it might contain the updated *rawio* patch that adds unbind support.

If your system has the updated version of rawio, you can unbind a raw device by using the raw command to bind it to major number 0 and minor number 0. On systems without the updated rawio patch, the use of major number 0 and minor number 0 will be rejected.

19.20.2 Setup

Raw disk access is provided by *rawio* through device files created with the mknod command with a major number of 162 and a minor number between 1 and 255. There is also a file that is used to perform *rawio* control operations that has a major number of 162 and a minor number of 0. FDR/UPSTREAM uses this file and assumes it is named **/dev/rawctl**. Most Linux distributions with rawio will already have this file. Some Linux distributions may be using raw device file names based on an early *rawio* patch, or may have created raw device files using names unique to that distribution. In either case you will have to create **/dev/rawctl** with the mknod command. You must be the root user to use mknod. To create /dev/rawctl, enter:

```
# mknod /dev/rawctl c 162 0
```

Under no circumstances should you remove the file created by your Linux distribution for *rawio* control. The raw command will no longer work if you do.

For each disk device that you want to use as a local backup disk, you must create a raw device file for use by FDR/UPSTREAM. In order to do, you must first select the disks that you want to use for local backup. You will need to know the Linux device names that correspond to the SCSI devices you want to use. You can browse the output of the **dmesg** command for the messages generated at boot time by the *sd* driver listing the detected SCSI disks.

As can be seen in the following sample output from **dmesg**, the SYMMETRIX disk with an id or target of 0 and lun 0 will be SCSI disk sdh, the device file for this disk is /dev/sdh.

```
(scsi1:0:0:0) Synchronous at 40.0 Mbyte/sec, offset 8.
  Vendor: EMC       Model: SYMMETRIX         Rev: 5267
  Type:   Direct-Access                      ANSI SCSI revision: 02
Detected scsi disk sdh at scsi1, channel 0, id 0, lun 0
(scsi1:0:1:0) Synchronous at 40.0 Mbyte/sec, offset 8.
  Vendor: EMC       Model: SYMMETRIX         Rev: 5267
  Type:   Direct-Access                      ANSI SCSI revision: 02
Detected scsi disk sdi at scsi1, channel 0, id 1, lun 0
(scsi1:0:2:0) Synchronous at 40.0 Mbyte/sec, offset 8.
  Vendor: EMC       Model: SYMMETRIX         Rev: 5267
  Type:   Direct-Access                      ANSI SCSI revision: 02
Detected scsi disk sdj at scsi1, channel 0, id 2, lun 0
```

If you make any changes to your SCSI configuration, it is very likely that the Linux device names shown above will change. The above output is from a system that contains a single channel ultra2 SCSI controller and a dual channel differential controller. The devices shown above are connected to the first channel of the differential controller. The ultra2 controller is the first SCSI controller seen by Linux and has seven SCSI disks connected to it. These disks are assigned to device files sda-sdg. The SYMMETRIX disks are then assigned to device files starting with sdh. If a disk were added to the first SCSI controller, the names of each SYMMETRIX disk will change and would now start at sdi. Similarly, if a disk were removed from the first SCSI controller, the names of the SYMMETRIX disks would now start at sdg. When any changes are made to your SCSI configuration, you must check the output from the **dmesg** command. If the device names of the local backup disks have changed, you will have to perform the following setup again.

Assuming you want to use the SYMMETRIX disk with id 1 and lun 0 as your local backup device which in Linux is /dev/sdi, you must create a raw device file for FDR/UPSTREAM and use the raw command whenever the system is booted to bind the *sd* device file to the raw device file. FDR/UPSTREAM will only use raw device files named:

```
/dev/rsdxx
```

Where sdxx corresponds to the Linux device name. The raw device files are created with the **mknod** command. These files must have a major number of 162. The minor number can be between 1 and 255 and must be unique for each file. If you are running other software that is using *rawio*, you must use minor numbers for the FDR/UPSTREAM raw device files that are different than the ones already in use. For example, the setup documentation for Oracle Parallel Server for Linux suggests creating a raw device for the Node Monitor named /dev/raw/nodemtr with a minor number of 1. In this case you should not use a minor number of 1 for any of the FDR/UPSTREAM raw device files. Assuming that no other raw devices are being used, to create the raw device file for /dev/sdi enter:

```
# mknod /dev/rsdi -c 162 1
```

The *-c* option in mknod creates a character device. If you want to create a raw device file for a second local backup disk on /dev/sdj enter:

```
# mknod /dev/rsdj -c 162 2
```

In order to use these raw device files, they must be bound to the appropriate sd device with the raw command every time the system is booted. You might want to put these commands in the local system startup script for your distribution. The name of this file tends to vary from distribution to distribution. Some typical names for this file are */etc/rc.d/rc.local* and */etc/rc.d/boot.local*. To bind these raw device files enter:

```
# raw /dev/rsdi /dev/sdi
# raw /dev/rdsj /dev/sdj
```

The output from the above commands will show the major and minor number of the block device that the raw device was bound to. In addition, the name of the raw device shown in this output will not be the name used with the raw command. It will be of the form */dev/raw/rawn* where n will be the minor number used when creating the raw device file. The base part of the name may be different depending on the distribution.

20 Management and Reporting

FDR/UPSTREAM offers a wide variety of management facilities both on the host and on the workstation/server. This chapter discusses some of the management features including:

- Profile Management. This facility allows a manager to view and delete single backups or all backups for a backup profile.
- Profile Configuration. Allows the display, creation, modification and deletion of backup profile definitions on the host.
- Status of FDR/UPSTREAM MVS. Allows the viewing of active processes within FDR/UPSTREAM MVS and several features including the termination of an active process.
- Host Reporting. FDR/UPSTREAM MVS supports a powerful reporting system. This facility is also available on the workstation/server.
- Personalization. This is a configuration feature of FDR/UPSTREAM where an administrator can determine (“personalize”) a copy of FDR/UPSTREAM on a workstation for specific functions.
- Registration Management. Allows an administrator to view, create, modify and delete host registration entries.
- FDR/UPSTREAM Software Auto-Updates. FDR/UPSTREAM can be configured to automatically update its own software (including FDR/UPSTREAM ULTra workstations). This facility uses registration and is described in this chapter.

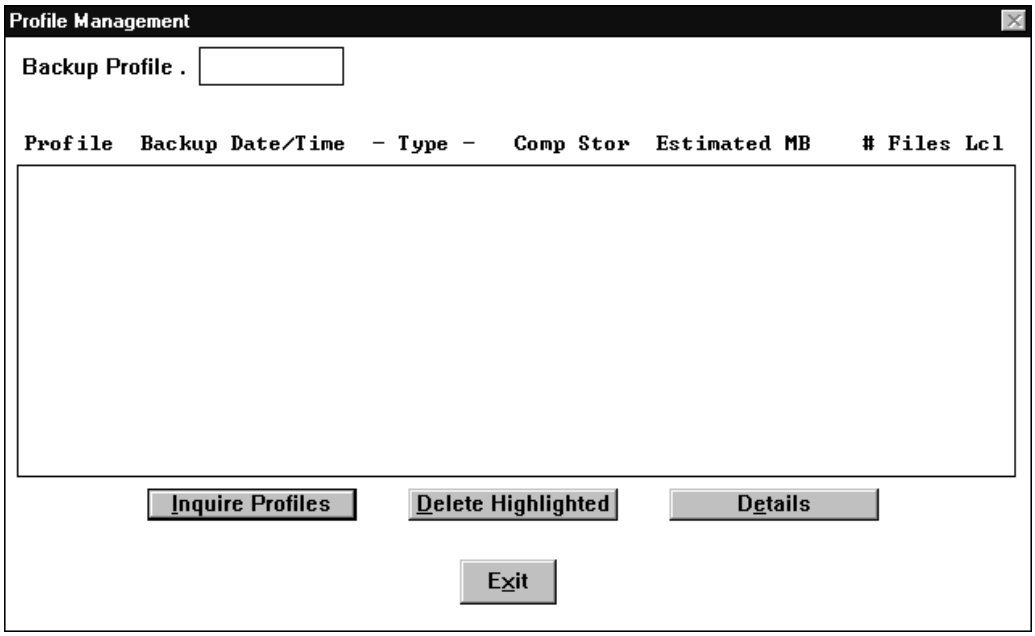
20.1. Profile Management

Profile Management is a facility of the FDR/UPSTREAM program US.EXE that allows authorized users to view and delete complete backups (versions), and delete all backups within a profile.

Care must be taken in using this facility, as the deletion of active data without the knowledge of the owner of that data is often a problem.

To assure that this facility is only used by those who are authorized two checks are performed. Standard FDR/UPSTREAM security is validated (see the Security chapter and the FDR/UPSTREAM MVS manual), and there is also a Personalization option for Profile Management. Note that the old method using the file **PROFMGT.NUL** is no longer used.

To access Profile Management, pull down the Management menu and select Profile Management. You will see the Profile Management dialog .



The parameters in this dialog are:

- **Backup Profile:** Enter the backup profile name you wish to see the backups for. The default is the backup profile specified in security validation.

  If you wish to see the versions for a group of profiles with a common prefix, enter the prefix name followed by an asterisk. For example, to see all the versions for the profiles SERVER1, SERVER2 and SERVER3, enter SERVER*. Leave the field blank or enter a single asterisk ('*') to view all backups.

- **Profiles List:** This list box contains the profiles and versions maintained by FDR/UPSTREAM MVS. This box is filled when you press the <Inquire Profiles> button. Highlighted entries are used by the <Delete Highlighted> and <Details> buttons. Displayed information includes (in a mono-space font, displayed in columns):

- The profile name (Profile). The name is displayed a single time for all backups for a profile, on its own line.
- The date/time the backup was begun (Backup Date/Time)
- The backup type (Type). Values displayed are Merge Full, Merge Inc., Keyed, Archive, Physical.
- Whether the backup was completed (Comp). The column has Intr if it was interrupted.
- The storage type (Stor), either Disk or Tape
- Estimated Megabytes (Estimated MB). The value is calculated by the workstation/server when the backup is begun and may not be exact.
- Number of files (# Files).
- A local backup file number if a local backup was specified.

☐ **Inquire Profiles:** Press this button to see the profiles and the versions contained in each profile currently maintained by FDR/UPSTREAM MVS. You must perform this inquiry to delete or view the profile information.

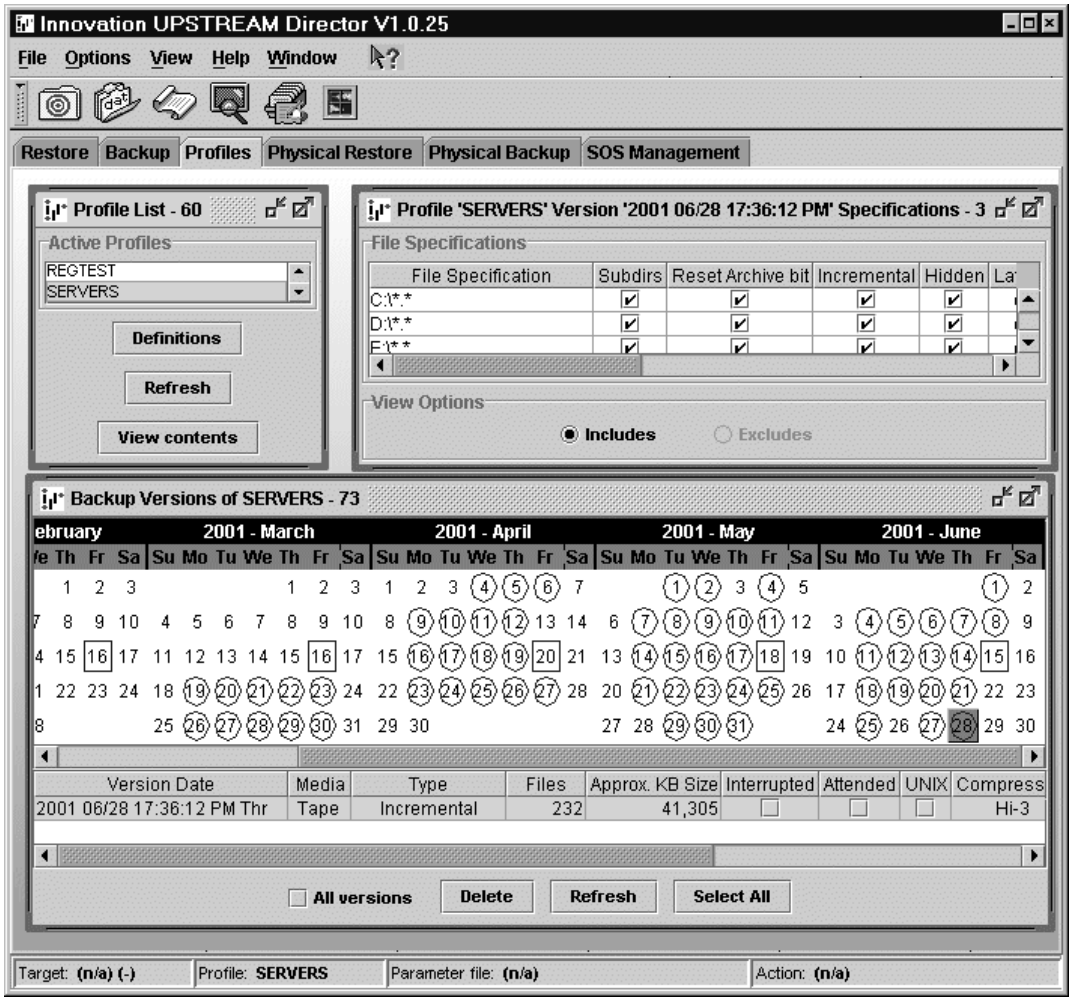
☐ **Delete Highlighted:** Press this button to delete the profile or version currently highlighted in the list box. You will be asked for confirmation before the function is done. During the deletes, a status dialog is displayed.

When the delete has finished, the entries are replaced with the word DELETED. These entries can no longer be viewed or otherwise modified. Later inquiries will no longer show the versions deleted.

☐ **Details**: Press this button to view the version currently highlighted in the list box. You must highlight a version, not a complete profile. The information displayed is the same as for an inquire versions done in the restore dialog.

☐ **Exit:** Press this button when you have finished.

The UPSTREAM Director offers a similar facility. Press the Profiles tab to see all backups for a given profile:



To delete a given backup, highlight the backup's date in the Backup Versions frame Calendar and press the **Delete** button.

20.2. Profile Configuration

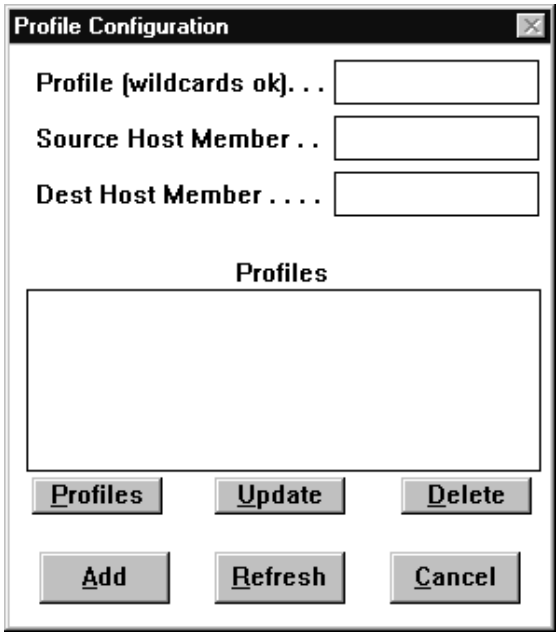
Each backup profile must be configured to FDR/UPSTREAM MVS either explicitly (where the configuration specifies the exact name) or implicitly(where the configuration specifies a global or prefix name). This configuration specifies such options as limitations, file prefixes and the like.

Backup Profile configurations can be modified on the host by modifying the configuration member and either using the FDR/UPSTREAM MVS configurator (USTCONFG) or through console commands. You can also modify them from your PC.

Care must be taken in using this facility, as improper modifications may cause working backup profiles to no longer operate correctly.

To assure that this facility is only used by those who are authorized two checks are performed. Standard FDR/UPSTREAM security is validated (see the Security chapter and the FDR/UPSTREAM MVS manual), and there is also a Personalization option for Profile Management. Note that the old method using the file **PROFMGT.NUL** is no longer used.

To access Profile Configuration, pull down the Management menu and select Profile Configuration. You will see the Profile Configuration dialog.



This is primarily a selection dialog where you select profiles or configuration members to modify, add or delete.

- **Profile:** If you wish to view or update an existing profile, enter a backup profile name or a part of a name and an asterisk wildcard and press the <Profiles> button. If you wish to add a new profile, enter a complete (non wildcarded) profile name in this field and press the <Add> button.

- **Source Host Member:** If you wish to add/update/delete backup profiles in the default host configuration member you can leave this field blank. This field is filled in with the default name when you press the <Profiles> button. If you wish to perform an action on another host member enter that member name.

- **Dest Host Member:** Leave this field blank (or accept the automatically entered value) unless you wish to create a new host configuration member, using the Host Member value (entered above) as the source and this value as the destination. Most users will rarely do this. During this process, if you add, update or delete a member the change will be reflected in the new member. Note that by specifying the same Host Member and Destination Host Member multiple times will continually erase the contents of the Destination Host Member. FDR/UPSTREAM will automatically change the Host Member to be the value of the Destination Host Member when you actually perform an add or update.

- **Profiles List:** This list, which is filled in after you press the <Profiles> button, contains the profiles which matched the value entered in the Profile field. If you double-click an entry it is the same as pressing the <Update> button. The highlighted entry is used when you press the <Update> or <Delete> buttons.

- **Profiles:** Press this button to retrieve from the host the profiles entered in the Profile field.

- **Update:** Press this button to view and/or update the profile information which is currently highlighted in the Profiles List.

- **Delete:** Press this button to delete the profile currently highlighted in the Profiles List.

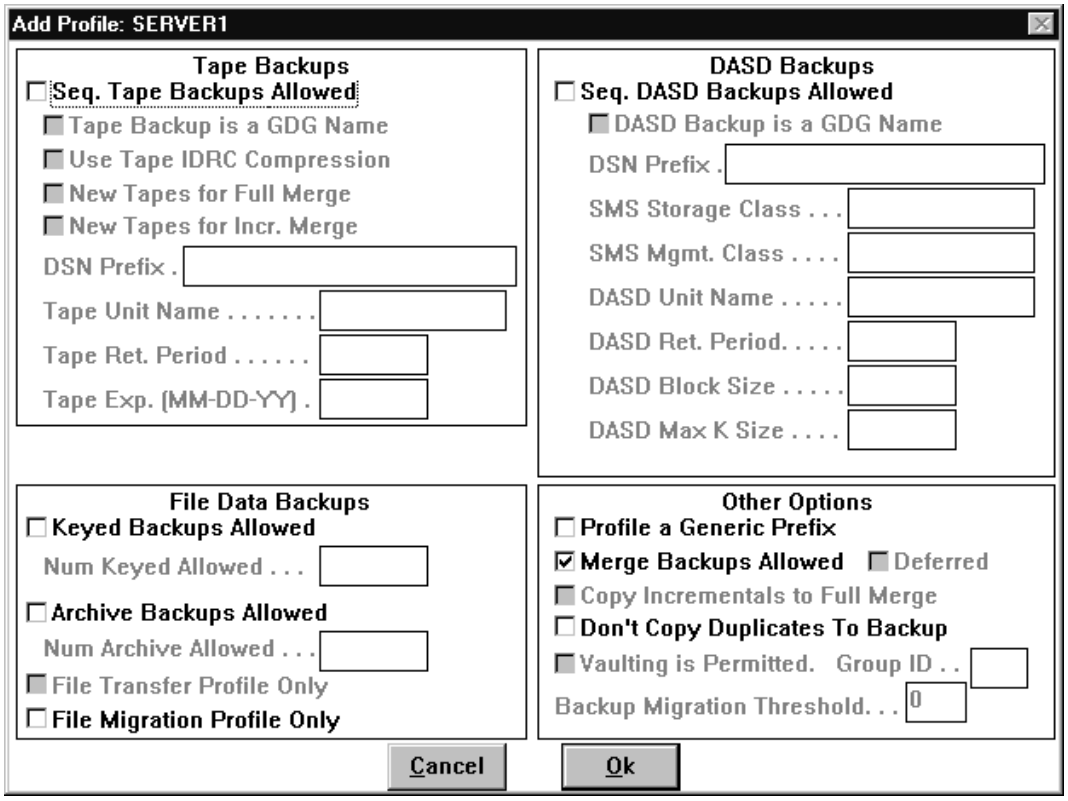
- **Add:** Press this button to add a new profile which will have the name specified in the Profile edit field. If you have an existing profile highlighted in the Profiles List, the values in that profile will be used as defaults for the new profile.

- **Refresh:** Press this button to have the active configuration in FDR/UPSTREAM MVS refreshed with the values changed in this facility. Additionally, if you change the Destination Host Member, that will become the active member.

- **Cancel:** Press this button to leave this dialog.

FDR/UPSTREAM will begin a conversation with the host when you press the <Profiles>, <Delete> or <Refresh> buttons. If you press the <Add> or <Update> buttons you will see the Profile Modification dialog .

Many of the fields in the Profile Modification dialog are unfamiliar to PC users. Pressing the [F1] button will provide help specific to the field you have highlighted.



There is a similar dialog in the UPSTREAM Director.

The fields in the Tape Backups frame are:

- **Seq. Tape Backups Allowed:** Check this box if you wish to allow this profile to perform backups directly to tape. You must enter a tape DSN Prefix and a Tape Unit. Checking this box will activate the other parameters in the Tape Backups frame.

- **Tape Backup is a GDG Name:** Check this box if you wish tape backup datasets to be allocated as new generations of a GDG. This is not recommended, since FDR/UPSTREAM MVS will automatically uncatalog unneeded tapes and tape management systems will scratch expired backups. If used, the GDG base name specified in "Tape DSN Prefix" must be predefined in your MVS system catalogs before it can be used by FDR/UPSTREAM MVS; be sure you define sufficient generations in the GDG base to retain all required backups.

- **Use Tape IDRC Compression:** Check this box if you are using 3480/3490 cartridge drives and wish to have FDR/UPSTREAM MVS specify the TRTCH=COMP parameter when dynamically allocating the tape backup to request hardware (IDRC) compaction of the tape dataset. IDRC compaction may be used even you don't check this box if compaction is your system default.

- **New Tapes for Full Merge:** Check this box if you will be using MERGE BACKUP, both full and incremental backups are stored on tape and you do NOT wish the full backups appended to the tape used for incremental back-ups. Otherwise the full backup will be appended to the tape used for incremental backups. It is more efficient to NOT check this box.

- **New Tapes for Incr. Merge:** Check this box if you will be using MERGE BACKUP, both full and incremental backups are stored on tape and you do NOT wish incremental backups after the first backup stored on the same tape.

Otherwise the first incremental backup will use a new tape and subsequent incremental backups will be appended to that tape. It is more efficient to NOT check this box.

- **Tape DSN Prefix:** This is a required field if you check the Seq. Tape Backups Allowed check box above. Specify a 1 to 35 character dataset name prefix that will be used to dynamically allocate the tape dataset for the backup. The prefix may include periods (".") to separate index levels and must meet MVS standards for dataset names.

  If you do not enable the tape GDG option in this profile, FDR/UPSTREAM will allocate the backup file as a non-GDG. The length of this value must not exceed 19 characters and FDR/UPSTREAM will add 3 additional index levels at the end of the name to create a unique dataset name: profile name, the date as "Dyymmdd", and the time as "Thhmmss".

  If the tape GDG option is enabled in the profile, the backup datasets will be allocated as new generations of a GDG; this field must specify the GDG base name and may be up to 35 characters long. The GDG base must be predefined in the appropriate MVS catalog along with the number of generations to keep. If the tape GDG option is enabled in a profile which is a prefix or has a profile name as GLOBAL and the LAST index level of this field matches the profile prefix name (or GLOBAL), then FDR/UPSTREAM will substitute the actual profile name used by the workstation. For example, if the profile has a prefix of ABC, is a GDG Name, and this field is BACKUP.ABC but the workstation uses profile name ABC123, the actual GDG name will be BACKUP.ABC123. This allows unique dataset names to be generated based on the actual profile name. The GDG bases for these modified names must be predefined, and the total length of the name with a maximum 8 character profile name cannot exceed 35 characters. If the last index does not match, the unmodified GDG name will be used for all actual profile names (in this case, GDG is not recommended).

- **Tape Unit Name:** Applies only to profiles where Seq. Tape Backups Allowed has been checked and specifies a MVS tape unit name (any value that will allocate a tape device when specified in a UNIT= parameter in JCL). This unit name will be used when dynamically allocating the backup dataset. This field is required when the Seq. tape backups are enabled.

- **Tape Ret. Period:** Applies only to profiles where the Seq. Tape Backups Allowed check box has been checked. The meaning is identical to the JCL parameter RETPD=; the number of days that a tape will be maintained before it is expired. This is optional; by default no expiration date or retention period is specified when the dataset is allocated. Either this field or "Tape. Exp." can be specified, not both. FDR/UPSTREAM MVS does not explicitly enforce these dates, but if you have a tape management system which does, FDR/UPSTREAM MVS will recognize that the dataset has been scratched or uncataloged during USTMAINT execution.

  WARNING: Be sure that the expiration date you specify causes the backups to be retained for a sufficient period. Once the backups are scratched by tape management systems, they are no longer available to FDR/UPSTREAM MVS and the next execution of USTMAINT will cause them to be deleted from UPSTREAM's records.

- **Tape Exp. (MM-DD-YY):** Applies only to profiles where the Seq. Tape Backups Allowed check box has been checked. The meaning is identical to the JCL parameter EXPDT=. This value must be specified in MM-DD-YY format; special expirations such as 99000 would be entered as 00-00-99. Either this field or "Tape Ret. Period" can be specified, not both. This field is optional; by default no expiration date or retention period is specified when the dataset is allocated. FDR/UPSTREAM MVS does not explicitly enforce these dates, but if you have a tape management system which does FDR/UPSTREAM MVS will recognize that the dataset has been scratched or uncataloged during USTMAINT execution. Most users will use tape Ret. Period rather than this field.

  WARNING: Be sure that the expiration date you specify causes the backups to be retained for a sufficient period. Once the backups are scratched by tape management systems, they are no longer available to FDR/UPSTREAM MVS and the next execution of USTMAINT will cause them to be deleted from UPSTREAM's records.

The fields in the DASD Backups frame are:

- ☐ **Seq. DASD Backups Allowed:** Check this box if you wish to allow this profile to perform backups to sequential host disk files (DASD). You must enter a DASD DSN Prefix, a DASD Unit or SMS Storage Class.

- ☐ **DASD Backup is a GDG Name:** Check this box if you wish the DASD backup datasets to be allocated as new generations of a GDG. This is recommended for backups on sequential disk, since GDG processing will automatically delete old generations. The GDG base name specified in "DASD DSN Prefix" must be predefined in your MVS system catalogs before it can be used by FDR/UPSTREAM MVS; be sure you define sufficient generations in the GDG base to retain all required backups.

- ☐ **DASD DSN Prefix:** This is a required field if you check the Seq. DASD Backups Allowed check box above. Specify a 1 to 35 character dataset name prefix that will be used to dynamically allocate the tape dataset for the backup. The prefix may include periods (".") to separate index levels and must meet MVS standards for dataset names.

  If you do not enable the DASD GDG option in this profile, FDR/UPSTREAM will allocate the backup file as a non-GDG. The length of this value must not exceed 19 characters and FDR/UPSTREAM will add 3 additional index levels at the end of the name to create a unique dataset name: profile name, the date as "Dyymmdd", and the time as "Thhmmss".

  If the DASD GDG option is enabled in the profile, the backup datasets will be allocated as new generations of a GDG; this field must specify the GDG base name and may be up to 35 characters long. The GDG base must be predefined in the appropriate MVS catalog along with the number of generations to keep. If the DASD GDG option is enabled in a profile which is a prefix or has a profile name as GLOBAL and the LAST level of this field matches the profile prefix name (or GLOBAL), then FDR/UPSTREAM will substitute the actual profile name used by the workstation. For example, if the profile has a prefix of ABC, a GDG Name, and this field is BACKUP.ABC but the workstation uses profile name ABC123, the actual GDG name will be BACKUP.ABC123. This allows unique dataset names to be generated based on the actual profile name. The GDG bases for these modified names must be predefined, and the total length of the name with a maximum 8 character profile name cannot exceed 35 characters. If the last index does not match, the unmodified GDG name will be used for all actual profile names (in this case, GDG is not recommended).

- ☐ **SMS Storage Class:** Applies only to profiles where the Seq. DASD Backups Allowed check box has been checked if your MVS system has SMS (System Managed Storage) enabled. It specifies a 1-8 character storage class name that will be passed to SMS during the dynamic allocation of the backup dataset; it will be used by SMS if the dataset becomes SMS managed (see SMS Storage Class). Consult your storage administrator or MVS system programmer for valid storage class names. Note that SMS may override or ignore your storage class even if you do not specify one in the profile. The operand is optional and defaults to no storage class name.

- ☐ **SMS Mgmt. Class:** Applies only to profiles where the Seq. DASD Backups Allowed check box has been checked if your MVS system has SMS (System Managed Storage) enabled. It specifies a 1-8 character management class name that will be passed to SMS during the dynamic allocation of the backup dataset; it will be used by SMS if the dataset becomes SMS managed (see SMS Storage Class). Consult your storage administrator or MVS system programmer for valid management class names. Note that SMS may override or ignore your management class even if you do not specify one in the profile. The operand is optional and defaults to no management class name.

- ☐ **DASD Unit Name:** Applies only to profiles where Seq. DASD Backups Allowed has been checked and specifies a MVS disk unit name (any value that will allocate a disk device when specified in a UNIT= parameter in JCL). This unit name will be used then dynamically allocating the backup dataset; there must be one or more volumes with a mount attribute of STORAGE included in that unit. Either this field, or SMS Storage Class is required when the Seq. DASD backups are enabled.

- ☐ **DASD Block Size:** Applies only to profiles where the Seq. DASD Backups Allowed check box has been checked and specifies the blocksize to be used when allocating those backups; it is no longer used as the actual blocksize so

you generally do not need to specify it. Values from 1024 to 32760 are accepted. The parameter is optional and has a default of the value of DASDBLK= on the MAIN statement in this configuration (10752 if not specified there).

- **DASD Ret. Period:** Applies only to profiles where the Seq. DASD Backups Allowed check box has been checked. The meaning is identical to the JCL parameter RETPD=; the number of days that a file will be maintained before it is expired. This is optional; by default no retention period is specified when the dataset is allocated. FDR/UPSTREAM MVS does not explicitly enforce these dates, but if you have a DASD management system which does FDR/UPSTREAM MVS will recognize that the dataset has been scratched or uncataloged during USTMAINT execution.

  WARNING: Be sure that the expiration date you specify causes the backups to be retained for a sufficient period. Once the backups are scratched by DASD or disk management systems, they are no longer available to FDR/UPSTREAM MVS and the next execution of USTMAINT will cause them to be deleted from UPSTREAM's records.

The fields in the File Data Backups frame are:

- **Keyed Allowed:** Check this box if you wish to allow this profile to perform keyed (online) backups. These are backups in which the data is stored in the FILE_DATA cluster and rolled-off by FDR/UPSTREAM MVS when the maximum number entered is exceeded. You must enter a maximum number of backups to be stored.

- **Num Keyed:** Specify the number of Online (keyed) backups which will be retained for this workstation by FDR/UPSTREAM MVS. It can have a value from 0 to 4096; 0 prohibits the workstation from performing keyed backups. During the backup, if this count is exceeded, the oldest backup version associated with this profile is deleted. The operand is optional, with a default of 0. The host title is ONLINE=. This field is grayed unless you check the Keyed Backups Allowed check box above.

- **Archive Allowed:** Check this box if you wish to allow this profile to perform archived backups. These are backups in which the data is staged in the FILE_DATA cluster and then migrated to tape when you run the archive utility. The backups are rolled-off by FDR/UPSTREAM MVS when the maximum number entered is exceeded. You must enter a maximum number of backups to be stored.

- **Num Archive:** Specify the number of Archive (non-keyed) backups which will be retained for this workstation by FDR/UPSTREAM MVS. It can have a value from 0 to 4096; 0 prohibits the workstation from performing archive backups. During the backup, if this count is exceeded, the oldest archive version associated with this profile is flagged for deletion during the next execution of USTARCH, the archive utility. The operand is optional, with a default of 0. The host title is ARCHIVE=. This field is grayed unless you check the Archive Backups Allowed check box above.

- **File Transfer Profile Only:** Check this box if you wish to use this backup profile ONLY for file transfers. If you check this box, you cannot use this profile for backups. If checked the tape/DASD information specified above is used as the default values, thus you may choose to have multiple file transfer profiles, each with different attributes. This box is grayed unless you have checked either DASD or tape (above) and have not checked the Merge Backups Allowed checkbox.

- **File Migration Profile Only:** Check this box if you wish to use this backup profile ONLY for file migration. If you check this box you cannot use this profile for standard backups or file transfers. The default is not checked.

The fields in the Other Options frame are:

- **Generic Prefix:** Check this box if you wish the profile you are adding or updating to be used as a prefix profile name. Your profile name can be from 1 to 7 characters. Similar to the GLOBAL profile, the parameters in this profile will be used when the profile name entered at the workstation does not exist in the configuration, as long as the profile name starts with the characters specified. Checking this box allows you to define a number of profiles with a

single entry. This may be used to define a set of profiles for the use of a single workstation, for various purposes, or may be used to define profiles for a set of workstations. In any case, be sure that a given profile name will be used only for a single purpose.

- ☐ **Merge Backups Allowed:** Check this box if you wish this profile to be used for MERGE BACKUP processing; the profile must also be enabled for DASD (sequential disk) or Tape backups. Profiles enabled for Merge can also be used to do non-merge backups. When you check this box, the Deferred and File Transfer boxes become ungreyed and available

  MERGE BACKUP is the recommended backup technique. It is more efficient than non-merge full and incremental backups and allows for simpler restores.

- ☐ **Deferred:** Check this box if you wish the merge backups to be deferred. This process causes FDR/UPSTREAM to defer the merging of prior tape information until the merge defer utility is run at a later time, thus reducing the number of tape mounts at the time the merge backup is performed. Unless you must reduce tape mounts during the merge backup process, it is recommended that you NOT check this option. Note that the merge defer utility must be run to assure that the tape is complete. The default is not checked.

- ☐ **Copy Incrementals to Full Merge:** Check this box if you will be using MERGE BACKUP with incremental backups stored on disk and full backups stored on tape and you wish the incrementals to be copied to the full backup tape.

- ☐ **Don't Copy Duplicates to Backup:** Check this box if you wish duplicate files to not be copied to the backup disk or tape file. That means that when a restore is requested, the file data will be restored from the duplicate file database. Checking this box will reduce the amount of storage required on the backup files, but will make maintenance of the duplicate file database more difficult, and reduce the performance of the restores. The default is not checked.

- ☐ **Vaulting is Permitted:** Check this box if you wish the backups stored in this profile to be eligible for vaulting. Vaulting is the process where copies of the backups are created to be sent to a disaster site for disaster recovery. Vaulting is described in full in the FDR/UPSTREAM MVS manual. The default is not checked.

- ☐ **Group ID:** You can specify a two character field to cause this profile to be eligible for vaulting when a USTVLTXX (where XX matches this suffix) is processed. If the suffix is not specified, then if vaulting is enabled, these backups can be included in any vault run.

- ☐ **Backup Migration Threshold.**: Specify the number of sequential DASD backups that you wish to keep on disk before they are migrated to tape using the USTMIGRT utility. Specify 0 if you wish to either not use the USTMIGRT utility or you wish these backups to not be migrated. The default is 0. The migration process is for the backups once they are on the mainframe. This process is particularly useful if you will be backing up a number of workstations and wish to efficiently use your tape drives while minimizing the amount of host DASD space you are using. You can use this process by specifying a non-zero number in this field and specifying a Sequential Disk backup in the backup screens. This process can result in slightly slower merges if you are using it for incrementals and can result in long delays if you run a number of fulls which require the same tapes.

The buttons are:

- ☐ **Ok:** Press this button to perform the add or update. You will be asked again if you are sure and if you respond YES, then the profile information is transmitted to the host and validated.

- ☐ **Cancel:** Press this button to abandon any changes you have entered and to return to the preceding profile configuration dialog.

20.2.1. UPSTREAM Director Profile Configuration

Profile Configuration can also be performed in the UPSTREAM Director. Pull down the **View** menu and select **Profile Definitions**. From this panel there are buttons to Add, View, Delete or Update profile definitions. If you select Add, View or Update you will see panels similar to the ones above.

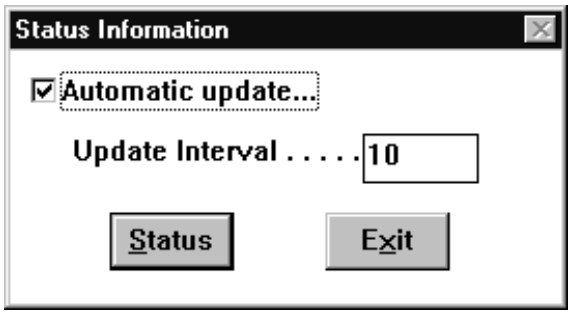
20.3. Status

FDR/UPSTREAM MVS process status information (activity) can be obtained from a workstation/server. Through this facility you can view the running FDR/UPSTREAM functions, check detailed information, cancel them and see general information concerning FDR/UPSTREAM MVS.

Note that this feature requires FDR/UPSTREAM MVS v2.4.5 and is disabled using personalization in the workstation/server distribution and must be enabled to be used.

To enter the status facility, from the Management menu, pull down the **Status of all FDR/UPSTREAM** option.

You will see the Status Information request dialog.

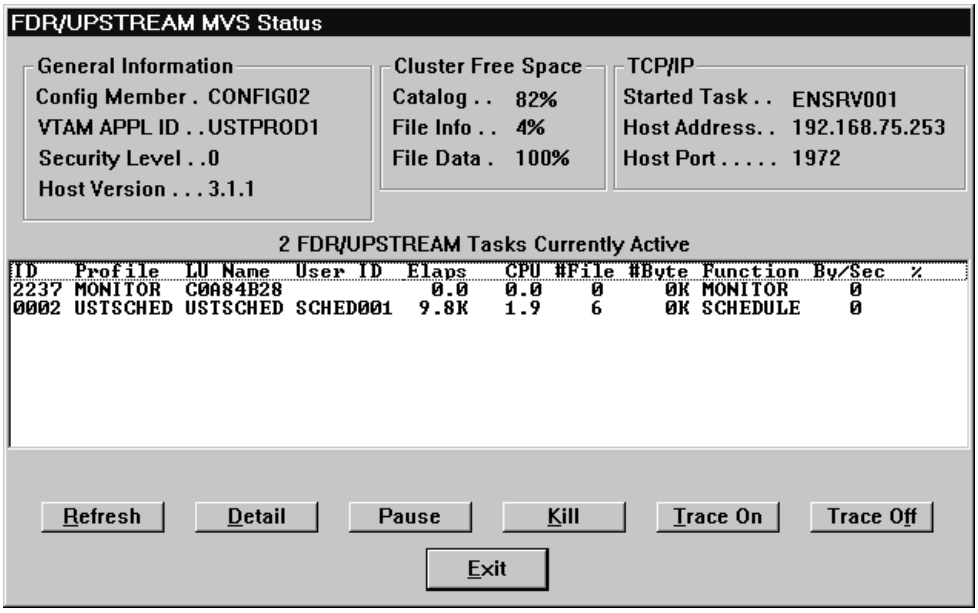


The fields are:

- **Automatic Update:** Check this box if you wish the status information refreshed automatically. This can be convenient, and the default is checked.

- **Update Interval:** How often (in seconds) automatic updates are performed. This field is required if Automatic Update is checked and grayed if Automatic Update is not checked. The default is 10 seconds.

Press the **<Ok>** button to perform the (initial) status inquiry.



Note that if you have automatic update on you will see a flashing communications display underneath the top set of frames.

There are 4 display frames:

- **General Information:** Displays the configuration member utilized by the host in the FDR/UPSTREAM MVS configuration, the VTAM APPL ID (which is the SNA partner LU name), the security level specified and the version of FDR/UPSTREAM MVS.

- **Cluster Free Space:** The percentages of available free space in the 3 primary clusters. Note the free space has a special meaning in both IAM and VSAM and that many users will not define a File Data cluster.

- **TCP/IP:** The name of the TCP/IP facility FDR/UPSTREAM MVS uses and the addresses workstations will use to connect to it. This frame can be ignored if you do not use TCP/IP in your environment.

- **Tasks:** Above the list box, is a count of the number of FDR/UPSTREAM tasks currently active. (or the text Communications Error if there was a problem accessing the host). In the list box is a single line description of the task (ID, Profile, LU Name, etc.). If you selected Automatic Update, this text above the list box and the contents of the list box are automatically, periodically refreshed. If you double-click on a task in the list box, you will see the detail display for that task (see below). Note that there is always at least one task active: a status task which is this display.

The buttons below the list box are:

- **Refresh:** Press this button to cause a manual refresh of the task information. If you have Automatic Update selected, the next automatic update will be the Update Interval number of seconds after you press this button.

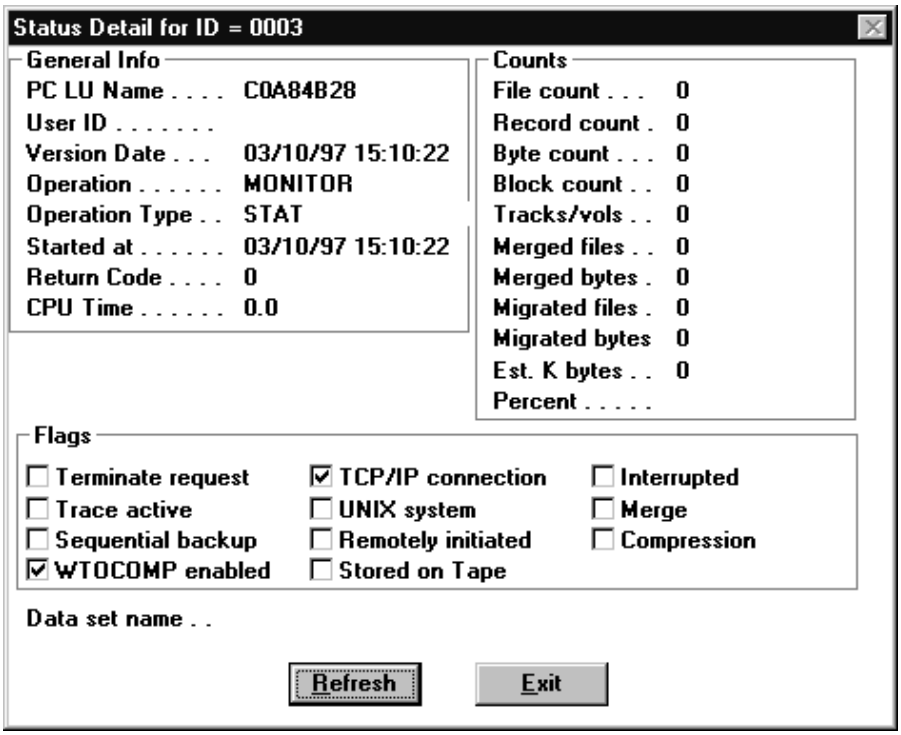
- **Detail:** Pressing this button displays detail information for the highlighted task in the task list (see below).

- **Kill:** Pressing this button will cause the task to be canceled by FDR/UPSTREAM MVS. You will be prompted for acknowledgment before the kill is performed. The remote PC will receive a message indicating that the process was canceled by request.

- **Trace On and Trace Off:** Press these buttons only on request of FDR/UPSTREAM technical support.

- **Exit:** Press this button to terminate the active status conversation with the host and return to the preceding dialog.

If you press the Detail button or double-click the mouse on a task you will see the task detail dialog.



Note that if you have automatic update on you will see a flashing communications display underneath the top set of frames.

There are three frames and a text field:

- **General Info:** Contains information such as the LU name, user name, version date (or time the task started if this is not backup/restore related), operation name and type, task start time, current return code and CPU time in seconds.

- **Counts:** Reports the status through a backup or restore. Of particular interest is fact that these counts will constantly increment (if you have automatic update on) during a backup or restore. The percent complete will be somewhat inaccurate as it does not take into account compression.

- **Flags:** Displays activated/not activated information such as whether the request is in termination, trace is active, sequential backup, WTOCOMP (console notify), TCP/IP type connection (vs. SNA), UNIX system (vs. PC), remotely initiated (vs. PC initiated), Stored on Tape (vs. disk), Interrupted, Merge (and whether this is a full or incremental merge), and the compression level.

- **Data set name:** The host data set name related to this task.

The buttons are:

- **Refresh:** Operates as for the previous dialog, causes the fields to be refreshed.

- **Exit:** Return to the previous dialog.

Note that if the task terminates and either a manual or automatic refresh takes place, an error is displayed and you are returned to the previous dialog.

20.3.1. UPSTREAM Director Status

To display all operating tasks within the FDR/UPSTREAM host in the FDR/UPSTREAM Director, pull down the View menu and select System Status. This will display a status screen similar to the one above, with equivalent buttons. Note that this screen is not displayed as part of the multiple document interface; it can be minimized, maximized or closed independent of other UPSTREAM Director screen.

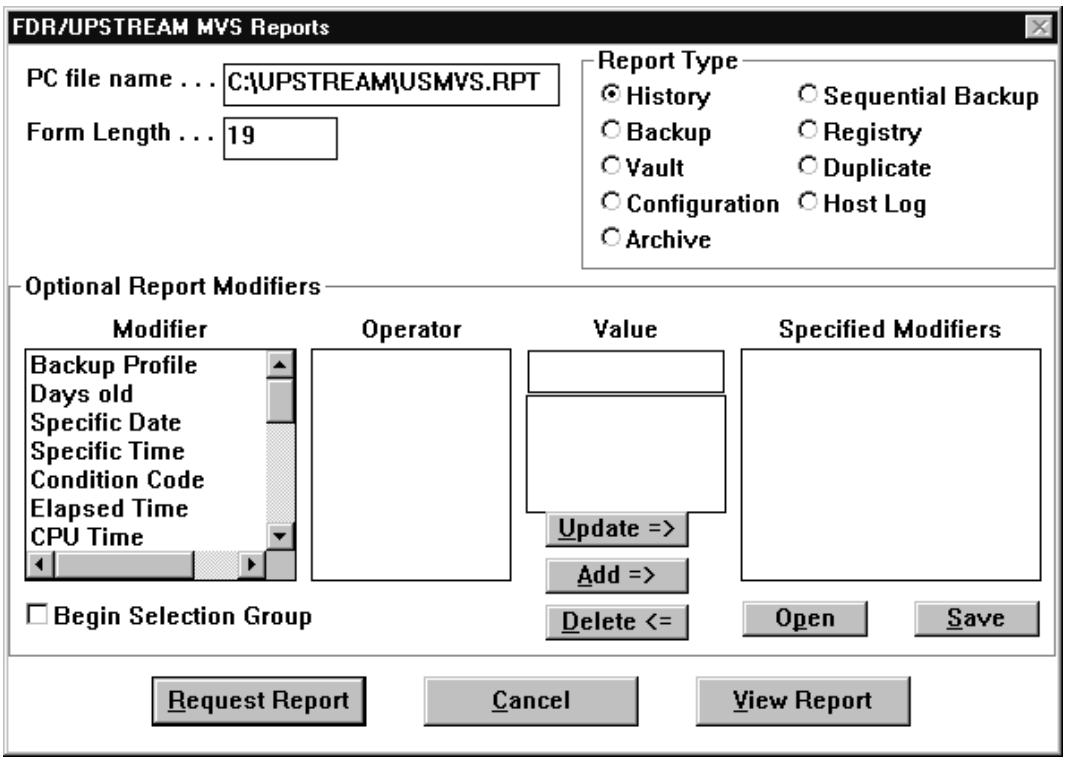
20.4. Reporting

FDR/UPSTREAM's comprehensive reporting facilities are now available from a FDR/UPSTREAM client. Comprehensive filtering options allow you to tailor reports to your specific needs and these tailored reports can be saved and recalled for later use. You can even command line execute (or host request) specific reports.

Also, note that even with all of its power, these reporting facilities are a subset of the even more extensive reporting available through the batch report function of FDR/UPSTREAM MVS.

20.4.1. Running Simple Reports

To request a report, from the FDR/UPSTREAM main screen, pull down the Management Menu and select Host Reporting. You will see the FDR/UPSTREAM MVS Reports dialog.



The fields which are required are:

- **PC file name:** When the report is generated, the output is placed in the specified PC file and a file browser is automatically brought up so that you can view the results immediately. The default file name is USMVS.RPT in your work path.

- **Form Length:** After the specified number of lines a set of title lines are automatically drawn. The default is set so that a title is always displayed on your screen. Changing this to 0 causes the title to be written only once.

- **Report Type:** Press a radio button for the type of report you wish to generate. The options are:

- **History**: Generates a report from history records stored in the FDR/UPSTREAM MVS Catalog file. This is virtually all activity noted by FDR/UPSTREAM. The report notes (by Backup Profile when known), the date/time of the request, the resulting condition code, elapsed and CPU times, the LU name, the operation and various statistics.
- **Backup:** Generates a report of requested backups. This report also is from history records, but includes information on backup data set names and values in place of other fields in the History report. It reports on backups recorded by FDR/UPSTREAM which have no matching history records.
- **Vault:** Generates a report identical to the Backup report, but it will only select backup records which are flagged as having a vault (secondary) copy created by USTVAULT, and the backup data sets shown will be the vault (copy 2) backups.
- **Configuration:** Generates a report listing information from the FDR/UPSTREAM MVS configuration file. A USTCONFG DD statement pointing to the configuration file or member must be present when FDR/UPSTREAM MVS was started. The same information can be viewed (and modified) using the Profile Configuration facility.
- **Archive:** Generates a report on archive backup storage from information in the FDR/UPSTREAM MVS Catalog and File Information data files. It is similar to the previous utility program USTDLOC2.
- **Sequential Backup:** Generates a report of storage utilized for sequential backups.
- **Registry:** Lists the known registered names.
- **Duplicate:** Reports on the files stored in the duplicate file database.
- **Host Log:** FDR/UPSTREAM MVS maintains in memory a large number of its latest log entries (the exact amount is configurable in FDR/UPSTREAM MVS). This report can be very helpful in problem determination. Unlike viewing the running started task log, the log does not have to be flushed to see the latest entries.

When you have entered the required fields, press:

☐ **Request Report:** Pressing this button causes FDR/UPSTREAM to request and receive the report specified. When the report has been received, the file view facility is used to display the resulting report.

☐ **View Report:** Pressing this button causes FDR/UPSTREAM to use the file view facility to display the report previously requested (using the report name specified in the PC file name field).

☐ **Cancel:** Press this button to leave this dialog and return to the main FDR/UPSTREAM display.

The file view facility is tailored for low-memory utilization; lines outside a given range are not displayed until they are highlighted. Thus we recommend that you use the [PageUp], [PageDown] keys rather than the scroll-bar to page through reports. If you are using DOS, you will not be able to scroll horizontally; you must use a text editor outside of FDR/UPSTREAM to see the results to the right of the text displayed.

20.4.2. Limiting Reports

In an environment where FDR/UPSTREAM is quite active, the reports displayed may be too long for your needs. FDR/UPSTREAM allows you to specify report modifiers which allow you a virtually unlimited number of combinations of how reports are generated.

The method to limit your reports is:

- Specify the required report information (described above).

- Select a Modifier from the Modifier list. The Operator list will show the allowable operators and (depending on the Modifier selected), the Value list may show some suggested values.
- Select an Operator from the Operator list (equal, not equal, etc.).
- Enter a Value or select a Value from the Value list.
- Press the <Add> button to add the completed modifier to the Specified Modifiers list.

You can use the <Update> button to highlight an existing complete modifier in the Specified Modifiers list and then change its values. You can use the <Delete> button to remove a highlighted Specified Modifier.

The <Save> button allows you to save your report specifiers (User ID, Password, PC file name, Form Length, Report type and all modifiers) to a report selection file. You can save report specifiers for unattended operations (see below).

The <Open> button allows you to retrieve previously specified report information from a report selection file.

For example, if you wished a backup report specifying only those backups for the profile SERVER* that were performed in the last day, request a backup report with the following modifiers:

Modifier	Operator	Value	Specified Modifiers
Backup Profile	Equal	SERVER*	Backup Profile.EQ.SERVER*
Days old	Less than	1	Days old.LT.1

20.4.3. How Modifiers Work

All modifiers in FDR/UPSTREAM MVS Reporting are used as exclusion statements; it is as if the modifiers are ANDed together. In the example above, you are requesting a backup report of all backups where the backup profile is equal to SERVER* and the days old is less than 1.

The exception to this rule is if you use the same modifier twice with the equal operator. For example, a backup report for backup profiles of SERVER* including (or) backup profiles of USER*.

If you wish to use the inclusion operator (OR) between modifiers, you can check the Begin Selection Group checkbox. Modifiers within a selection group are ANDed together, but the modifier immediately preceding the group is ORed with the modifiers in the group.

For example, if there are backups for SERVER* done within the last 2 days, but none previous to that, a backup report of using the modifiers Backup Profile.EQ.SERVER*, Days old.GT.2 would result in no entries. But if you check Begin Selection Group on Days old.GT.2, then you would see a report of all backups for SERVER*.

20.4.4. Unattended Reporting

You can run the reporting function unattended if you wish to repeat one or more reports on a regular basis. As this uses standard FDR/UPSTREAM parameter overrides, you can request that this be host initiated.

The ACTION parameter value of 7 specifies that a report is to be run and the report selection file should be specified in the REPORTNAME parameter. Note that if performed locally, you must also specify ATTENDED=N.

For example, if you wish to run a report from the command line (or a batch file), with a report selection file of RPTPARMS.MRT, enter:

```
US ACTION=7 REPORTNAME=RPTPARMS.MRT ATTENDED=N
```

Note that if you wish to run multiple reports unattended, you must run FDR/UPSTREAM multiple times.

The report modifiers are listed in the following table:

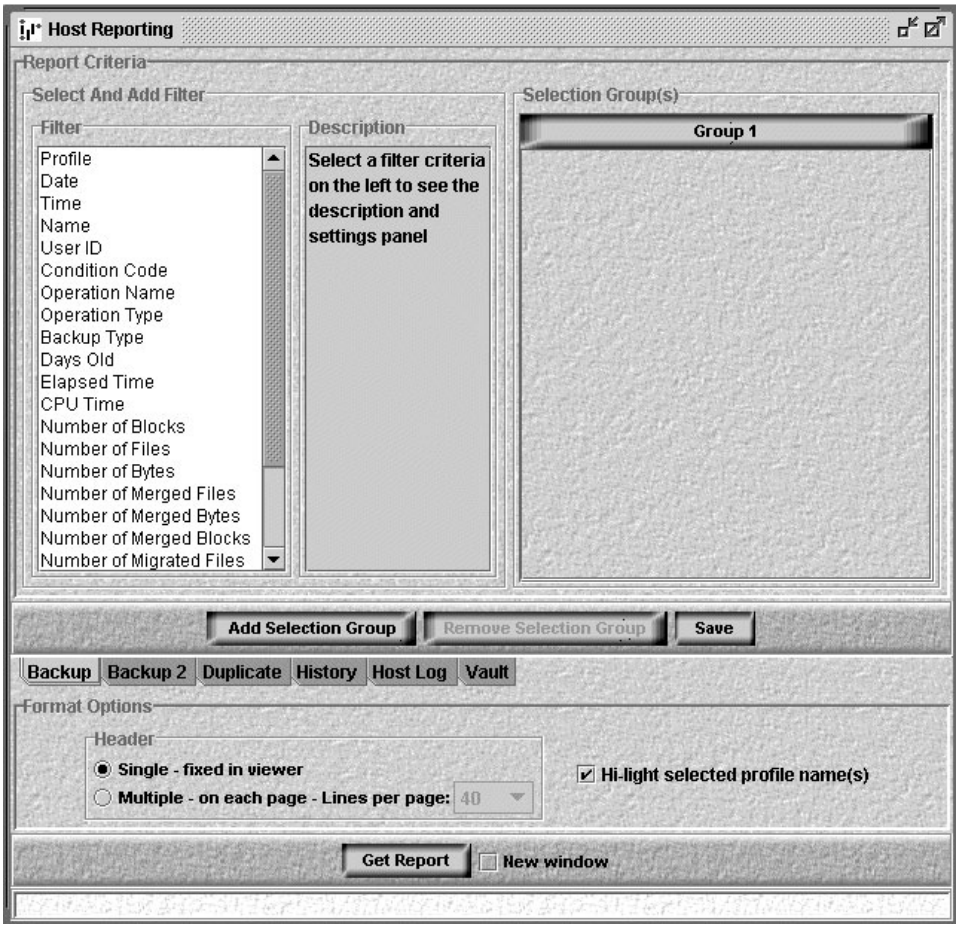
Modifier	Report Type	Operators	Values	Description
Backup Profile	All	Equal Not Equal	<= 8 characters	The backup profile (with wildcards) that you wish to include/exclude from the report.
Days old	History Backup Vault	All	A number	The number of days old that the event occurred.
Specific Date	History Backup Vault	All	A date in the form YY/MM/DD	A specified date.
Specific Time	History Backup Vault	All	A time in the form HH:MM:SS	A specified time.
Condition Code	History Backup Vault	Equal Not Equal	A number: 0,4,8,12,16 or ABEND, SUSPEND, CANCEL, SYSTEM, USER, ZERO.	The result of the specified operation.
Elapsed Time	History Backup Vault	All	A number	The elapsed time, in tenths of minutes, recorded for the operation to complete. For example, 2 ½ minutes would be 25.
CPU Time	History Backup Vault	All	A number	Specifies MVS CPU time used, in thousands of a second (milliseconds) to complete the operation. For example, 1 second is 1000.
LU Name	History Backup Vault	Equal Not Equal	<= 8 characters	A [wildcarded] SNA LU name or for TCP/IP, the network address coded as an 8-digit hexadecimal value (each pair of digits corresponds to one of the 4 values in the address, converted to hex).
User ID	History Backup Vault	Equal Not Equal	<= 8 characters	A [wildcarded] host user ID.

Modifier	Report Type	Operators	Values	Description
Operation Name	History Backup Vault	Equal Not Equal	<= 8 characters	The type of operation. Utility operations: ARCHIVE, DELETE, MAINT, MAINTF, REGEN, REORG. Termination: SHUTDOWN. Workstation operations: BACKUP, BACKUP M, RESTORE, RESTARTB, INQUIREV, INQUIREF, REMOVE F, REMOVE B, COMM MVS, COMM PC, VSAM TST, NON I/O, REPORT Mainframe initiated: HOSTINIT.
Operation Type	History Backup Vault	Equal Not Equal	<= 8 characters	Used with operation names to qualify the type of operations. for backup: INCR, FULL, MERG, ARCH, KEYD. for restore: TAPE, DASD for mainframe initiated: MVS, PC for utility: RPT
Backup Type	History Backup Vault	Equal Not Equal	<= 8 characters	For backups, the type of backup. Some values are: KEYD, ARCH, DASD, TAPE.
Number of Blocks	History Backup Vault	All	A number	The number of blocks transmitted to/from the workstation.
Number of Files	History Backup Vault	All	A number	The number of files transmitted to/from the workstation.
Number of Bytes	History Backup Vault	All	A number	The number of bytes transmitted to/from the workstation.
Number of Merged Files	History Backup Vault	All	A number	The number of files which were merged forward from previous backups during a full merge backup.
Number of Merged Bytes	History Backup Vault	All	A number	The number of bytes which were merged forward from previous backups during a full merge backup.
Number of Merged Blocks	History Backup Vault	All	A number	The number of blocks which were merged forward from previous backups during a full merge backup.
Number of Migrated Files	History Backup Vault	All	A number	The number of migrated files which were merged forward from previous backups during a full merge backup.
Number of Tracks	History Backup Vault	All	A number	The number of DASD tracks that were used for a sequential DASD backup.

Modifier	Report Type	Operators	Values	Description
Number of Tapes	History Backup Vault	All	A number	The number of tape volumes that were used for a sequential tape backup.
File Name Mask	History Backup Vault	Equal Not Equal	*.*	*.* indicates that files should be listed.
Host Config Member	Configuration	Equal Not Equal	<= 8 characters	A specific configuration member name.
Task Modifier	Host Log	Equal Not Equal	A number.	The four digit numeric FDR/UPSTREAM MVS assigned task identifier.
Include Subdirs	Backup	Equal	INCLUDE,EXCLUDE, ONLY	INCLUDE = Include subdirectories EXCLUDE = Exclude subdirectories ONLY = Only subdirectories

20.4.5. Host Reporting in the UPSTREAM Director

The UPSTREAM Director offers a similar reporting feature to the one described above, but with a somewhat more intuitive interface. When you press the Host Reports tab you'll see the main window:



The tabs at the bottom represent the type of report:

- **Backup:** Generates a report of requested backups. This report also is from history records, but includes information on backup data set names and values in place of other fields in the History report. It reports on backups recorded by FDR/UPSTREAM which have no matching history records.
- **Backup2:** Generates a report of storage utilized for sequential backups. Described as the "Sequential Backup" report above.
- **Duplicate:** Reports on the files stored in the duplicate file database.
- **History:** Generates a report from history records stored in the FDR/UPSTREAM MVS Catalog file. This is virtually all activity noted by FDR/UPSTREAM. The report notes (by Backup Profile when known), the date/time of the request, the resulting condition code, elapsed and CPU times, the LU name, the operation and various statistics.
- **Host Log:** FDR/UPSTREAM MVS maintains in memory a large number of its latest log entries (the exact amount is configurable in FDR/UPSTREAM MVS). This report can be very helpful in problem determination. Unlike viewing the running started task log, the log does not have to be flushed to see the latest entries.
- **Vault:** Generates a report identical to the Backup report, but it will only select backup records which are flagged as having a vault (secondary) copy created by USTVAULT, and the backup data sets shown will be the vault (copy 2) backups.

When you select a report type tab, the list of possible filters will change.

When you highlight a filter, the Description frame (to the right of the filter) will change to describe the use of the given filter and a frame will be created beneath the filter list to allow you to enter the filter. Since the format of each filter is different (text for profile, a date for date, etc.), the way that you enter each filter's value will change as well. When you wish to add the filter, press the **Add** button in the same frame as you enter the filter's value.

For example, if you wished to see all of the failed operations in the last two days:

- Press the **History** tab
- Highlight the filter **Condition Code**
- In the *Condition Code* frame enter the number **0**, check the **Exclude** radio button and press the **Add** button.
- In the *Condition Code* frame enter the number **4**, check the **Exclude** radio button and press the **Add** button.
- Highlight the filter **Days old**
- In the *Days old* frame, enter the number **2**, check the **Less than** radio button and press the **Add** button.
- Press the **Get Report** button.

Selection Groups allow you to use the inclusion operator (OR) between modifiers; modifiers within a selection group are ANDed together, but the modifier immediately preceding the group is ORed with the modifiers in the group. To add a selection group press the *Add Selection Group* button, to remove a group, highlight the group label and press the *Delete Selection Group* button.

For example, if you wished to see all operations with a CPU time of greater than 600seconds (10 minutes) or an elapsed time of greater than 6 hours.

- Press the **History** tab
- Highlight the filter **CPU time**
- In the *CPU time* frame enter the number **600000** (which is 600 seconds * 1000 as it's represented in milliseconds), check the **Greater than** radio button and press the **Add** button.
- Press the **Add Selection Group** button.
- Highlight the filter **Elapsed time**
- In the *Elapsed Time* frame, pull down the hours list and select 6, check the **Greater than** radio button and press the **Add** button.
- Press the **Get Report** button.

The *Format Options* frame allow you to adjust how the report is displayed:

☐ In the Header frame you select:

- **Single - fixed in viewer.** The header is displayed at the top of the viewer screen and does not scroll when the report is scrolled - it remains at the top. This is most useful when you are generating a report for display only. This is the default.
- **Multiple - on each page - lines per page.** The header is re-displayed every xx number of lines - and you need to specify the number of lines between headers. This is most useful when generating reports which will be printed.

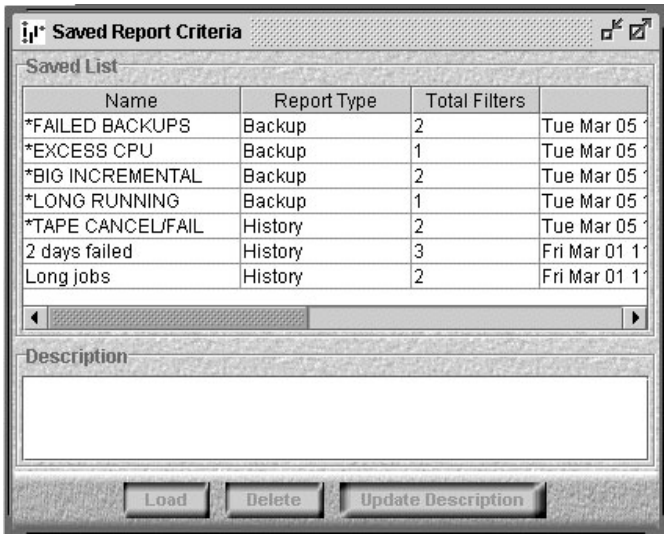
- ☐ **Hi-light selected profile names.** When you check this box, the Director will highlight backup profile names if you used that as a filter. The default is unchecked.

- ☐ **New window** If you check this box, each report you generate is displayed in a separate window. If you don't check it, each report is displayed in the single window.

When a Director report is displayed you can press the First button to go to the top of the display, the Last button to go to the bottom or the Save button to display a save dialog which allows you to save the report to a file. Saved reports are plain ASCII text files with no special formatting.

The UPSTREAM Director can save your report definitions which include the report type, filter settings, and all of the other settings which comprise a report. Press the **Save** button in the Host Reporting window, and you will be asked to enter a New Criteria Name which is merely a short description of the report and optionally a more lengthy description. It then is saved to an internal location within the Director so it's available in later Director sessions.

Load the saved jobs in the Saved Report Criteria window, also in the Host Reports tab.



Reports with a leading asterisk ('*') are pre-canned reports which are shipped with UPSTREAM.

Press the Load button to load the highlighted saved report to the main report display (double-click the line will have the same affect. Press the Delete button to delete the saved report and Update Description to change it's descriptive text.

20.5. Personalizing FDR/UPSTREAM

FDR/UPSTREAM PC can be personalized to allow an administrator to be able to suppress access to a wide variety of FDR/UPSTREAM functions. Some of these include: access to a specified directory, a hard-coded backup profile name, and more...

Personalization information is written to a file (US.SER) which must either be in the work path (as specified in the FDR/UPSTREAM Configurator Advanced Configuration) or in the same directory as the FDR/UPSTREAM program. This process is performed using the FDR/UPSTREAM Configurator.

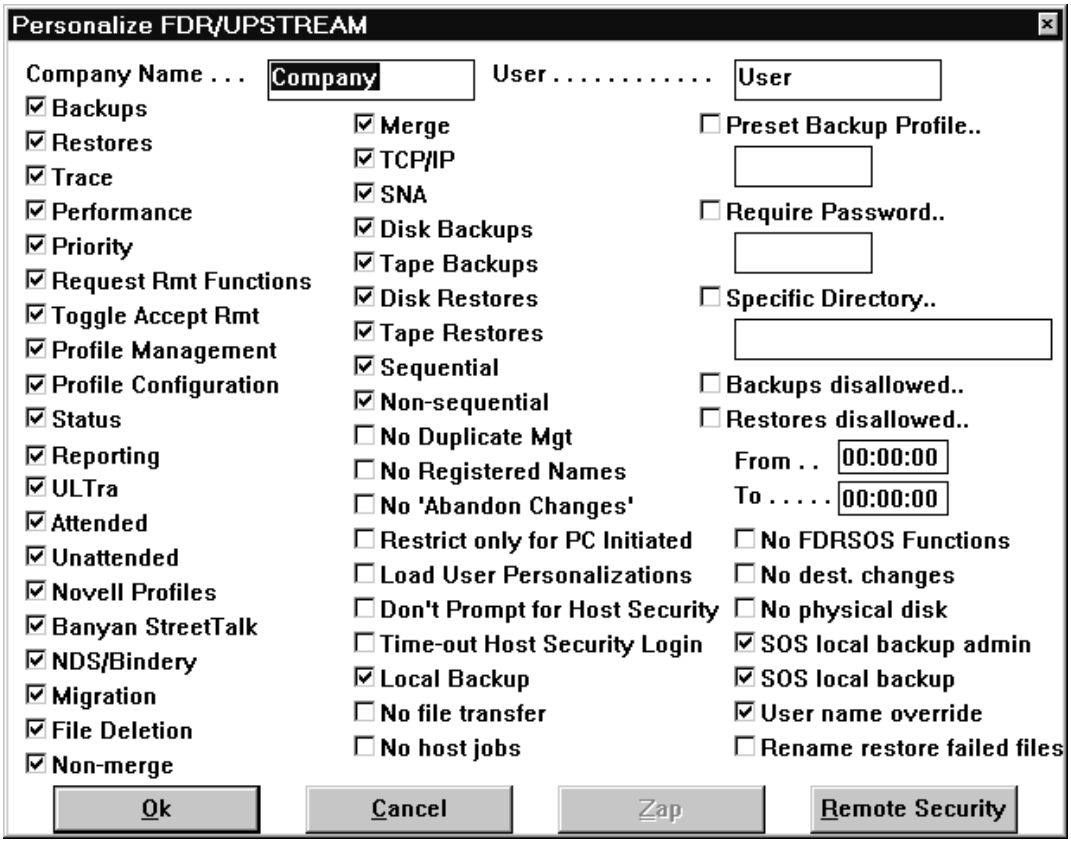
To utilize this facility, the user must have both the configurator and a specially coded file SERIAL.DAT. If this user does not, then the specified customization is permanent. When upgrading to new versions of FDR/UPSTREAM, the personalization information will remain in effect.

To access Personalization in Windows, enter the FDR/UPSTREAM Configurator (USCFG.EXE), press the **Advanced** button, press the **Miscellaneous** tab, and press the **Personalization** button.

To access Personalization on all other systems, enter the FDR/UPSTREAM Configurator (uscfg), press the <Cancel> button to exit the specification dialog, pull down the **Action** menu and select **Personalize UPSTREAM**.

You will then see a file open dialog. In most cases you will select the personalization file (US.SER) in the default directory which will allow you to edit personalization information.

If you have the SERIAL.DAT file in the directory, you will then see the Personalization dialog.



The Company Name and User are displayed in the About box in the File menu of FDR/UPSTREAM.

Most of the check boxes represent features and are self-explanatory. For example, if the Backups check box is unchecked then the Backups menu item in FDR/UPSTREAM is grayed, and an error will be displayed if the user attempts to perform a backup.

Specific use of the Security specific features are described in the Security chapter.

The three columns of check boxes are:

- **Backups:** Check this box if you wish to allow users to perform backups. If this box is not checked then the backup option in FDR/UPSTREAM is grayed and unattended backups will be denied.

- **Restores:** Check this box if you wish to allow users to perform restores. If this box is not checked then the restore option in FDR/UPSTREAM is grayed and unattended restores will be denied.

- **As of...Restores**: Check this box if you wish to allow users to perform as of...restores. If this box is not checked then the as of...restore option in FDR/UPSTREAM is grayed and unattended as of...restores will be denied.

- **Trace:** Check this box if you wish to allow this user to activate the internal FDR/UPSTREAM trace.

- **Performance**: Check this box if you wish to allow this user to run the FDR/UPSTREAM performance tests.

- **Priority:** Check this box if you wish to allow this user to modify the execution priority of FDR/UPSTREAM. This option is only valid in OS/2.

- ☐ **Request Rmt Functions:** Check this box if you wish to allow this user to request an FDR/UPSTREAM function of another PC.
- ☐ **Toggle Accept Rmt:** Check this box if you wish to allow this user to enable/disable accepting remote initiates. FDR/UPSTREAM will listen for remote initiates either way, but the user will be disabled from changing whether remote initiates will be accepted (they will always be accepted).
- ☐ **Profile Management**: Check this box if you wish to allow this user to run Profile Management which allows viewing and deleting of backups stored on the host.
- ☐ **Profile Configuration**: Check this box if you wish to allow this user to run Profile Configuration which allows viewing, modifying, and deleting host defined backup profile configuration information.
- ☐ **Status:** Check this box if you wish to allow this user to run the FDR/UPSTREAM MVS status facility which allows users to view currently active UPSTREAM functions, cancel them and toggle tracing.
- ☐ **Reporting:** Check this box if you wish to allow this user to perform FDR/UPSTREAM MVS reporting functions from the PC.
- ☐ **ULTra:** Check this box if you wish to allow this user to be able to activate the FDR/UPSTREAM ULTra facility which allows backups/restores of LAN attached workstations.
- ☐ **Attended**: Check this box if you wish to allow this user to perform attended FDR/UPSTREAM functions. If this box is not checked all FDR/UPSTREAM functions must be unattended.
- ☐ **Unattended**: Check this box if you wish to allow this user to perform unattended FDR/UPSTREAM functions. If this box is not checked all FDR/UPSTREAM functions must be attended.
- ☐ **Novell Profiles:** Check this box if you wish to allow this user to specify a Novell Profile which allows unattended login to a Novell file server based on login information specified in the SETNOV program.
- ☐ **NDS/Bindery:** Check this box if you wish to allow this user to backup/restore the Novell bindery (if v3.x) or the Novell NetWare Directory Services (if v4.x).
- ☐ **Migration:** Check this box if you wish to allow this user to perform migration: the backup of unmodified files to the host and the subsequent deletion of those files.
- ☐ **Deletion:** Check this box if you wish to allow this user to allow FDR/UPSTREAM to perform file deletes.
- ☐ **Non-Merge:** Check this box if you wish to allow this user to perform non-merge backups.
- ☐ **Merge**: Check this box if you wish to allow this user to perform merge backups.
- ☐ **TCP/IP:** Check this box if you wish to allow this user to use TCP/IP to connect to the host.
- ☐ **SNA:** Check this box if you wish to allow this user to use SNA to connect to the host.
- ☐ **Disk Backups:** Check this box if you wish to allow this user to perform backups to disk (vs. tape).
- ☐ **Tape Backups:** Check this box if you wish to allow this user to perform backups to tape (vs. disk).
- ☐ **Disk Restores:** Check this box if you wish to allow this user to perform restores from disk.

- ☐ **Tape Restores :** Check this box if you wish to allow this user to perform restores from tape.
- ☐ **Sequential:** Check this box if you wish to allow this user to perform sequential (disk or tape) backups/restores. If you do not check this box, all backups are Keyed or Archive.
- ☐ **Non-sequential:** Check this box if you wish to allow this user to perform non-sequential (keyed or archive) backups/restores. If you do not check this box, all backups are sequential disk or tape.
- ☐ **No Duplicate Mgt:** Check this box if you wish to not allow this user to use the duplicate management facility which allows the viewing/deleting of files in the duplicate database (keyed backups in USTDUPFL).
- ☐ **No Registered Names:** Check this box if you wish to not allow this user to use the registered name facility which allows the viewing/updating of target names which logically identify the LU Name or IP Address/Port Number of a workstation/server.
- ☐ **No 'Abandon Changes':** Check this box if you don't want the user to see the *Abandon Changes* box when the <Cancel> button is pressed.
- ☐ **Restrict only for PC Initiated:** Check this box if you want ALL the personalization options to only apply to PC initiate functions; host initiated functions have no personalization defined restrictions.
- ☐ **Load User Personalizations:** Check this box if you want to have separate personalization files for each user, activated when they log in. The personalization file name is the user's host login name with the .ser extension in the work path directory. For example, for a user with the host login name of "TOM", you must have a TOM.ser in the work path directory for that user to use UPSTREAM. This box should be checked for us.ser and all user personalization files if you will be using this option.
- ☐ **No Host Security:** Check this box if you wish to skip the initial host login dialog on UPSTREAM entry. If you do not have host security enabled, you should check this box.
- ☐ **Time-out Host Security Login:** Check this box if you wish a user's login to time out after 30 minutes of disuse. Note that the timer is only effective when at the main UPSTREAM screen, so your users should be encouraged to return to the main screen when they are done.
- ☐ **Local Backup:** Check this box if you wish to allow users to be able to specify and utilize local backup storage.
- ☐ **No File Transfer:** Check this box if you wish to disallow users from using the file transfer facility.
- ☐ **No Host Jobs:** Check this box if you wish to disallow the submission of host jobs from the workstation/server.
- ☐ **No FDRSOS Functions:** Check this box if you wish to disallow the use of FDRSOS Timestamp functions and physical disk functions..
- ☐ **No Dest Changes:** Check this box if you wish to disallow restores to a different location than where the backup was performed from. This is particularly useful if you wish to have the local workstation/server security system validate access to files. When possible, the UNC name is validated.
- ☐ **No physical disk:** Check this box if you wish to disallow FDRSOS/physical disk backups/restores.
- ☐ **SOS local backup admin:** Check this box if you wish to authorize access to the FDRSOS Local Backup Admin facility.
- ☐ **SOS local backup:** Check this box if you wish to authorize FDRSOS local backups.

- ☐ **User name override:** Check this box if you are running UPSTREAM in multi-user mode and wish to allow users to override their user name.

- ☐ **Rename restore failed files:** Check this box if you are running Windows NT and wish to have the option to have UPSTREAM automatically rename a locked file and/or replace it on a reboot. If this option is not checked, the fields in UPSTREAM will not display at all.

The right hand column consists of several more complex features:

- ☐ **Preset Backup Profile:** If you wish to customize FDR/UPSTREAM so that users can only perform backups and restores using a particular backup profile, check this box and enter the backup profile beneath it. In FDR/UPSTREAM, all backup profile edit fields are grayed and the specified entry is always used.

- ☐ **Require Password:** If you wish to secure access to FDR/UPSTREAM, check this box and enter a password in the edit field beneath it. When you enter FDR/UPSTREAM, you must enter this password to use the software.

- ☐ **Specific Directory:** If you wish to only allow access to a given directory, (and those files and directories underneath it), enter this directory entry here. This is a powerful feature as it allows the security within FDR/UPSTREAM MVS to be augmented. An example would be if you will be performing backups centrally and wish users to be able to perform their own restores, you would enter the primary directory that they have access to. Enter the directory with a terminating backslash; for example, F:\USERS\TOM\.

- ☐ **Backups Disallowed/Restores Disallowed:** If you check either of these boxes, enter a From and To time in the edit fields below. This allows you to be able to specify a range of times where backups and/or restores cannot be performed. You specify times using a 24 hour clock. For example, if you wish to restrict restores during the day (to limit tape mounts or excess line traffic), check the Restores Disallowed check box and enter a From time of 09:00:00 and a To time of 17:00:00.

Press the **Ok** button to write your changes to a FDR/UPSTREAM personalization file. The default is the same file as was opened when you entered this facility. You can also save to a different file, but note that FDR/UPSTREAM will require a file named US.SER in either the work path or the FDR/UPSTREAM directory of the workstation that is being personalized.

If you press the **Cancel** button you will leave the dialog without making any changes. The **Zap** button is for use only by FDR/UPSTREAM technical support.

The **Remote Security** button is intended to limit access to your machine by remote UPSTREAM users. See the *Security* chapter for more information.

Some additional notes on this facility:

- The special purpose file PROFMGT.NUL is no longer used to restrict access to profile management and profile configuration; this facility supersedes the need for this file.
- SERIAL.DAT can be generated to disallow access in USCFG to disabling certain facilities. Contact FDR/UPSTREAM technical support for more information.

20.6. Registration

Requesting a FDR/UPSTREAM function (backup, restore, etc.) of a workstation/server from the host or another workstation/server has required that you know the LU Name or the IP Address/Port Number of that workstation/server. LU Names/IP Addresses can be difficult to remember and there is no support for dynamic LUs or the TCP/IP DHCP facility.

This facility allows you to be able to register a target name that you can use to identify the workstation. This can be any name that easily identifies the workstation/server allowing host or other workstation requests to be easily located. Using this facility now allows you to locate workstations/servers even if they are using dynamic LUs or DHCP.

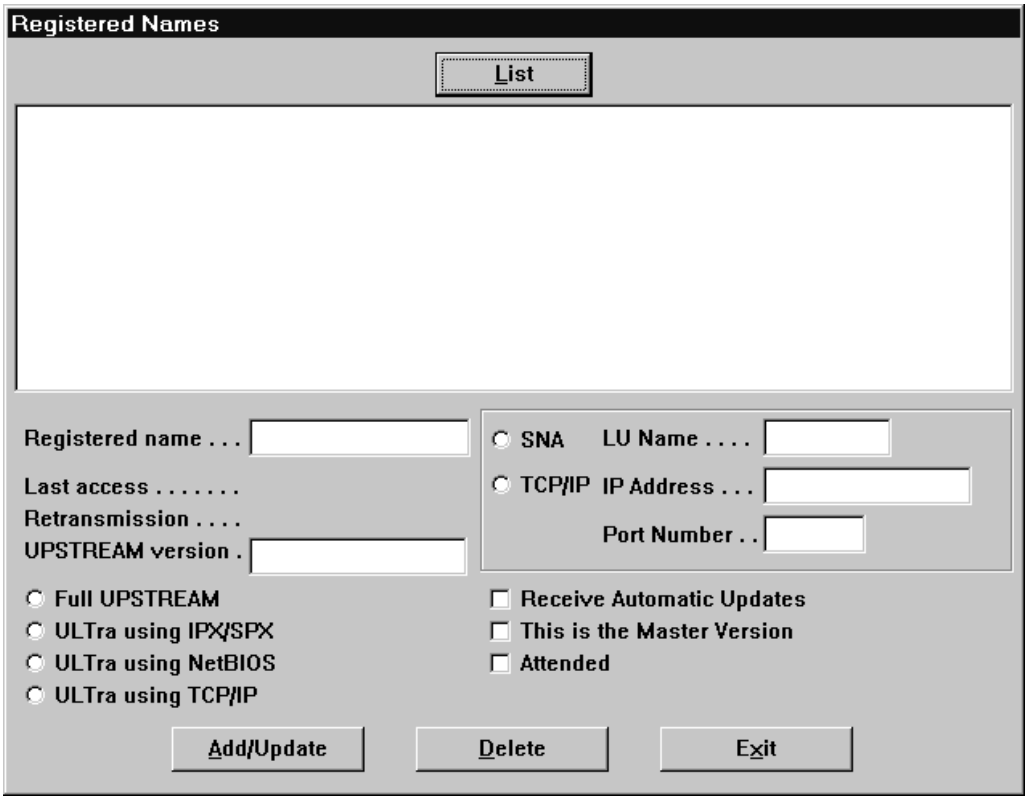
To register a target name you can:

- Have the workstation/server self-register. There is a new configuration option which allows you to define the target name during configuration.
- Register from the host. There is a new option in the FDR/UPSTREAM MVS ISPF panels REGISTRY which allows you to maintain target names.
- Register from a PC. There is a new option in the Remote Menu on the Workstation/Server (Registered Names) which allows you to maintain target names.

Registration is also the basis for the FDR/UPSTREAM Auto-Update facility described in the next section.

The workstation/server self-registration is defined in the Configurator. This process is described in the configuration chapters, depending upon the operating system type.

To modify FDR/UPSTREAM MVS registration from a workstation/server, pull down the **Remote** menu and select the **Registered Names** option.



- **List:** Press this button to request the list of registered workstations/servers. After pressing this button the list box is filled with a list of the names currently registered, their LU Name or TCP/IP address/port number, the last access (use), how often they retransmit if they use self-registration, whether this workstation is set up for auto-updates, whether it is the auto-update "master", whether it is an ULTra workstation and the ULTra connectivity type. See the following section for a description of the auto-update fields.

- **Registered Names List:** When you highlight an entry in this list, the fields under the list box are filled in with the registration information defined for this workstation/server. The fields under the list box are used to add, modify or delete registration.

- **Registered Name:** The name assigned to a given workstation/server. This field is filled in automatically when you highlight registration information in the Registered Names list box above. You can enter up to 16 characters and embedded spaces are allowed. This field is required.

- **SNA:** Press this radio button if the workstation/server is connected via SNA. You must enter a LU Name if you press this button.

- **LU Name:** Enter the SNA LU Name (not alias) used by the workstation/server. This field is required.

- **TCP/IP:** Press this radio button if the workstation/server is connected via TCP/IP. You must enter an IP Address and Port Number if you press this button.

- **IP Address:** Enter the IP Address used by the workstation server. This field is required. Note that if workstations/servers use DHCP, self-registration is the recommended mechanism.

- **Port Number:** Enter the port number used by the workstation/server for servicing FDR/UPSTREAM requests. The default used by most FDR/UPSTREAM users is 1972.

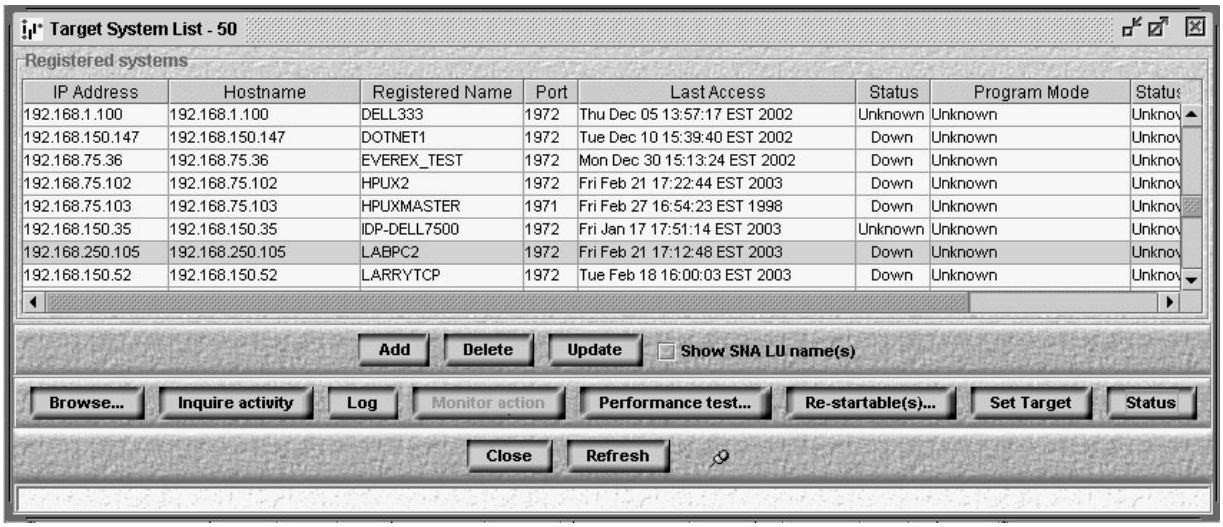
The remaining screen fields are used for auto-updates. See the next section for more information.

- ☐ **Add/Update:** Press this button if you wish to add or update the registration information entered below the list box.
- ☐ **Delete:** Press this button if you wish to delete the registered name specified in the Registered name field.
- ☐ **Exit:** Press this button to leave the dialog.

Note that there is another option in the **Remote** menu: **Resend Target Nam**e. This option is only enabled if you are using self-registration and it allows you to retransmit the registration information defined in the FDR/UP-STREAM configuration.

20.6.1. UPSTREAM Director Registration

The UPSTREAM Director performs registration functions in the Target System display, available by either pressing the Target icon, or pulling down the **View** menu and selecting **Registration/Target List**.



To add a new registered system, press the **Add** button; to delete or update an existing registered system, high-light the system in the list and press the **Delete** or **Update** buttons respectively.

20.7. Automatic Updates

An automatic workstation/server update of FDR/UPSTREAM software is available which upgrades your software (including ULTra workstations) to an administrator specified version. After a one-time setup of the workstation/server, an administrator can request automatic updates of specified operating system versions of FDR/UPSTREAM.

Some features of this facility include:

- Automatic workstation detection of old versions.
- Administrator control of the production version, the workstations to receive the updates and when it is activated.
- Administrator verification of software updates.
- Support for multiple versions of FDR/UPSTREAM and multiple operating systems.
- Preservation of prior versions and fallback.
- Updates of active programs.
- ULTra workstation support.
- Automatic operating system type recognition for ULTra workstations.
- Support for ULTra profiles.

To use this facility for FDR/UPSTREAM workstation/servers, see the next section; for ULTra workstations, see the following section.

NOTE: There are Windows, UNIX and Novell notes at the end of this section. Windows, UNIX and Novell system administrators should see those notes before beginning.

20.7.1. FDR/UPSTREAM Updates

The process of automatic updates of FDR/UPSTREAM Workstation/Server is:

- An administrator certifies a version of software for automatic update. This version is placed in a predefined directory (based on operating system type) and is backed up to the host using a predefined backup profile (again, based on operating system type).
- An administrator, using the Registered Names facility, specifies a user as the Master Version for a specific version and operating system type of FDR/UPSTREAM.
- An administrator, using the Registered Names facility, specifies the workstation/servers by registered name to be automatically updated.
- When the workstation/server registers, the host indicates to it that it’s version is out of sync (it can be either older or newer to qualify to automatic updates).
- When the workstation/server is idle (has performed all local and remote requests), it performs an automatic restore to a separate directory (using the pre-setup parameter file AUTOINST.DAT).
- After the successful restore, a job is run (AUTOINST.BAT, AUTOINST.CMD or autoinst) to save the old software to a separate directory, and the new software is copied in.

FDR/UPSTREAM terminates to allow the copy of the new software to complete. The batch file can optionally restart FDR/UPSTREAM on completion.

- The next time FDR/UPSTREAM runs, it will register it's version to the host for administrator verification.

To set up a FDR/UPSTREAM workstation for automatic updates you must perform the following steps on each workstation.

☐ Make sure that the workstation uses FDR/UPSTREAM registration and that you note the registered name. If the workstation is running the full screen version of UPSTREAM (US.EXE or us), then you need to set the *Display messages for* (Windows) or *Messages Time Out* (all others) in the UPSTREAM configurator to a non-zero value.

☐ Create an **autoinst.dat** file in the WORKPATH directory which restores:

- From a predefined source directory (for example: FILES= C:\UPSTREAM\WINNT*.* for Windows NT)
- To a new software directory (DESTINATION=C:\UPSTREAM\NEW*.*).
- Using the latest version.
- In the backup profile USTooo, where ooo is the operating system type (USTNT for Windows NT).

For Windows NT/2000/2003/XP, this parameter file will also run a pre and post process job (USIDLE.BAT) to wait for UPSTREAM to become idle, so as not to have running operations keep the installation from running.

In Windows, sample autoinst.dat parameter files are included in the \SAMPLES directory. See the Windows notes at the end of this section.

Operating system types are listed below. Note that even though currently the Windows version of FDR/UPSTREAM is also used for Windows 95 and Windows NT/2000/2003/XP, these versions should be maintained separately as future plans call for separate versions of these products.

- **DOS** for all versions of DOS
- **OS2** for all versions of OS/2
- **W95** for Windows 9.x
- **NT** for Windows NT, 2000, 2003 or XP
- **AIX** for AIX UNIX.
- **SOL** for SPARC Solaris
- **S86** for Intel Solaris
- **HP** for HPUX.
- **NLM** for Novell.
- **L86** for Intel Linux
- **L39** for S/390 Linux

☐ Create an installation job (**AUTOINST.BAT** for DOS, Windows and Windows NT, **AUTOINST.CMD** for OS/2, **AUTOINST.NCF** for Novell and **autoinst** for UNIX). This job should copy the current software to an "old" directory, copy the new software from the "new" directory and (optionally) restart FDR/UPSTREAM if it must be running or you wish it to automatically register immediately. A sample AUTOINST is included in the \SAMPLES directory. You may want to modify this sample to use the correct directory (if not C:\UPSTREAM) or restart FDR/UPSTREAM if the communications facilities do not start it.

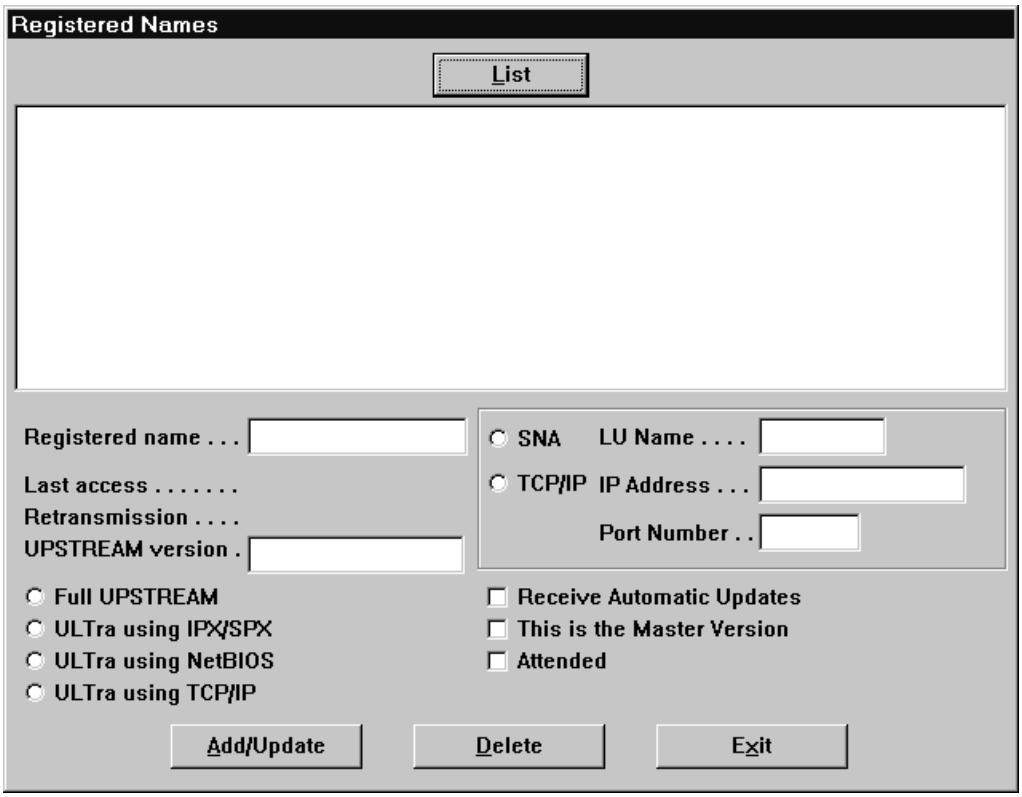
Note that in some operating systems (Windows in particular) the batch job will run before UPSTREAM has properly terminated. Thus in the sample AUTOINST.BAT, it runs a small program: SLEEP.EXE which waits the number of seconds specified on the command line (10 in the sample).

When an administrator wishes to automatically distribute software the software, it should be locally installed, tested and certified for your local environment. When ready to distribute, follow these steps:

- ☐ Copy the distribution diskette or CD to a subdirectory named for the operating system type (for Windows NT, C:\UPSTREAM\WINNT*.*). For Windows NT/2000/2003/XP you must include subdirectories so that all PlugIns get copied.

- ☐ Perform a non-merge, disk backup of this directory using the backup profile configured on the workstations (for example, USTNT). For Windows NT/2000/2003/XP, you must include subdirectories in the backup so that PlugIns get included in the backup.

- ☐ In the FDR/UPSTREAM program (we recommend that you use the version that you are automatically distributing), select **Registered Names** from the **Remote** menu.



- ☐ Press the <List> button to list the FDR/UPSTREAM machines registered to the system.

- ☐ Highlight your name and the UPSTREAM version field which should match the version and operating system that you are distributing. If it does not, you can change it.

- ☐ Check the **Receive Automatic Updates** , **This is the Master Version** checkboxes and uncheck the **Attended** checkbox.

- ☐ Review the list of workstations which have the **Full UPSTREAM** radio button pressed. Check the **Receive Automatic Updates** checkbox and uncheck the **Attended** checkbox for workstations that you wish to receive the up-

dates and uncheck it for those you don't wish to see receive the updates. From this point onwards the workstations will be eligible to receive updates when they register.

- ☐ You can later verify that the workstations have received the software by checking that the UPSTREAM version field has been properly updated.

When a FDR/UPSTREAM workstation has been selected to receive automatic updates, and it registers the host software will notify the workstation that it's version number is not the same as the master version and it has been selected for automatic updates.

The workstation software then completes any locally requested processing and remote requests. When it is idle, it puts up a message dialog allowing the user 15 seconds to cancel the first step of the automatic update, which is the restore. If the user does not cancel the automatic update restore, the restore will run, using autoinst.dat.

When the restore has completed successfully, the user is given a final opportunity to cancel the automatic update process for the second step which is running the installation job. If the user does not perform this cancel, the installation job (autoinst) is run and FDR/UPSTREAM immediately terminates so that active programs can be overwritten. If you wish, you can have autoinst rerun FDR/UPSTREAM or perform any other function.

20.7.2. Windows 9.x notes

Windows 9.x (Windows 95, 98 and ME) follow the procedures above completely. The sample parameter files are in the \SAMPLES directory; they should be copied to the UPSTREAM workpath directory and renamed: **autoinst.9x.dat** to **autoinst.da**t and **autoinst.9x.bat** to **autoinst.bat**

20.7.3. Windows NT/2000/2003/XP notes

UPSTREAM for Windows NT/2000/2003/XP has two major differences from Windows 9.x:

- PlugIns specific to your needs and operating systems be installed and upgraded.
- Since UPSTREAM includes an embedded attach manager, another running UPSTREAM function may cause the upgrade to fail.

On your master system, to deal with the PlugIn problem, it is essential that you copy from the \UPSTREAM\WIN32 directory on the original CD all subdirectories to your distribution directory (usually C:\UPSTREAM\NTDIST) so that the PlugIn files are copied. For example:

```
xcopy d:\upstream\win32\*.* c:\upstream\ntdist\*.* /s
```

When you perform the backup of the master directory, you must also include subdirectories in the backup.

On each workstation, there are a number of files which should be copied from the \SAMPLES directory to your WORKPATH:

- **autoinst.nt.dat** as **autoinst.dat**
- **autoinst.nt.bat** as **autoinst.bat**
- **usidle.bat**

Each of these files must be modified your UPSTREAM environment. There are CUSTOMIZE remarks in the locations where the most common changes must be made.

The sample parameter file autoinst.dat runs a pre and post processing job: USIDLE.BAT. This batch file uses the UPSTREAM program NumUS.EXE which determines the number of active running UPSTREAM pro-

grams. The sample uses the /1 switch which returns a program return code of 0 only if there is a single copy of UPSTREAM running. USIDLE.BAT will sleep for 60 seconds and retry until there is only one copy of UPSTREAM running. This assures that the installation will run only when no other instances of UPSTREAM is running. It may cause the auto update to wait for some time until all other processes have completed.

20.7.4. UNIX notes

To make UNIX automatic updates smooth, we provide samples:

- **autoinst.sample.dat** A sample parameter file (which you will need to rename to be **autoinst.dat**) for the automated restore step.
- **autoinst.sample.script** A sample script file (which you will need to rename to be **autoinst**) for the installation job step.

We further recommend the following:

- That UPSTREAM on all systems be installed in the directory suggested in the UNIX chapter. The samples assume that UPSTREAM is installed in this directory.
- That you create a set of directories to hold the old and new versions of FDR/UPSTREAM:
  (AIX) /usr/lpp/fdrupstream.old and /usr/lpp/fdrupstream.new
  (Solaris and HPUX) /opt/fdrupstream.old and /opt/fdrupstream.new

20.7.5. Novell notes

There are a number of limitations in the auto-update facility due to the nature of the NLM environment:

- The AUTOINST.DAT restore file must restore directly to the UPSTREAM directory. Restores can not be staged to another directory and then copied as NCF files can't perform copies. Thus you must set the source (FILES) to be the master source directory, and the destination (DESTINATION) to be the UPSTREAM directory itself.
- AUTOINST.NCF is the batch file that will be run by UPSTREAM. It must be stored in the UPSTREAM directory and it must specifically unload and reload UPSTREAM. For example:

```
unload us
load sys:upstream/us
```

20.7.6. ULTra Updates

The automatic update of ULTra workstations is somewhat different that for full FDR/UPSTREAM workstations. You should understand the procedure for FDR/UPSTREAM machines before setting up for ULTra workstations.

The ULTra update facility uses the ULTra workstation name as the registered name, and performs the registration during a backup. This allows ULTra workstations to be included in automatic updates even if they use ULTra Profiles.

On each ULTra workstation that will be using automatic updates, you must perform the following steps:

- ☐ Install FDR/UPSTREAM ULTra v2.5.3 or later.
- ☐ Create an installation job (ULTINST.BAT for Windows and Windows NT, or ULTINST.CMD for OS/2). This job should copy the current software to an "old" directory, copy the new software from the "new" directory and (optionally) restart ULTra if it must be running. A sample ULTINST is included in the \SAMPLES directory. You may

want to modify this sample to use the correct directory (if not C:\UPSTREAM).

Note that since ULTra for DOS does not support jobs, this step is not necessary; the restore must be performed directly to the ULTra directory.

On the FDR/UPSTREAM machine:

- ☐ Create a parameter file in the **WORKPATH** directory which restores:
  - From a predefined source directory (for example: files= C:\UPSTREAM\ULTNT*.* for Windows NT)
  - To a new software directory (DESTINATION=C:\UPSTREAM\NEW*.*).
  - Using the latest version.
  - In the backup profile USTUooo, where ooo is the operating system type (USTUNT for Windows NT).

The name of the DAT file, its backup profile and directories must be customized for each version of FDR/UPSTREAM ULTra that you will be updating. The format for the DAT file is **ULTooo.DAT** where ooo is the operating system type (see above); the format for the backup profiles is **USTUooo**.

Thus, if you support Windows NT and Windows 95 workstations, you must have, in the WORKPATH directory, 2 DAT files (ULTNT.DAT, and ULTW95.DAT) each of which restores from a separate backup profile (USTUNT and USTUW95 respectively) and separate specification directories (C:\UPSTREAM\ULTNT*.* and C:\UPSTREAM\ULTW95*.* respectively). Sample DAT files are included in the \SAMPLES directory.

- ☐ In the backup <More...> dialog, there are two new checkboxes in the ULTra frame: **Register** and **Auto-upgrade**. If you press the Register checkbox, the LAN Workstation Name is used as the registered name and the version number and ULTra connection type is registered on the host. If you press the Auto-upgrade button (which is grayed unless you have pressed the Register checkbox) the workstation is automatically upgraded. This function is only performed during backups (not restores) and you can use ULTra profiles.

When the administrator is ready to perform an automatic update, the process is similar to FDR/UPSTREAM automatic updates:

- ☐ Copy the distribution diskette or CD to a subdirectory for the operating system type to be distributed (for example, C:\UPSTREAM\ULTNT*.*).
- ☐ Perform a non-merge, disk backup of this directory using the backup profile configured on the workstations (for example, USTUNT).
- ☐ In the FDR/UPSTREAM program, select **Registered Names** from the **Remote** menu.
- ☐ Press the <List> button to list the FDR/UPSTREAM machines registered to the system.
- ☐ Add or Update a dummy workstation name (for example ULTNT), entering the operating system and version number in the **UPSTREAM version** field and pressing the ULTra connection type (**ULTra using IPX/SPX** or **ULTra using NetBIOS**). Enter your connection type (SNA or TCP/IP) and your LU Name or IP Address/Port Number.
- ☐ Check the **Receive Automatic Updates** and **This is the Master Version** checkboxes.
- ☐ Review the list of workstations which have one of the ULTra radio buttons pressed. Check the **Receive Automatic Updates** checkbox for workstations that you wish to receive the updates and uncheck it for those you don't wish to see receive the updates. From this point onwards the workstations will be eligible to receive updates when they register.

- ☐ You can later verify that the workstations have received the software by checking that the **UPSTREAM version** field has been properly updated.

  When an ULTra workstation has been selected to receive automatic updates and it completes a backup, it will then register itself with the host. The host software will notify the workstation that it's version number is not the same as the master version and it has been selected for automatic updates.

  The FDR/UPSTREAM machine then puts up a message dialog allowing the user 10 seconds to cancel the first step of the automatic update, which is the restore. If the user does not cancel the automatic update restore, the restore will run, using ULTooo.DAT (ULTNT.DAT) and automatically replacing the LAN Workstation Name, Password and ULTra connection type with that used in the backup.

  When the restore has completed successfully, the user is given a final opportunity to cancel the automatic update process for the second step which is running the installation job. If the user does not perform this cancel, the installation job (ultinst) is run and the ULTra software immediately terminates so that active programs can be overwritten. If you wish, you can have ultinst rerun FDR/UPSTREAM or perform any other function.

  Note that since DOS ULTra does not allow the execution of jobs, a job is not run; the software will be updated the next time that it is loaded.

20.7.7. Roll-Back

If for some reason you wish to roll-back to a prior version of FDR/UPSTREAM the process is:

- The administrator should revert to the prior version.
- Uncheck Receive Automatic Updates.
- Delete the flawed version.
- Re-back up the version you wish to revert to (if it is not already the latest version).
- Check Receive Automatic Updates.
- ...or you can just copy the files from the OLD directory.

21 Duplicate Files

Many workstations and servers have files which are duplicates of files on other workstations/servers. These include operating system files, applications, etc. Transmission and storage of these files can be quite costly.

FDR/UPSTREAM provides a way to avoid transmitting and storing these duplicate files. FDR/UPSTREAM supports a duplicate file repository of files (stored on host disk) which will be checked whenever a file is most likely a duplicate (based on when the file was last modified).

Files can be identified as duplicates either:

- Automatically: If you enable the automatic duplicate file identification feature in FDR/UPSTREAM MVS, the determination of whether a file should be stored in the duplicate file database is performed by the host software. This is a very powerful feature; you don't have to have any prior knowledge of files that may be stored in duplicate, but it has some additional overhead and takes a few backups for these files to be identified.
- Manually: You can explicitly back up files to the duplicate database. This has the advantage of minimizing overhead and allowing you to be able to take advantage of duplicate file handling on your first full server backup.

Identified duplicate files can be copied to the host backup disk file or tape if you wish, which provides a backup disk file or tape that completely represents the workstation/server. This method eases disaster site recovery concerns, as the duplicate file database does not have to be present and current. Or, identified duplicate files can remain in the repository, easing host storage requirements.

The duplicate database are those files which are stored as Keyed/Duplicate backups in the FILE_DATA cluster, using the backup profile USTDUPFL. To manually add files to the duplicate database, all you do is perform keyed backups using the USTDUPFL backup profile. Since these files are stored on DASD, we recommend the use of high compression for Windows and OS/2 environments (DOS memory requirements may limit is usefulness). When FDR/UPSTREAM adds these files automatically to the duplicate file database, high compression will be used (except in DOS).

FDR/UPSTREAM is the first product in its class which allows the reduction of transmitted data in restores. Duplicated files stored in the host duplicate file repository are transmitted to the workstation/server once and then written to the locations on the disk or server where the file is stored. This significantly reduces the amount of data transmitted and thus reduces time to a complete system recovery.

21.1. In Backups...

Once there are duplicates stored on the host, use of the duplicate facility requires almost no user intervention.

There is a new option in the FDR/UPSTREAM Backup <More...> panel: **Duplicate Checking**. If this box is checked, a following field is activated: **Changed more than xxx days ago**. The default is 30. Thus if a file was modified more than 30 days ago, and the archive bit is on, the file will be considered eligible for duplicate checking.

After you have set this up, you perform full or incremental merge backups normally (do not perform first-time full merge backups even on new workstations/servers). Files will be taken from the duplicate file database if they are not found in prior backups and they have been modified longer ago than you have configured for (30 days by default). The results are backups that can be significantly faster.

Note that when files are placed in the duplicate file repository, their non-file data is included along with them. Since in some cases this may include security information (which may not be duplicate), Innovation does not recommend using automatic duplicate file detection if you believe that non-file data (or even regular file data) may cause a false duplicate. In these cases you should use the manual method and only copy those files which you know to be real duplicate candidates.

21.2. In Restores...

FDR/UPSTREAM has a variety of features designed to reduce the amount of data read, transmitted and stored on backups including merge backups, duplicate file checking, etc. FDR/UPSTREAM also allows the ability to reduce the amount of data transmitted to the workstation/server on a restore.

The way that it works is that when FDR/UPSTREAM MVS detects a request to restore multiple copies of a file stored in the duplicate repository, it will send multiple placeholder records to the workstation/server followed by the actual data. FDR/UPSTREAM Workstation/Server will then write the data to each of the locations for the file.

To take advantage of this facility, you must use the duplicate file facility for backups and store the files in the repository (select the **Don't Copy Duplicates to Backup** option in Profile Configuration or DUPLICATE=NO-COPY in the backup profile host configuration). The process is then automatic. This process is automatically disabled for FDR/UPSTREAM ULTra as ULTra only support a single file write.

The FDR/UPSTREAM Workstation/Server parameter MAXDUPS allows you to specify the maximum number of duplicated files which the workstation/server will attempt to write at one time. The default is 10 (except for DOS which is 1). You can disable this facility by specifying a MAXDUPS of 1.

21.3. Maintenance and Notes

When performing inquiries and restores using USTDUPFL, the radio buttons have different meanings:

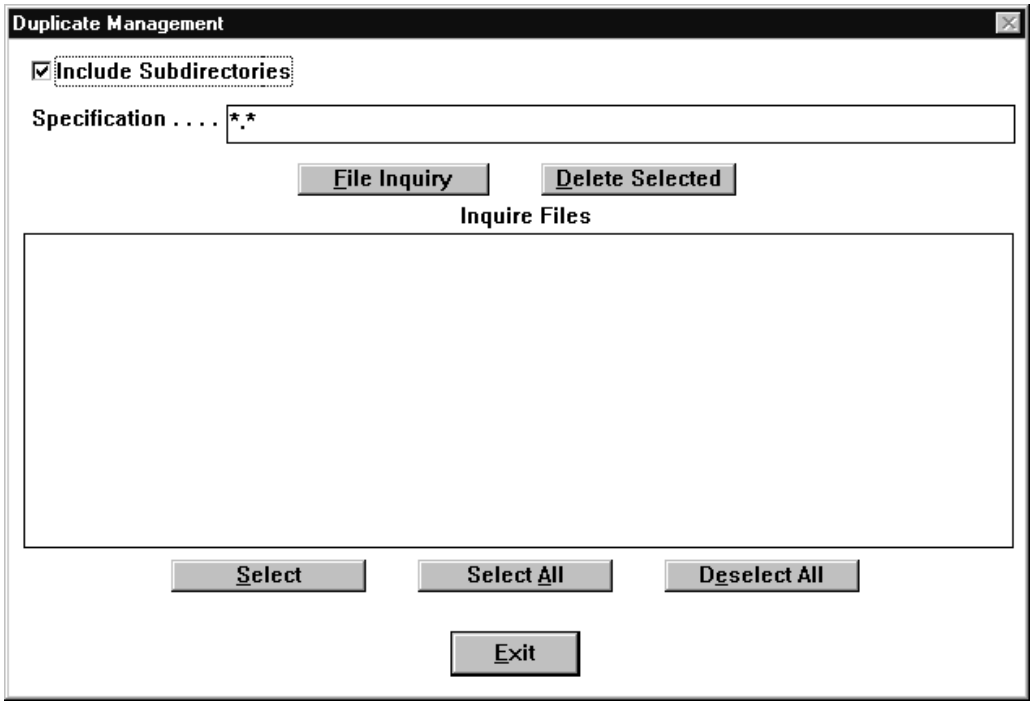
- **Only Highlighted Backup:** Only the backup version highlighted will be used for inquiries and restores. This is the method we recommend using when performing software distribution from the duplicate file database and when you wish to select backup versions for deletion.
- **Highlighted Back to Full:** For USTDUPFL, this means to look at the backup versions back from the highlighted backup to the very first backup stored.
- **Highlighted Back to Oldest:** For USTDUPFL, this means to examine all the backup versions from the highlighted backup, for files which are available specifically for duplicate management (i.e. have not exceeded 30 characters, were not deleted and re-added, etc.).

Note that if you will be using FDR/UPSTREAM for software distribution, we highly recommend using the USTDUPFL backup profile. Since these files will become duplicates through normal backups, placing them in the duplicate file database in advance allows you to take advantage of duplicate file support as soon as possible.

Under certain circumstances, files will be stored in USTDUPFL and are still unavailable for duplicate use. These include files which have file names (not including the directory path) greater than 30 characters, and files in backup versions which were deleted and then re-added.

You can remove manually performed duplicate backups in the standard way using profile management. Also, when you delete a backup, the files can not be made re-eligible for duplicate support.

To view and delete individual files in the duplicate database, there is an option in the **Remote** menu, **Duplicate Management.**



☐ **Include Subdirectories:** Check this box if you wish subdirectories searched when performing the file inquiry.

- **Specification:** Enter the specification to search. Like standard file inquiries, you can enter the drive/directory/file name with or without wildcards. In addition to this method, you can also enter a file name without the drive/directory prefix, allowing searches which are irrelevant to the original location of the file. Note that if you do not use the drive/directory prefix, the Include Subdirectories flag is automatically checked. The default is *.* and this field is required.

- **File Inquiry:** Press this button to perform the inquiry from the host using the Specification above.

- **Delete Selected:** Press this button to send the list of selected files and directories to the host for deletion. Pressing this button will prompt you for verification of the delete. When files/directories have been deleted, the file size field is replaced with the text [DEL] and a short size; the files are then deselected.

- **Inquire Files:** This list box contains the result of the search. If you double-click a file or directory or highlight it and press the <Select> button, a check mark (DOS or OS/2) or asterisk (Windows, UNIX) will appear in the first column. This indicates that the file or directory has been selected for delete. Double-clicking or highlighting and pressing the <Select> button on a file or directory already selected causes it to be deselected.

- **Select:** Press this button to select/deselect the file or directory highlighted in the list box for delete.

- **Select All:** Press this button to select **all** the files in the duplicate file repository for delete.

- **Deselect All:** Press this button to deselect all files that have been selected (but not yet deleted).

- **Exit:** Press this button to exit the dialog.

Note that if you check **Don't Copy Duplicates to Backup**, and you delete the backups using Profile Management or the files using Duplicate Management which contain files referenced, they are permanently deleted. Thus this method is recommended for use only with care.

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22 File Transfer

FDR/UPSTREAM's high performance, and reliability is now available for file transfers between workstation/servers and the host. File transfer allows native host files and workstation/server files to be interchanged outside of the backup/restore facility of FDR/UPSTREAM.

File transfer features on the workstation/server side allow:

- Selectable ASCII/EBCDIC translation.
- Selectable record blocking by carriage return/line feed (or just line feed for UNIX) or any other character with or without truncation or fixed record length blocking.
- File transfer directly to and from ULTra connected workstations.
- Full workstation/server or host scheduled automation.
- Bi-directional transfers using the UPSTREAM/SOS Local Backup disk.

File transfer features on the host side allow:

- Disk or Tape transfers.
- Automatic file creation for sends.
- GDGs.
- Integration with host security.
- Variable length records or, for sends only, fixed length and undefined records.
- Sequential files or PDS members.

This facility is particularly useful to transferring workstation/server logs and report files to the host. You can specify that the workstation/server delete the log or report file after it has been transmitted thus removing the need for USLOGCLR and allowing host interrogation of workstation/server activity.

22.1. Using File Transfer

22.1.1. Host Setup

To use file transfer, you must define a backup profile on the host which defines defaults for file transfer. File transfer profiles can not be used for backups and backup profiles can't be used for file transfer. There is a new parameter in Profile Configuration, File Transfer Profile Only which should be checked for backup profiles designated for file transfer (this field is grayed until you check Disk or Tape and uncheck Merge backups); a similar parameter is available on the ISPF panel: TRANSFER=YES.

The backup profile definition allows you to determine whether you wish to enable file transfers for disk and/or tape as well as default creation options (for workstation/server sends) such as whether created files are GDGs, the prefix names, storage classes, retention periods, etc. Once the backup profile has been defined and activated you can specify a file transfer.

22.1.2. Workstation-to-MVS Transfers

Since any workstation file may have variable-length records, a file transferred to MVS will be placed in a MVS disk or tape data set in variable format (RECFM=VB). The LRECL of the output data set will be the RECORDSIZE specified at the workstation when the transfer is initiated (+4 for the variable format length fields) and the BLKSIZE will be the value of DASDBLK in the associated file transfer profile which must be at least RECORDSIZE+8. The size of the individual records depends on options chosen, as described below.

When the transfer is initiated, the name of the input workstation file, transfer options, and disk or tape output is indicated. The data set name of the output MVS data set can optionally be specified; if omitted, the sequential disk or sequential tape name from the associated profile will be used.

If the output is a sequential data set or a GDG generation it will be allocated as a new data set with the DCB characteristics shown above and cataloged by FDR/UPSTREAM. The options in the file transfer profile for sequential disk or sequential tape backups will be used to allocate the data set (except for the name, if overridden). If you override the MVS name with a GDG name you must specify "(+1)" at the end of the name, e.g., "A.B.C(+1)". You can also output to a member of an existing PDS (partitioned data set) if you specify a member name at the end of the name, e.g., "A.B.C(MEMBER1)", but that PDS must have the proper DCB characteristics (RECFM=VB and an appropriate LRECL and BLKSIZE). The output PDS must be preallocated, FDR/UPSTREAM will never allocate a PDS.

If the file being transferred is a text file, you can request ASCII to EBCDIC translation; this is enabled by default.

Since text files are usually broken into records delimited by a CR/LF (just LF alone on UNIX systems), you can request that FDR/UPSTREAM scan for those delimiters and transmit the individual records (with the delimiters removed); this will result in a MVS file with the same records as the workstation file. This option is also enabled by default, but if it is not used the transmitted file is considered to be a continuous set of data bytes and delimiters are not removed. Since MVS requires that data sets consist of individual records, FDR/UPSTREAM will break the transmitted data in records of the size specified by RECORDSIZE. For example, if RECORDSIZE is 6000, the MVS data set will consist of variable length records, all of which are 6000 bytes in length (except the last).

If you are transmitting a non-text (binary) file, you must turn off the EBCDIC translation option and probably not use the record delimiter option. However, unless you have detailed knowledge of the format of the binary file, the transferred file will probably be useful only if you later transfer it back to a workstation.

22.1.3. MVS-to-Workstation Transfers

When transferring a file from MVS to a workstation, the MVS input data set may have any record format (fixed, variable, or undefined). It must be a sequential disk or tape data set (including GDG generations) or a member of a PDS. When the transfer is initiated, the name of the output workstation file and transfer options are specified. The data set name of the input MVS data set can optionally be specified and most of the time it must be given. If omitted, the name of the output MVS data set from the most recent transfer to MVS under the transfer profile name will be used as input, but this will work only if the option to record the transfer to MVS was chosen; this might be useful to transfer a file from one workstation and then transfer it back to one or more additional workstations. If no transfer has been recorded under the transfer profile name used, the input MVS name must be given.

FDR/UPSTREAM will automatically allocate the specified input data set using the MVS catalog. You do not need to specify if it is on tape or disk.

If the file being transferred is a text file, you can request EBCDIC to ASCII translation; this is enabled by default.

Since text files are usually broken into records delimited by a CR/LF (just LF alone on UNIX systems), you can request that FDR/UPSTREAM transmit the individual records from the MVS data set with the appropriate delimiters inserted; this will result in a workstation file with the same records as the MVS file. This option is also enabled by default, but if it is not used the transmitted file is considered to be a continuous set of data bytes and all bytes in the file will be transmitted without delimiters. Individual records in the MVS data set will be combined in the workstation file.

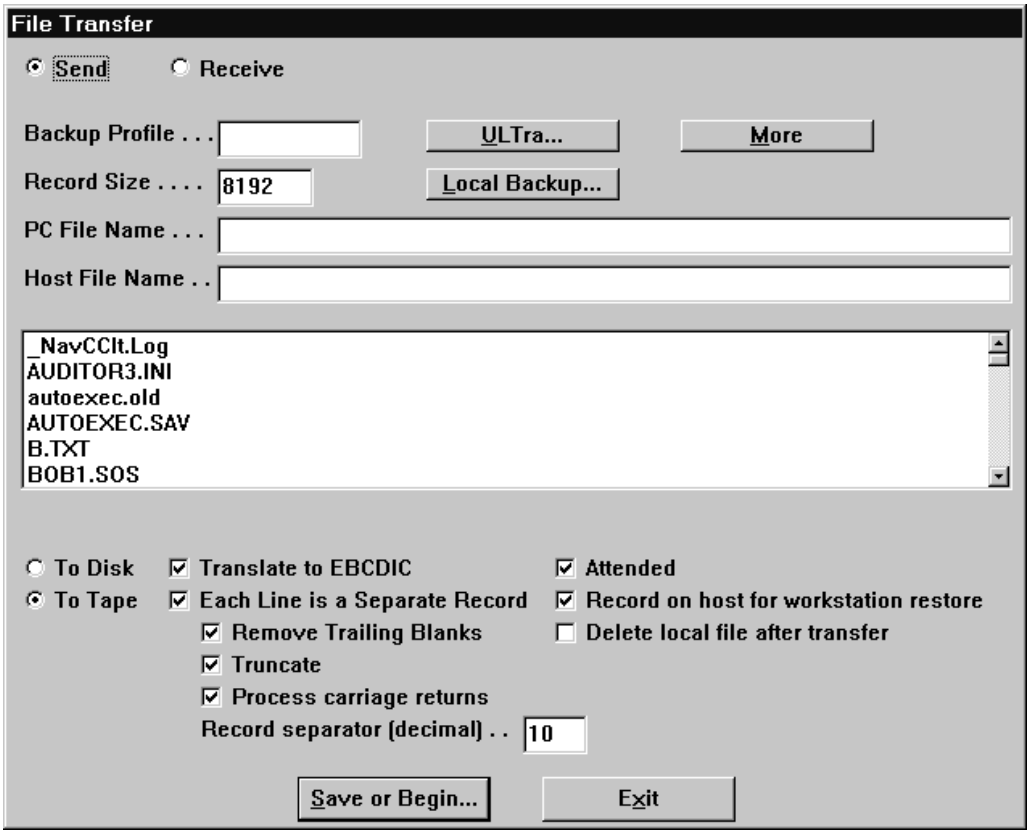
If you are transmitting a non-text (binary) file, you must turn off the EBCDIC translation option and probably not use the record delimiter option.

22.1.4. File Transfer Security

Because FDR/UPSTREAM file transfer can be used to transfer to or from any sequential MVS data set, security for file transfer is different from normal FDR/UPSTREAM security. If SECLVL=1 or more is specified in the FDR/UPSTREAM-MVS configuration, a security userid and password must be associated with the file transfer requires. All access to MVS data sets will be verified under that userid, so it must have CREATE authority to the MVS names for transfer to MVS, and READ authority for transfer to the workstation.

22.1.5. File Transfer Dialog

There is an option in the **Action** menu, **File Transfer** which can be used for workstation specification of file transfers, and a similar ISPF panel available through the USTBATCH facility.



- **Send/Receive:** Press the **Send** radio button if you wish to send a workstation/server file to the host; press the **Receive** radio button if you wish to receive a host file. The default is Send.

- **Backup Profile:** Specify the backup profile name which contains the defaults you wish to use for this file transfer. For receives, this can be any name not used for backups. This field is required and there is no default.

- **Record Size:** Record sizes can be very important in workstation/server sends as all host files are blocked into logical records. If you check Each Line is a Separate Record (below), then this is the longest line that is transmitted; otherwise the record size is the exact number of bytes for each record on the host. The default is 8192, but record sizes of 80 bytes (for text files) are also common.

- **ULTra...:** Press this button to specify file transfers to ULTra attached workstations. Note that you can specify ULTra profiles.

- **Local Backup:** Press this button to specify FDRSOS Local Backups (if you have purchased this facility). This will display the local backup dialog. See the UPSTREAM/SOS chapter for how to specify a local backup disk.

- **More...:** Press this button to specify additional file transfer parameters such as user defined translation tables, Novell Profiles, etc.

- **PC File Name:** Enter the name of the source file for Sends and the destination file for Receives. For sends, the file list below is used to help fill in this field. Wildcards are not allowed. The default is blank and is required.

- **Host File Name:** Enter the name of the destination file for Sends and the source file for Receives. You can leave this field blank if you wish to have the host assign a name using the FDR/UPSTREAM convention which is the profile defined prefix and a random suffix for non-GDGs.

Host file names are a maximum of 44 characters, are multi-level and have dot separators (for example BOB.TEST). Sequential files use these names. If you leave this field blank, the host will create the file name for sends, or will use the most recent recorded file transfer for receives.

GDGs (generation data groups) are host file names with a generation suffix number in parens. For sends, the suffix must be +1 (for example, BOB.GDG(+1)). For receives the suffix must be 0 or negative (for example, BOB.GDG(-1)).

PDSs (partitioned data sets) are a single large entity which holds a number of entries within it (somewhat similar to a directory) and are specified as host names with an 8 or less character entry in parens (for example, BOB.PDS(ENTRY)). FDR/UPSTREAM requires that the PDS be preallocated for sends, but the entry can either pre-exist or be created.

The default for host file name is blank and is required only for receives.

- **File List:** You can use the mouse or keyboard to help you select files to send in the same manner as selecting files for backup. The list is grayed for receives.

- **To Disk/Tape:** Select Disk if you wish to write your file on host disk; select Tape if you wish to write your file on host tape. This field is grayed for receives.

- **Translate to EBCDIC (ASCII):** Check this box if you wish to translate workstation/server readable ASCII to host readable EBCDIC for sends or vice-versa for receives. In most cases, check this box for text files and uncheck for binary files. The text of this message changes for sends and receives (Translate to EBCDIC for sends and Translate to ASCII for receives).

  Note that ASCII-to-EBCDIC translation may not be congruent (files transmitted and then receive may not be identical).

  FDR/UPSTREAM supports user loaded translation tables and we recommend their use in situations where data is not translated as expected. The default is checked.

- **Each Line is a Separate Record:** For sends, check this box if you wish to block workstation/server files into separate records based on lines (carriage return/line feed for PCs and line feed for UNIX systems); do not check this box if you wish to block the workstation/server file into records based on a fixed size (the record size). For receives, check this box if you wish to have FDR/UPSTREAM add a carriage return/line feed (line feed only for UNIX) after each received line; do not check this box if you don't want line delimiters added. Most users will check this box for text files and uncheck it for binary files. If this box is not checked, the two checkboxes below are grayed. The default is checked.

- **Remove Trailing Blanks:** Check this box if you wish trailing blanks on each line to be removed for both sends and receives. The default is checked.

- **Truncate:** Check this box if you wish records which are longer than the record size to be truncated (data which is too long is removed); do not check if you wish remaining characters in a line transmitted as the next record (data which is too long is transmitted, increasing the number of lines). This field is unavailable for receives. The default is checked.

- **Process carriage returns:** Check this box if you wish records with trailing carriage returns to have them stripped from the end of the record. The default is checked for PC systems and unchecked for UNIX systems with is standard handling of text files.

- ☐ **Record separator (decimal):** Specifies the record separator if you have specified *Each line is a separate record* above. Most of the time you want to use the line feed (decimal 10).

- ☐ **Attended:** If you check Attended, it is assumed that this is an attended file transfer. Do not check this box if you are building a parameter file for unattended file transfers. The default is checked.

- ☐ **Record on host for workstation restore:** Check this box if you wish to have FDR/UPSTREAM MVS record this information for easy workstation recovery in which the workstation does not have to know the host file name. This field is grayed for receives. The default is checked.

- ☐ **Delete local file after transfer:** Check this box if you wish to delete the file after a successful file send. Note that this parameter is automatically unchecked after a send. The default is not checked.

A file transfer visually appears as a standard backup or restore with a status screen, logging and reporting.

22.1.6. Other File Transfer Features

File transfers can be automated in the same way as any other FDR/UPSTREAM function: from the command line, utilizing the workstation scheduler, from the host, etc.

Reporting is available in file transfer and is specified in a backup or restore <More...> dialog.

23 Security

23.1. Overview

FDR/UPSTREAM offers unique security features for a product of its type. All FDR/UPSTREAM functions require a security clearance. FDR/UPSTREAM security is controlled centrally on MVS and integrates into your in-house security package which can include ACF-2, RACF and TOPSECRET and locally through the personalization facility.

Using central security, there are two different levels of security. The lowest security level (level 1) is comparable to a TSO logon. It allows you access to FDR/UPSTREAM data storage. Level 1 security is recommended for environments where minimal security checks are sufficient.

Level 2 security allows you to perform comprehensive security checks. You can allow or not allow individual users access to data stored in particular backup profiles.

See the FDR/UPSTREAM MVS User's Guide for more information concerning setting and maintaining data set security.

Requests of local UPSTREAM services can also be secured. This chapter discusses these methods.

23.2. User IDs and Passwords

The most common form of security protection for computer systems is a combined user ID and password. For FDR/UPSTREAM workstation/server, there are user ID and password fields on all screens which communicate with FDR/UPSTREAM MVS.

Both the user ID and the password are 8 characters. When you enter the user ID, the text is displayed; when you enter the password, the cursor moves but the characters you enter are not displayed.

When you save a parameter file which contains a password, it is stored to disk encrypted with a special algorithm which assures that none of the characters end up as control characters which avoids issues like errant line feeds and end of file markers.

The unattended nature of FDR/UPSTREAM requires that passwords be stored. If you wish to not store your password, there is an UPSTREAM advanced configurator option **Do Not Save Passwords to Parameter Files** which suppresses this feature.

Passwords must always be entered once when running in attended mode. This assures maximum security in attended mode and that changed passwords are reflected in unattended mode.

If you wish, you can specify a password unencrypted using the parameter entry schemes which can include parameter file, command line, and environment. FDR/UPSTREAM codes a flag with encrypted passwords so that it can tell when a password is unencrypted.

Thus, if you wish to integrate FDR/UPSTREAM with a security package of your own, or you wish to enter a different password when you run the FDR/UPSTREAM program, you can do this. For example, to start FDR/UPSTREAM with a different password than in the default data file (say TEST1), you could enter:

```
US PASSWORD=TEST1
```

23.3. Personalization

The personalization facility is an UPSTREAM configurator function which allows an administrator to limit access to specific UPSTREAM functions. It is described in detail in the Management chapter.

Some of its very powerful features include:

- Checkboxes to limit the access to virtually every UPSTREAM function.
- **Restrict only for PC Initiated:** If you specify this, all the personalization check boxes will apply only to workstation/server initiated functions; all host initiated functions will be accepted.
- **Load User Personalizations:** If you check this box, you must have separate personalization files for each user, activated when they log in. The personalization file name is the user's host login name with .ser extension in the work path directory. This is particularly useful for enforcing security on a multi-user system when running a single copy of FDR/UPSTREAM.
- **Time-out Host Security Login:** If you check this box, a user's login will time out after 30 minutes of inactivity.
- **No dest. Changes:** If you check this box, a user cannot redirect a restore to a different drive or directory. This allows your system's existing security system to enforce access to files. When possible, the UNC name (universal naming convention) name for the device is used to keep users from redirecting drives under the covers.
- **Preset Backup Profile:** Allows you to specify a specific backup profile, thus keeping the user from viewing or restoring data that they do not have permission to access.
- **Password:** Each copy of UPSTREAM can be locally password protected.
- **Specific Directory:** You can limit backups/restores to a specific directory (and below). This assures that your users are restricted to access to their home directories.

Since the personalization facility can be a powerful way to limit access to specific functions, we highly recommend it's use.

Remove access security within Personalization is discussed in the next section.

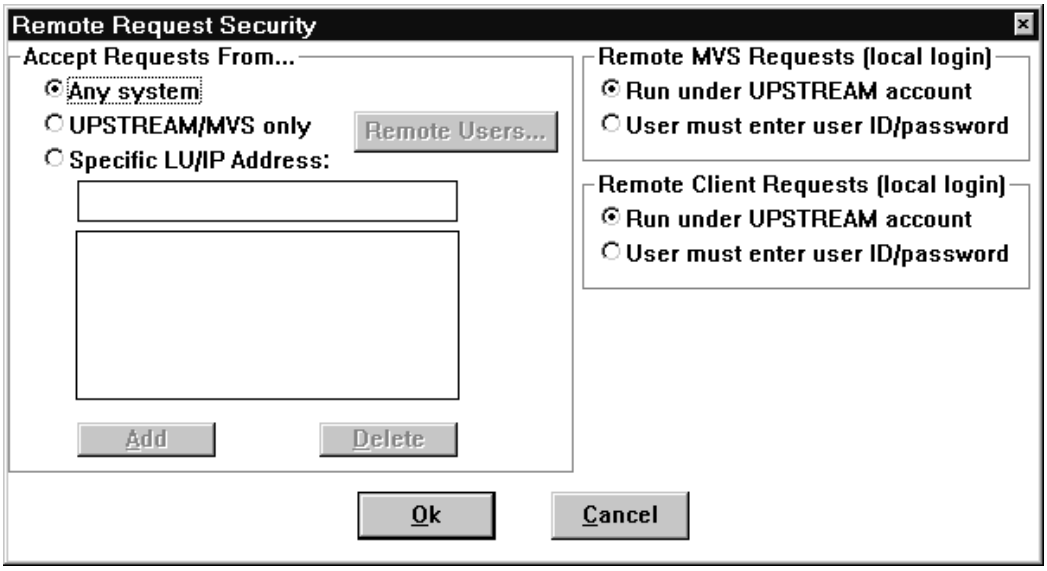
23.4. Remote Security

UPSTREAM typically must run as the "super-user" on your system to be able to perform backups, restores, run jobs, etc. This leaves a security hole which should be filled.

The most powerful facility in Personalization is available when you press the **Remote Security** button in the Personalization dialog in the UPSTREAM configurator. The Remote Security features in UPSTREAM allow you to secure your machine completely against unauthorized accesses.

Note that you are not required to use these new options and all existing functions will work with your current personalization files.

Also note that most of these features require that UPSTREAM be run as a super-user (root for UNIX or Administrator for Windows NT/2000).



The **Accept Requests From...** frame indicates which systems remote requests can be accepted and processed from.

- **Any system.** UPSTREAM will accept remote requests from any system - there will be no filtering by LU name/IP address. This is the default.

- **UPSTREAM/MVS only:** UPSTREAM will accept remote requests only from the system defined in the UPSTREAM configurator.

- **Specific LU/IP Address:** Allows specification of which systems UPSTREAM will accept remote requests from. When you check this radio button the edit field and the list box below are activated.

  To add systems to include/exclude, enter the LU name, or IP address (in either dotted decimal or DNS name server form) in the edit field and press the **Add** button. To remove systems, highlight the system in the list and press the **Delete** button.

- **Remote Users...** This button is activated when you select the *UPSTREAM/MVS only* or *Specific LU/IP Address* options. If you have selected *Specific LU/IP Address* the dialog affects the system highlighted in the list box. This button displays a dialog which allows you to specify/modify additional options specific to this remote system (see below).

  The other two frames address the local system authorization that the user has after being granted access to UPSTREAM.

  UPSTREAM supports impersonation for remote users. Since UPSTREAM must generally run as the super-user, supervisor, administrator, etc., you can require that users perform a login (the **User must enter user ID/password** option) and then work under the restrictions of this login.

  For example, if you require that the user login and they wish to restore files in a location where they have no rights, the operating system will deny access to these files. This is particularly important for running jobs, as, by default, the jobs will run under UPSTREAM security.

  Note that the default for both the FDR/UPSTREAM host and Client (workstation) system requests is the **Run under UPSTREAM account** option. This is to allow maximum accessibility for test environments.

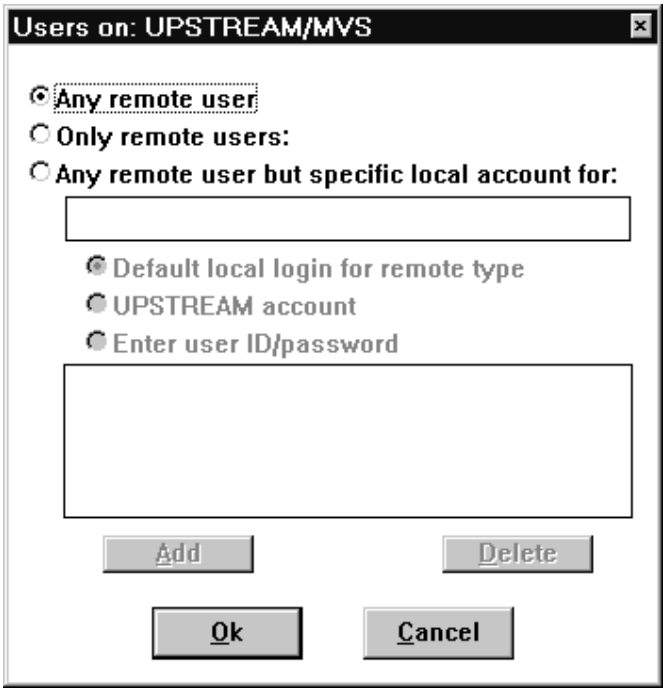
  These frames specify defaults when you have not defined specific attributes for a given system/user. You can modify the defaults for specific users/systems in the **Remote Users** dialog (below).

  The **Remote MVS Requests (local login)** frame specifies the security that remote requests from the system configured for the FDR/UPSTREAM host work under. The **Remote Client Requests (local login)** frame specifies the security that remote requests from any other system work under.

  We strongly recommend that in production environments that you select in the **Remote Client Requests (local login)** frame the **User must enter user ID/password** option for maximum security protection.

23.4.1. Remote Users

You can press the **Remote Users...** button when you select the *UPSTREAM/MVS only* or *Specific LU/IP Address* options. If you have selected *Specific LU/IP Address* the dialog affects the system highlighted in the list box. This button displays a dialog which allows you to specify/modify additional options specific to this remote system:



The user that is referred to in this dialog is the user currently logged onto the remote system

- **Any remote user:** Press this radio button if you wish to allow all users on the remote system access to UPSTREAM.

- **Only remote users:** Press this radio button to specify the remote users you wish to allow UPSTREAM access on this system.

- **Any remote user, but specific local account for:** Press this radio button to allow all remote users access to UPSTREAM but modify the login type of specific users.

If you check *Only remote users* or *Any remote user, but specific local account for*, then the edit field, the list box and the radio buttons become active. In the edit field, enter the name of the user on the remote system who you wish to specify access attributes.

The radio buttons modify the login requirements for the given user:

- **Default local login for remote type:** The login for this user will be as specified in the Remote Request Security dialog for the system type the user is connecting from (Client or MVS).

- **UPSTREAM account:** This user will run under the UPSTREAM account.

- **Enter user ID/password:** This user must logon.

Press the **Add** button to add the user and the login attributes to the list. When you highlight a user in the list the edit field displays the user's name and the radio buttons reflect the login attributes. You can remove a user from the list by highlighting the user and pressing the **Delete** button.

When you have completed your user changes press the **Ok** button to return to the Remote Request Security dialog. Press the **Cancel** button to exit without saving changes.

From the Remote Request Security dialog, press the Ok button to return to the Personalization dialog. Pressing the **Cancel** button will ignore all Personalization changes and return you to the Configuration main window.

23.4.2. Notes

There are several overall parameter file parameters for Remote Request Security:

Name	Default	Required	Description
LOCALPASSWORD	None	No	The password of the remote user who wishes to logon to this system.
LOCALUSER	None	No	The local user name of the remote user who wishes to logon to this system. For Windows NT, you can specify domain/user.

There are a number of differences in the way that Remote Request Security is processed within UPSTREAM for each operating system. These include:

- **Windows NT:** If you enable Remote Request Security you must enable the **Login as a batch job** privilege for the UPSTREAM user in the Windows NT User Manager.

  By default, the login will use the local account database. To specify a login to any given domain (including the local one for Windows 2000), specify for the user:

  `Domain/user`

- **Windows 2003/XP:** Besides setting the **Login as a batch job privilege** (set in Administrative Tools/Local Security Policy/User Rights Assignment), you also may need to go into Security Options in Local Security Policy and **disable** the **Accounts: Limit local account use of blank passwords to console login only** privilege.
- **NetWare:** Novell Profiles are still required for the NLM version to specify login attributes. However if personalization requires the user logon, the LOCALUSER and LOCALPASSWORD parameters must be specified.

  If you are using Windows NT and Novell Profiles, remote request security may be impossible to set up as both a Novell Profile login and a Windows NT login are required - and their naming conventions are dramatically different. In this case we recommend using the NLM version or a system for which there is no local security (Windows 95/98, or OS/2) for remotely secured requests.
- **Unix:** No special considerations.
- **All others:** Local logins are not supported. However, remote requests are still rejected for invalid LU name/IP address.

End-User Restores and the Request Remote Function dialog includes fields for entry of remote login name and password.

Note that you should secure the us.ser Personalization file with operating system security so that the Personalization options are not modified by users.

24 Running More Than One Copy

You may choose to run FDR/UPSTREAM in a multi-user/multi-processor way to:

- Improve performance on a FDR/UPSTREAM server by running more than one backup at a time.
- Allow multiple users on a server access to a single copy.
- Allow multiple users on a multi-user system access to the single copy.

In UNIX, NetWare and Windows, multi-processing is built into UPSTREAM and is automatically enabled. The first section describes it in detail.

In other environments you can run more than one copy simultaneously if all control and executable files are separated. The next section describes this method.

For OS/2 and Windows NT, there is a deprecated multi-user facility. We recommend this only for OS/2 customers or Windows customers which existing configurations.

24.1. Multi-Processing UPSTREAM for UNIX, NetWare and Windows

UPSTREAM is now automatically capable of supporting multiple simultaneous executing instances of UPSTREAM in the same directory in UNIX, NetWare and Windows. Workpath, restarts, multiple host and Director requests and a number of other issues are automatically handled.

No configuration or other changes are required to take advantage of this facility - it is the default operating mode for UPSTREAM. Note that this facility is only for UNIX, NetWare and Windows - it is not available for OS/2.

You can use this facility to share a copy of UPSTREAM on a network drive. The only note would be that if two instances of UPSTREAM running on different machines happen by chance to have the same process ID, the second instance would report a fatal error and not start. Simply restarting the second instance should resolve the problem.

24.1.1. Remote Requests

UPSTREAM will automatically perform multi-processing for both host and locally initiated requests. UPSTREAM will automatically handle as many host, Director or local requests as you wish to submit.

When you install or upgrade your UPSTREAM daemon or service, UPSTREAM will operate as usual waiting for remote requests. This copy of UPSTREAM will be the instance which will listen on the inbound IP port and will run until it is killed. However, if a remote request is received, a new copy of UPSTREAM will automatically be started to service this request. Each of these child copies will terminate when the given request has completed.

What this means is that you can submit as many jobs to UPSTREAM at any given time and gain the performance advantages of multi-processing without any effort on the client. For example, if you wish to backup the C:, D: and E: drives simultaneously to separate backup profiles, you can submit all three jobs at one time. In earlier versions of UPSTREAM you had to either sequence them so that only one ran at a time, run separate listening UPSTREAM processes, or (for Windows) run the multi-user version. The existing multi-user feature in Windows is still supported, but we recommend that new installations not use it as the new method is quite a bit simpler to manage.

Each copy of UPSTREAM will write to the same upstream.log file. When the parent UPSTREAM starts a child it will write the child's process ID number to the log. To determine messages for a given instance of UPSTREAM in the log, you will have to identify them by process ID number (logged with the message timestamp).

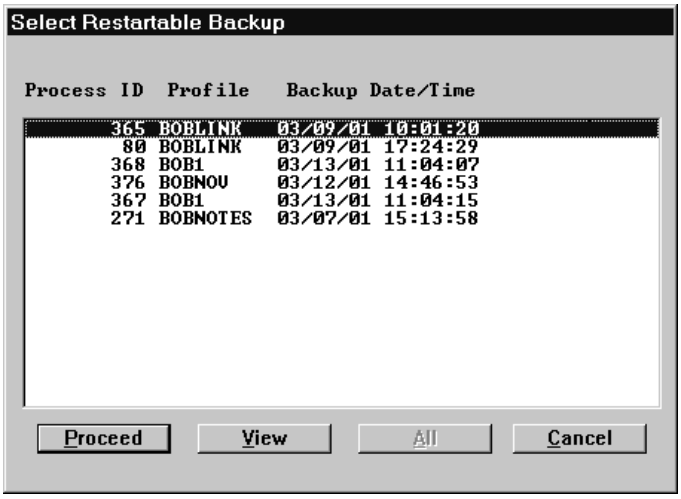
In Windows, if you are running US.EXE, a separate window will be created for each independent request. If you are running uscmd, UPSTREAM will write messages to only the parent (listening) process's screen.

When you upgrade your UPSTREAM to the new version, you will need to upgrade the Director as well. When the Director needs to have UPSTREAM process a request, it will start a given UPSTREAM which it will then manage.

This feature is on by default. To disable it and have the listening UPSTREAM process inbound requests, set the environment variable **USNOTATTMGR** to any value.

24.1.2. Restarts

Any failed restartable backup or restore can be restarted. From UPSTREAM, when you pull down the **Action** menu and select one of the restart options (**Restart Backup**, **Restart Restore**, **Kill Restartable Backup** or **Kill Restartable Restore**), you will see a new restart selection dialog:



The list displays the process ID, backup profile and formatted version date of the request.

The buttons are:

- **Proceed:** The highlighted backup or restore will be restarted or killed (based on the menu item you selected previously).
- **View:** Displays the UPSTREAM file viewer and allows you to see the parameters specified for the original request.
- **All:** Enabled only when you specified one of the Kill menu options, allows you to kill all of the pending restartable backups or restores.
- **Cancel**: Returns you to the main UPSTREAM screen.

Restartable backups or restores are preserved until they are not restartable or they are more than 7 days old. You can change the default aging time with the environment variable **USBACKFILEDAYSOLD**.

Any host initiated or unattended restart or kill restart request will process the most recent backup or restore by default. If you wish to specify a specific one use the non-repeating parameter RESTARTVERSIONDATE and specify the backup version date in 12-digit YYMMDDHHMMSS form.

Some of the minor differences relating to multi-processing are:

- All instances of UPSTREAM write to the common UPSTREAM log.
- UPSTREAM local reports continue to use the specified report file name (defaulting to *us.rpt*). When UPSTREAM is processing the backup or restore, the report is written to a temporary name (us.<pid>.rpt) and copied to the specified report name when the process has completed.
- Temporary files have the process ID in the name.

- us.ret does not have a name change.

24.1.3. NetWare Notes

The multi-user facility in NetWare requires that you have WINSOCK TCP/IP communications installed and that UPSTREAM be installed on a volume with the LONG name space installed. NetWare 5.0 or higher meets both of these needs. NetWare 4.x requires that they be installed separately. If you do not have them installed, UPSTREAM will step down to single user mode. Contact Innovation tech support if you need assistance in installing these features.

24.2. Separating Multiple Copies

One of the ways to improve performance with FDR/UPSTREAM is to run multiple copies at one time. This takes advantage of the operating system's multi-tasking abilities. While one copy of FDR/UPSTREAM is reading a file, another can be sending data. This technique can be used to ease administration as well: each LU can be dedicated for a particular file server. Note that there is rarely any performance benefit to running more than 3 copies at one time.

In general, these techniques should only be used under direction of Innovatino tech support - most users should use the other techniques described in this chapter.

The technique is fundamentally to run multiple separate copies of FDR/UPSTREAM. If you are using Windows NT or OS/2 see the following section for a more comprehensive method than the one described here. While there are ways (in some operating systems) to get a single copy of FDR/UPSTREAM running the issues of host connectivity, temporary files, etc.. just make it simpler to have separate FDR/UPSTREAM directories.

Before beginning this setup, get a single copy of FDR/UPSTREAM fully operational in the way that you want to use it. Note that this chapter only applies to non-DOS environments.

24.2.1. VTAM configuration

This step is only necessary for SNA. In VTAM configure enough LUs for your PC for every copy of FDR/UPSTREAM that you wish to run. Note that in most cases you cannot share 3270 LUs with APPC LUs so that you will need to configure enough. Note the LU names and numbers (LU Local Addresses) for use later.

24.2.2. Installing the PC software

Create a new directory for each copy of FDR/UPSTREAM. For best performance, they should be on separate disk drives (though this is rarely possible). For example, if you wish to run a total of 3 copies of FDR/UPSTREAM and the first copy is on C:\UPSTREAM, copy the diskettes to new directories C:\US2 and C:\US3.

24.2.3. Communications configuration

This step is only necessary for SNA. In the communications configuration, configure a separate LU for each copy of FDR/UPSTREAM that you intend to run. For example, if you have defined a Local LU named LU5 for FDR/UPSTREAM and wish to run a total of 3 copies, add definitions for LU6 and LU7. Note the Local LU Alias' for use later.

Also, in the communications configuration, configure a separate Transaction Program definition for each copy. If you are using the transaction program name of UPSTREAM for the first copy, configure definitions UPSTREA2 and UPSTREA3 for 2 more copies. Note the Transaction Program Names (and don't forget to use upper case) for use later. It is particularly important to remember which Transaction Program Name associates with which directory.

When configuring Transaction Program definitions, you need the executable file name. Using this example, define them as C:\US2\US.EXE and C:\US3\US.EXE. It is all right to use the definition PARAMETER=RMTPARM.DAT for all copies.

Verify and save your communications configuration (in most cases you will need to stop and restart communications to have it truly activate successfully).

24.2.4. FDR/UPSTREAM Configuration

(SNA only) In each of the FDR/UPSTREAM directories, run the Configurator (USCFG). Enter the new Local LU Alias (defined earlier in the communications configuration) in the configuration dialog and save to the configuration file. Remember that each copy of FDR/UPSTREAM must use a separate Local LU Alias.

From the main configuration screen, pull down the Action menu and select Advanced. Enter the transaction program name that you specified earlier in the Communications Configuration in the Inbound TPN field. Save to the configuration file.

(TCP/IP only) In each of the FDR/UPSTREAM directories, run the Configurator (USCFG). Specify a separate **TCP/IP PC Port** for each copy. When you request a host function, you will use this port number to reference a given copy of FDR/UPSTREAM on the workstation (which must be up and running to be serviced).

If you wish, you can specify the same port for each copy and then check **Allow dynamic TCP/IP PC Port assignment.** This requires that you specify a separate registered name for each copy but has the advantage of easy, logical name separation of each copy of UPSTREAM for host initiation.

(All Connection Types) For each copy, you may wish to specify a separate **Registered Name** for host initiation purposes.

From the main configuration screen, pull down the Action menu and select Advanced. Enter a separate directory for **Work Path** for each copy.

For Win32, NLM and UNIX, you will also need to specify unique **Status Port** values. Status Port entries must be separated by at least 2 as UPSTREAM uses the specified Status Port as a starting point. For example, for three copies you would specify 2033, 2036 and 2039. If you specify **Allow dynamic TCP/IP PC Port assignmen**t (above) then the values will be dynamically incremented when UPSTREAM starts if the port is in use. This may be a problem if you wish to target a specific copy of UPSTREAM in which case you should be sure that all ports are unique.

24.2.5. US.EXE Issues

Each copy of FDR/UPSTREAM is now ready to run. You should test a small backup to verify that you have set up the communications environment correctly. You may also wish to test them all running simultaneously to verify that all is working as expected.

Some issues of note when running FDR/UPSTREAM in production are:

- **Backup Profiles:** You MUST use separate backup profiles when running multiple backups at one time, regardless of whether it comes from one or more than one PCs.
- **Host initiation:** You must consistently use a combination of LU/Transaction Program Name (TPN) when host initiating or IP address/port number. For example, if you have 3 LUs (LU1, LU2 and LU3) you should have three TPNs (UPSTREAM, UPSTREA2, UPSTREA3). They should then be always used together; i.e.: LU1 and UPSTREAM, LU2 and UPSTREA2, and LU3 and UPSTREA3.
- **Novell Profiles:** FDR/UPSTREAM will mount Novell volumes on local drives. You will need to be sure that each copy of FDR/UPSTREAM is working with a separate set of drive mappings.

Novell Profiles defined in SETNOV are visible only to the copy of FDR/UPSTREAM that is in the same directory as the SETNOV program. Plan on either running SETNOV in every directory and duplicating definitions, or only backing up particular servers from particular directories.

- **Local scheduler:** If you will be locally initiating backups, then you may choose to run multiple copies of the USSTART program. While a single copy will work, there will be fewer frequencies and things will be a little earlier to manage.

24.3. Enhanced Multi-User Support

There are a number of cases where you may wish to install and configure FDR/UPSTREAM a single time and run it from multiple machines/multiple-processes:

- Installing FDR/UPSTREAM on a server and allowing multiple users on other machines to be able to run from that single copy (Server mode).
- If you wish to back up a number of servers/disks from a single machine simultaneously (Multi-Tasking mode).
- Installing FDR/UPSTREAM on a machine and having multiple users access it (Single-Processor mode).

There are somewhat different issues on using this facility for locally initiated functions and host initiated functions. To make the host initiated functions more effective, we have added a TCP/IP attach manager which will start UPSTREAM when a TCP/IP request occurs.

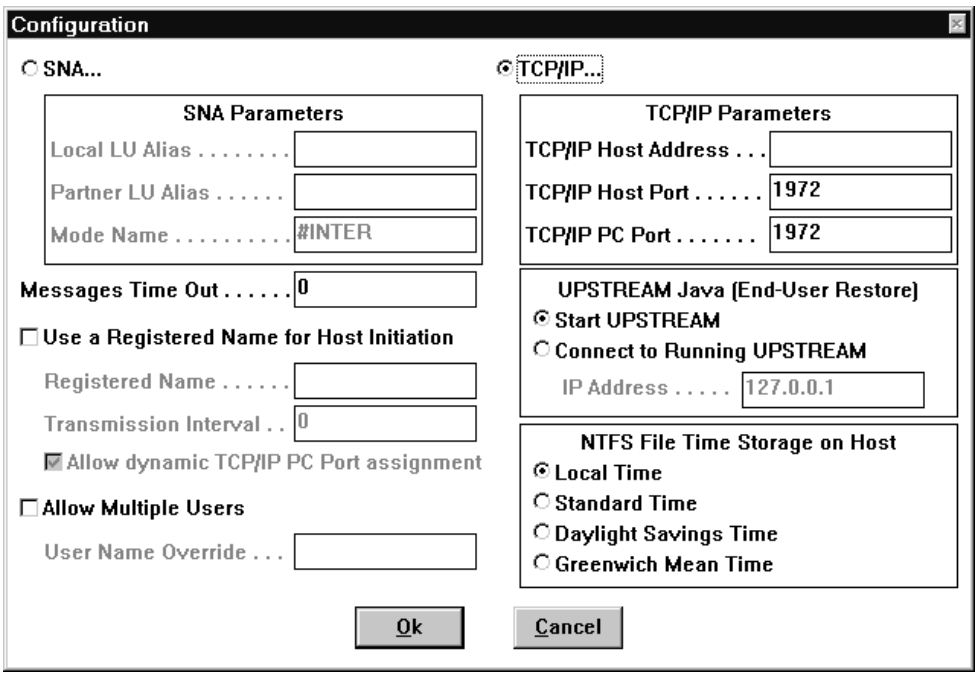
If you are currently backing up multiple servers from a single machine using multiple but separated copies of FDR/UPSTREAM, that method will still work. However, the new method can make adding new servers much easier.

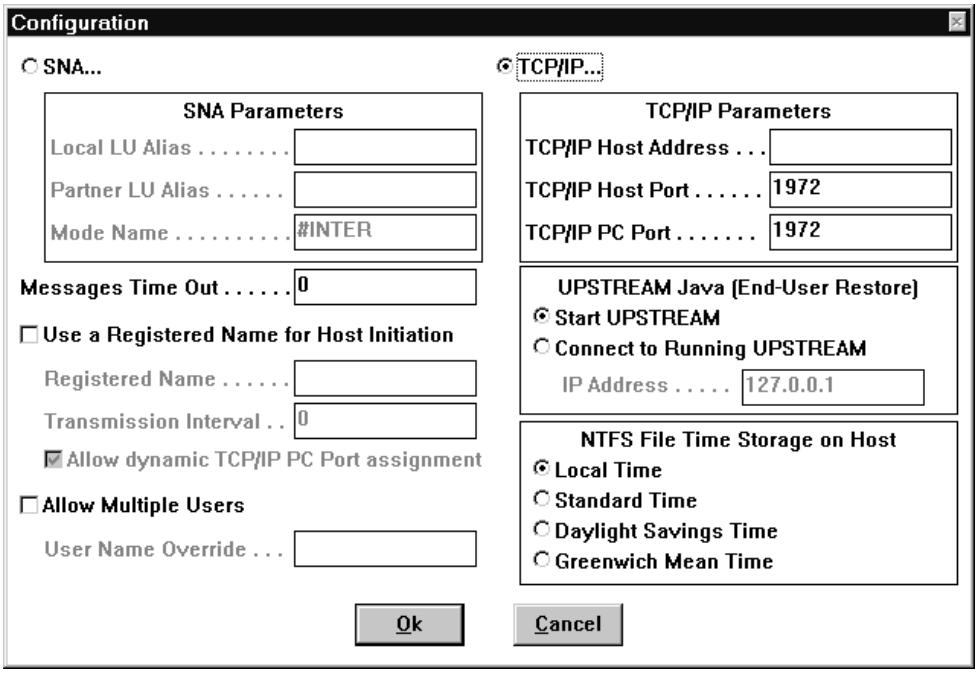
The multi-user functions described here only operate in PC multi-tasking operating systems (Windows 95, Windows NT and OS/2). Note that if you will only be using UPSTREAM in a single user environment, you should not enable multi-user functions as it adds a small amount of overhead.

This technique is only recommended for OS/2; it is still available for Windows but is not recommended.

24.3.1. Configuration

To configure for multi-user, run the UPSTREAM Configurator. On the first screen are two multi-user options:





- **Allow Multiple Users:** Check this box if you wish to enable multi-user functions. This has significant implications as UPSTREAM will create directories and relocate work files, log files, etc. If checked, the next time you run FDR/UPSTREAM Multi-User functions will be enabled.

- **User Name Override:** This field is grayed unless you check *Allow Multiple Users* . If left blank, the operating system determined user name is used; otherwise you can specify a different user name in this field. A user name entered in this field may only be used if you also check the *User name override* option in Personalization.

When you configure UPSTREAM, the registered name is automatically overwritten to be the <machine name> (for SNA) or <machine name><port> for TCP/IP.

24.3.2. Concepts

For multi-user UPSTREAM the most important concept is that of the **User Name**. The operating system user name is used as the primary way to identify a particular execution of UPSTREAM. For host initiated functions, the user name of **HOST** is automatically assigned. The operating system name is used; if you have a file server name separate from the operating system name (for example, with Novell) the operating system name is used.

Each time UPSTREAM is started for a particular user, an **Instance Number** is assigned, starting from 1. This allows you to have multiple copies for the same user running at the same time. When an instance of UPSTREAM finishes, the number is available for reuse. The User Name and Instance Number are logged with each message and displayed in the UPSTREAM title bar.

When UPSTREAM is run in multi-user mode, it will automatically create a set of subdirectories under the UPSTREAM directory. Thus you must allow users read/write access to the UPSTREAM directory and all its subdirectories.

The directory structure automatically created is:

```
<UPSTREAM Dir>\<User name>\WORK<Instance>
```

Where:

- <UPSTREAM Dir> is your UPSTREAM directory. By default it is C:\UPSTREAM. This directory holds the UPSTREAM programs and the top level UPSTREAM.LOG file.
- <User name> is the operating system determined user name. This directory is the default directory for parameter files, and the log and report files are written here.
- WORK<Instance> is the text "WORK" followed by the 4 digit instance number, a new one created for each concurrent execution of UPSTREAM. The first user will cause WORK0001 to be created. This is the WORKPATH directory.

In multi-user mode, you run UPSTREAM:

- Attended. In this case host initiates are disabled and you run as described above.
- Unattended, Locally Initiated. Again, running as described above and host initiates are disabled.
- Waiting for Host Initiates (ACTION=3). This is what happens when UPSTREAM is started with PARAMETER=RMTPARM.DAT. The user name is HOST. There are specific communications requirements described below.

Communications issues for TCP/IP and SNA are discussed below.

24.3.3. SNA

Depending on the multi-user mode you are using, there are SNA specific issues:

- ☐ **Server mode:** Each user must have SNA installed and configured. They must all use the same Local LU Alias, Partner LU Alias and Mode Name. If each user will be supporting host initiates, you must obey the "Multi-Tasking" rules below.

- ☐ **Multi-Tasking and Single Processor mode:** Since UPSTREAM will use the same LU name for all processes, it must be an independent LU which supports parallel sessions. The mode name that you use must define enough contention winner sessions for all processes which may be running simultaneously. The mode name must be a parallel session mode which is never used for single sessions (VTAM cannot handle mixing parallel and single sessions to a started task for the same mode).

For host initiated functions, you must configure communications as above. The process performed is:

- ☐ The SNA attach manager will start the first copy of UPSTREAM automatically. UPSTREAM will immediately start another copy of itself to wait for subsequent host requests and then begin to process the received request and terminate when it is done.

- ☐ Each subsequent copy of UPSTREAM will wait until it receives a host request to process (in which case it will start another copy, process the request and terminate), or until all other copies of UPSTREAM have completed and the REMOTETIMEOUT has expired.

24.3.4. TCP/IP

For locally initiated TCP/IP functions, in all multi-user environments, you only need to configure the host IP address and port number.

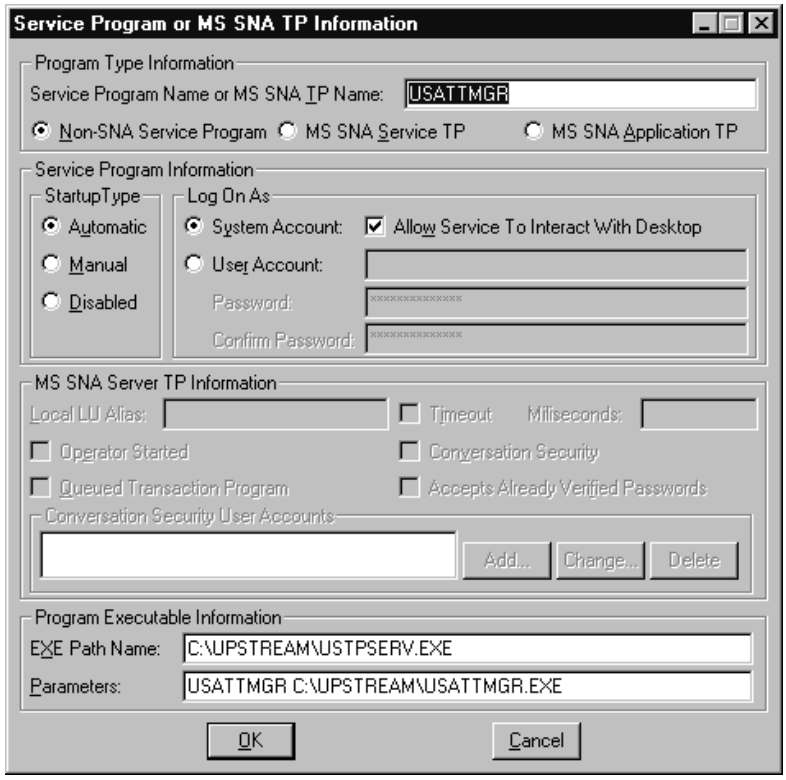
For remotely initiated TCP/IP functions, you MUST use the TCP/IP attach manager.

24.3.5. TCP/IP Attach Manager

The UPSTREAM TCP/IP Attach Manager (USATTMGR.EXE) is provided to support multi-tasking by starting a new copy of UPSTREAM automatically whenever a remote initiate is received through TCP/IP, similar to SNA attach managers. It is provided for Windows and OS/2.

This program should be placed in your Startup group for OS/2 and Windows NT (if you wish to run it as an application). If you wish to run it as a service, you should run the UPSTREAM Transaction Program Configurator and create a new service for it:

- Press the **Add** button to add the new service definition. This will display the Service Program dialog.

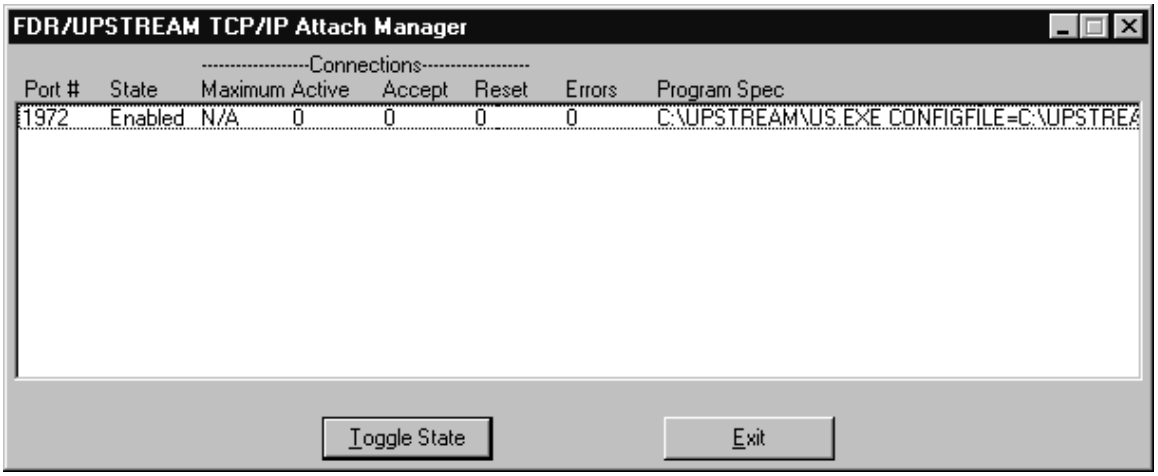


- **Service Program Name or MS SNA TP Name:** Enter **USATTMGR**
- Check **Non SNA Service Program**
- **Startup Type**: Check **Automatic**
- **Log On As:** You can either check System Account (if you are only backing up data on this machine), or User Account for backups of this or other machines. See the *Running As A Service* section in the *Windows NT* chapter.
- **EXE Path Name**: Must start USTPSERV.EXE. Most users will enter **C:\UPSTREAM\USTPSERV.EXE**.
- **Parameters:** Most users will enter no specific parameters to USATTMGR and will thus enter: **USATTMGR C:\UPSTREAM\USATTMGR.EXE**
- Press **Ok** to save your definition.

When the attach manager starts it will immediately start UPSTREAM to:

- Register the registered name with the host. Note that this is the <machine name> (for SNA) or the <machine name><port> for TCP/IP.
- Restart any failed backups or restores.

Then you will see the attach manager main display:



There is one line for each port number being listened on. When you highlight a port number and press the **Toggle State** button (or double-click a port number line) the state will be toggled from Enabled to Disabled. When disabled, remote initiates are not serviced (the host will get a Connection Refused error message). This should only be performed when you wish to explicitly refuse host initiates.

The attach manager maintains a log: **USATTMGR.LOG**. This log file can be viewed with a text editor or the UPSTREAM file viewer and shrunk with the USLOGCLR program.

Counters reflecting the maximum number of attachments supported, the number currently active, the number accepted, the number reset and the number of errors are displayed in the attach manager display. All attempts to start UPSTREAM are logged in the attach manager log as well as any errors.

The attach manager can be used to listen on more than one port. The command line for the attach manager to support this is:

```
USATTMGR [configfilename] | [portnumber,programspec,[maxconns]]
```

The 2 main parameters are space separated and may repeat:

- **configfilename** is an UPSTREAM configuration file name. This name is used to obtain the inbound port number and it is passed to UPSTREAM when it is invoked.
- If you specify **portnumber**, the default UPSTREAM configuration file name is used with the specified inbound port number. If you specify portnumber you must also specify programspec and may optionally specify maxconns. All 3 portnumber parameters are comma separated.

  programspec is the fully qualified name, with parameters, for UPSTREAM. Since command line parameters are usually specified, you will need to enclose them in double quotes.

  maxconns specifies the maximum number of remote host connections that are allowed. When exceeded, the attach manager closes any new connections and the host will see Connection Reset By Peer messages. This is a repeating parameter, space separated. If not specified, no limits are enforced.

Example command lines are:

- USATTMGR: Just specifying the attach manager without any command line parameters causes the attach manager to read UPSTREAM.CFG for the inbound port number, use it when invoking UPSTREAM and enforce no limits on the number of host initiates.
- USATTMGR 2000,"C:\UPSTREAM\US.EXE PARAMETER=10MINS.DAT": Will cause the attach manager to wait on port 2000 and will invoke UPSTREAM using the 10MINS.DAT file (which may, for example wait 10 minutes before terminating).
- USATTMGR CFG1972 1973,"C:\UPSTREAM\US.EXE PARAMETER=RMTPARM.DAT",2: Will cause the attach manager to listen on two ports: the one specified in CFG1972.CFG and 1973. When starting UPSTREAM it will use US.EXE with PARAMETER=RMTPARM.DAT; for port 1972 it will also add CONFIGFILE=CFG1972.CFG. Port 1972 will have an unlimited number of connections; port 1973 will allow no more than 2 connections.

24.3.6. Host Initiation

Registered names behave somewhat differently in multi-user mode than in single user mode:

- The name registered is <Machine name> for SNA and <Machine Name><Port> for TCP/IP. If the combined name is greater than 16 characters, the machine name is truncated. If you are unsure about your machine name, view the Registered name list in the Remote menu of UPSTREAM for the current active list.
- When UPSTREAM is run locally initiated, there is no registration. Registration only occurs when waiting for host initiation. Note that the UPSTREAM TCP/IP attach manager will automatically start UPSTREAM once to perform registration when it starts. For SNA, you may wish to start UPSTREAM once manually with PARAMETER=RMTPARM.DAT to force the registration.

Other host initiation notes are:

- Since a new copy of UPSTREAM is started EVERY time you request a function on a PC, there is no internal PC request queuing. All requests are immediately serviced. Thus if you wish to limit the number of requests performed simultaneously, you should limit them on the host (based on the completion of prior CONV=WAIT requests for example).
- For SNA host initiation in multi-tasking mode, you should always use the same LU/mode/TPNAME.
- In Multi-tasking or Single-Processor mode, if you specify a large number of requests you may run out of resources (memory, disk, drive letters, etc.).

24.3.7. Management

The following are a number of tips which will help you in managing a multi-user environment:

- UPSTREAM.LOG in the base UPSTREAM directory is primarily used to show when a copy of UPSTREAM is started and for which user. All other messages are written to the UPSTREAM.LOG file in the specific user's directory. USATTMGR.LOG in the base UPSTREAM directory contains attach manager messages.
- US.SER is loaded from the UPSTREAM directory. Any functions you wish disabled for the user community as a whole should be defined here. Remember that you should delete SERIAL.DAT from this directory to keep users from modifying US.SER.
- Restarted backups and restores are searched in all instance directories when UPSTREAM is started for a given user. Since host initiates always use the same user name (HOST), you do not lose the ability to restart backups/restores.

- The UPSTREAM.DAT and UPSTREAM.CFG files are first examined in the common UPSTREAM directory and then examined in the user's specific directory. This allows you to specify defaults and have the user be able to override specific values.

25 Advanced Configuration

By using the FDR/UPSTREAM Configurator (USCfg.exe), you can use user-friendly dialogs for setting the various FDR/UPSTREAM configuration parameters. The FDR/UPSTREAM Configurator is different depending on the operating system it was designed for. Section 25.1. describes the Configurator for FDR/UPSTREAM Windows while section 25.2. describes the advanced options available in the Advanced section of the Configurator for FDR/UPSTREAM for non-Windows operating systems.

All configuration options are changeable from the command line, the environment (using the SET command), from a file and from a dialog. What has been described up until now has been setting parameters from one of the Configurator dialogs. Section 25.3.describes the other methods for setting configuration parameters without using the Configurator.

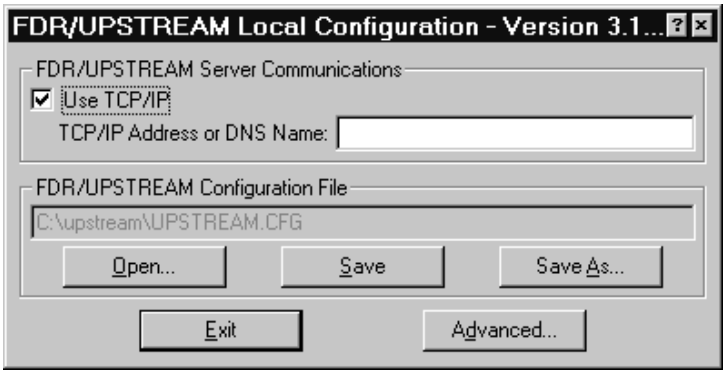
25.1. Windows Advanced Configuration Options

The Configurator for FDR/UPSTREAM Windows is unique for Windows, though it is also used to configure the NetWare version. This section describes the FDR/UPSTREAM Windows Configurator.

When the Configurator is started for the first time, the UPSTREAM.cfg file does not yet exist. The Configurator recognizes this and sets a number of configuration parameters according to the machine on which FDR/UPSTREAM is installed. It is possible to use the Configurator to modify a configuration file from another machine. The name of the configuration file does not have to be UPSTREAM.cfg (except on a cluster system). The configuration parameters that the Configurator sets automatically are:

- **WORKPATH:** This parameter is set to blanks if the machine from which the configuration file was opened is not the same machine as the one that the Configurator is running on.
- **USETARGETNAME:** This parameter is set to **Y** to cause FDR/UPSTREAM Local to always register itself with the FDR/UPSTREAM Server.
- **TARGETNAME:** This parameter is set to the name of the machine from which the configuration file was opened.
- **GUISTARTCLIENTLOCAL:** This parameter is set to **N**.
- **GUICLIENTTCPADDRESS:** This parameter is set to **127.0.0.1**.
- **TIMECONVERSION:** This parameter is set to **1** to cause FDR/UPSTREAM Local to store all of the file time-stamps on the FDR/UPSTREAM Server in Standard Time form.

During its initialization, the Configurator examines the communication protocol set in the configuration file to determine which dialog it will display first. If the communication protocol is TCP/IP and the system is not a cluster system, the following dialog will be displayed:



The fields and controls on this dialog are:

- **Use TCP/IP:** This checkbox is checked to indicate that you want to use TCP/IP as the communications protocol between FDR/UPSTREAM Local and FDR/UPSTREAM Server. Uncheck this checkbox to use SNA as the communications protocol. When this checkbox is unchecked, the SNA tab of the FDR/UPSTREAM Local Advanced Configurator dialog will be displayed.

- **TCP/IP Address or DNS Name:** This is the TCP/IP address or DNS name of FDR/UPSTREAM Server. Your FDR/UPSTREAM Server administrator will supply this address or name.

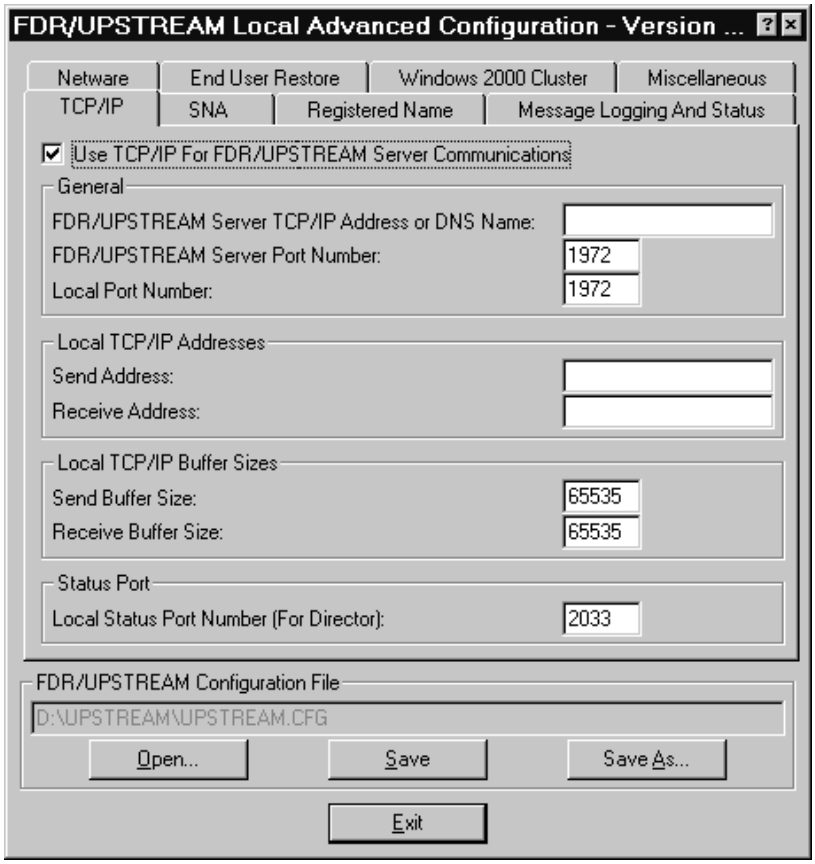
- **FDR/UPSTREAM Configuration File:** This is the name of the configuration file which is currently being modified by the Configurator.

- **Open... button:** Click this button to open another configuration file. If changes have been made to the current configuration file, you will be prompted to save the changes before opening another file.

- **Save button:** Click this button to save the configuration parameters in the current configuration file.

- **Save As... button:** Click this button to save the configuration parameters in a configuration file that is different than the current one.

If the communication protocol specified in the configuration file is not TCP/IP or the system is a cluster system, the FDR/UPSTREAM Local Advanced Configurator dialog displayed first. This dialog will also be displayed if you remove the check from the **Use TCP/IP** checkbox of the FDR/UPSTREAM Local Configurator dialog, or click the **Advanced...** button of FDR/UPSTREAM Local Configurator dialog. The FDR/UPSTREAM Local Advanced dialog follows:



This dialog utilizes tabs to logically group related configuration parameters. The tabs of this dialog are:

- TCP/IP
- SNA

- Registered Name
- Message Logging And Status
- Netware
- End User Restore
- Windows 2000 Cluster
- Miscellaneous

This dialog also displays a number of controls that are common to all of the tabs. These common controls are:

- ☐ **FDR/UPSTREAM Configuration File:** This is the name of the configuration file which is currently being modified by the Configurator.

- ☐ **Open... button:** Click this button to open another configuration file. If changes have been made to the current configuration file, you will be prompted to save the changes before opening another file.

- ☐ **Save button:** Click this button to save the configuration parameters in the current configuration file.

- ☐ **Save As... button:** Click this button to save the configuration parameters in a configuration file that is different than the current one.

25.1.1. Configurator TCP/IP Tab

The fields displayed on the TCP/IP tab (shown above) are:

- ☐ **Use TCP/IP For FDR/UPSTREAM Server Communications:** This checkbox is checked to indicate that you want to use TCP/IP as the communications protocol between FDR/UPSTREAM Local and FDR/UPSTREAM Server. Uncheck this checkbox to use SNA as the communications protocol. When this checkbox is unchecked, the SNA tab of the FDR/UPSTREAM Local Advanced Configurator dialog will be displayed.

- ☐ **FDR/UPSTREAM Server TCP/IP Address or DNS Name:** This is the TCP/IP address or DNS name of FDR/UPSTREAM Server. Your FDR/UPSTREAM Server administrator will supply this address or name.

- ☐ **FDR/UPSTREAM Server Port Number:** This is the TCP/IP port number of FDR/UPSTREAM Server. Your FDR/UPSTREAM Server administrator will supply this port number. The default is 1972.

- ☐ **Local Port Number:** This is the TCP/IP port number of FDR/UPSTREAM Local. The default is 1972.

- ☐ **Send Address:** This is the TCP/IP address that FDR/UPSTREAM Local will be limited to when sending data to FDR/UPSTREAM Server. By default, FDR/UPSTREAM Local will use any available TCP/IP address. This TCP/IP address is useful when running FDR/UPSTREAM Local in a Microsoft cluster environment where FDR/UPSTREAM Local must be limited to using only the single TCP/IP address configured for a virtual server or cluster node.

- ☐ **Receive Address:** This is the TCP/IP address that FDR/UPSTREAM Local will be limited to when receiving data from FDR/UPSTREAM Server. By default, FDR/UPSTREAM Local will use any available TCP/IP address. This TCP/IP address is useful when running FDR/UPSTREAM Local in a Microsoft cluster environment where FDR/UPSTREAM Local must be limited to using only the single TCP/IP address configured for a virtual server or cluster node.

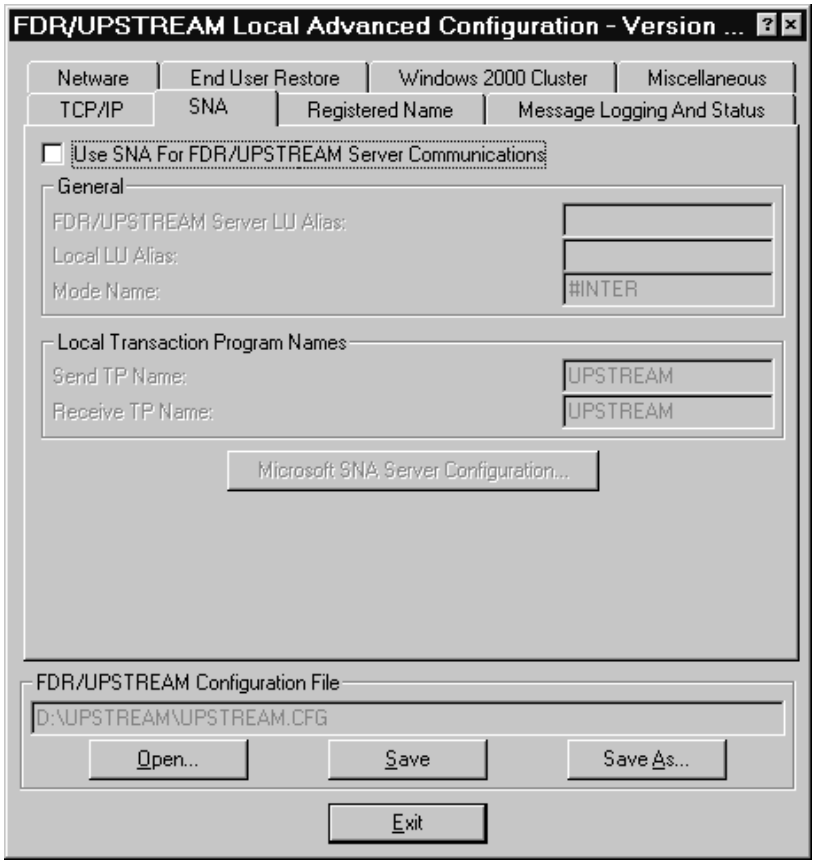
- **Send Buffer Size:** This is the size of the TCP/IP data buffer to be used when sending data to FDR/UPSTREAM Server.

- **Receive Buffer Size:** This is the size of the TCP/IP data buffer to be used when receiving data from FDR/UPSTREAM Server.

- **Local Status Port Number (For Director):** This is the TCP/IP port number that FDR/UPSTREAM Local will use as a starting point when creating the status ports needed to communicate with the FDR/UPSTREAM Director. Each running instance of FDR/UPSTREAM Local creates a pair of status ports. It creates these status ports by using the next available port numbers starting with this value. The default is 2033.

25.1.2. Configurator SNA Tab

The SNA tab follows:



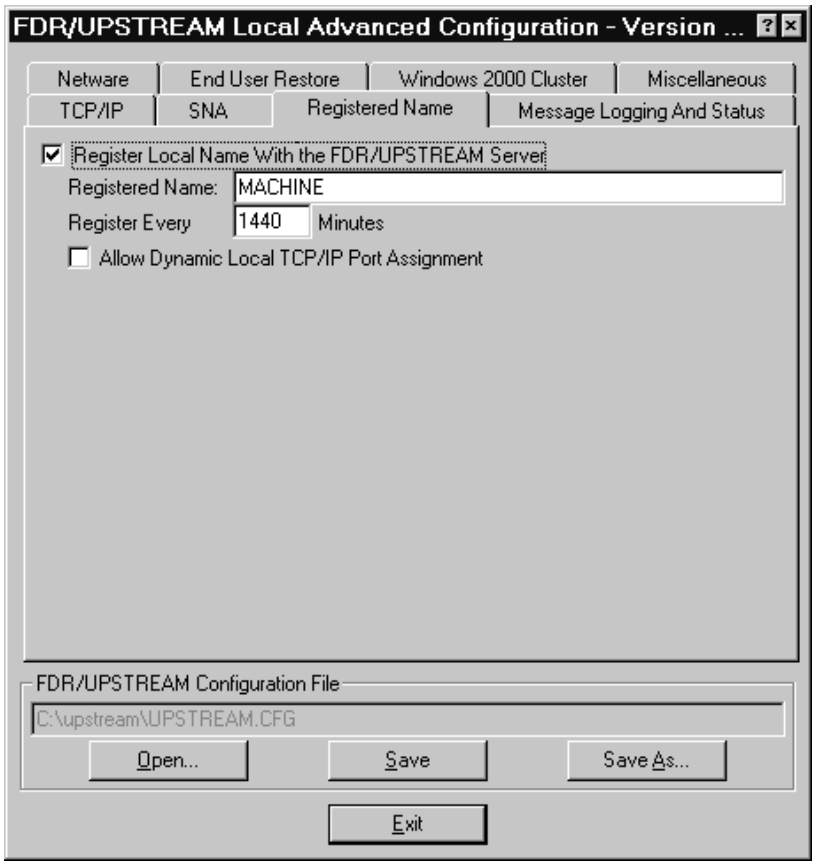
The fields displayed on the SNA tab are:

- **Use SNA for FDR/UPSTREAM Server Communications:** This checkbox is checked to indicate that you want to use SNA as the communications protocol between FDR/UPSTREAM Local and FDR/UPSTREAM Server. Uncheck this checkbox to use TCP/IP as the communications protocol. When this checkbox is unchecked, the TCP/IP tab of the FDR/UPSTREAM Local Advanced Configurator dialog will be displayed.

- **FDR/UPSTREAM Server LU Alias:** This is the SNA LU Alias of FDR/UPSTREAM Server. Your FDR/UPSTREAM Server administrator will supply this LU Alias.
- **Local LU Alias:** This is the SNA LU Alias of FDR/UPSTREAM Local.
- **Mode Name:** This is the SNA mode name to be used for the communications with FDR/UPSTREAM Server.
- **Send TP Name:** This is the SNA APPC Transaction Program (TP) name to be used for initiating communications with FDR/UPSTREAM Server.
- **Receive TP Name:** This is the SNA APPC Transaction Program (TP) name to be used to receive incoming communications initiated by FDR/UPSTREAM Server.
- **Microsoft SNA Server Configuration...:** Click this button to display the Microsoft SNA Server Configurator dialog. You may find the Microsoft SNA Server Configurator to be more user-friendly than the Microsoft SNA Server Manager supplied by Microsoft as part of the SNA Server product.

25.1.3. Configurator -Registered Name Tab

The Registered Name tab follows:



The fields displayed on the Registered Name tab are:

- ☐ **Register Local Name With the FDR/UPSTREAM Server:** Check this checkbox in order to have FDR/UPSTREAM Local register its name with FDR/UPSTREAM Server. FDR/UPSTREAM registered names (target names) are similar in concept to DNS names in TCP/IP.

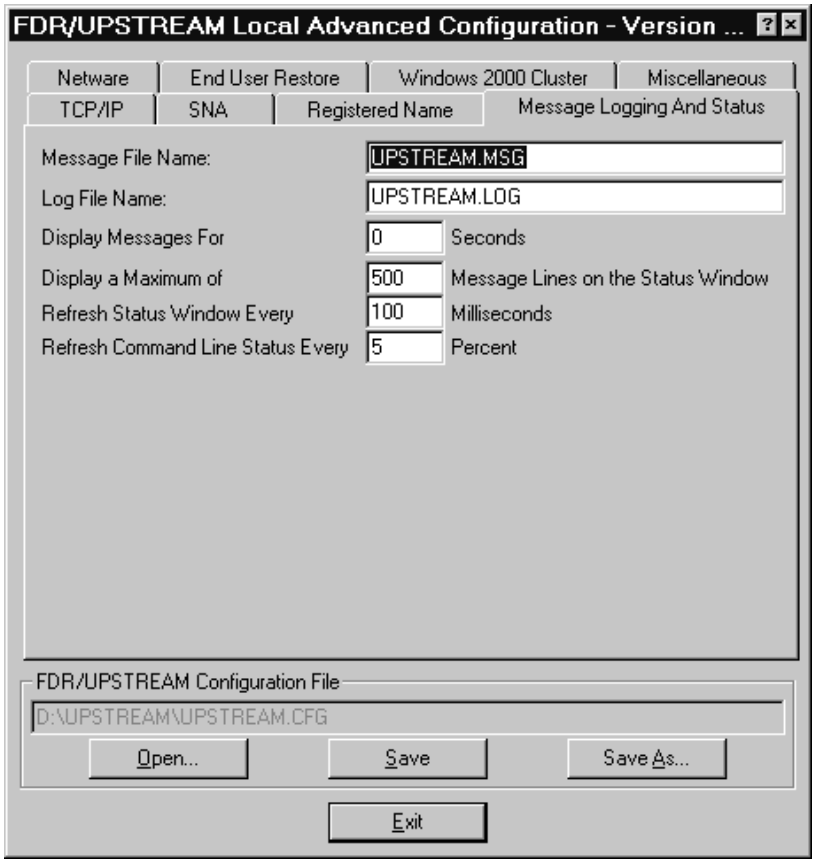
- ☐ **Registered Name:** This is the name that FDR/UPSTREAM Local will use to register itself with FDR/UPSTREAM Server. The default is the name of the machine on which FDR/UPSTREAM Local will run.

- ☐ **Register Every n Minutes:** This is the length of time in minutes between registration name refreshes. FDR/UPSTREAM Local will register its name with FDR/UPSTREAM Server every n minutes. The default of 1440 means that FDR/UPSTREAM Local will register itself once per day.

- ☐ **Allow Dynamic Local TCP/IP Port Assignment:** Check this checkbox to cause FDR/UPSTREAM Local to dynamically adjust its local port number (default of 1972) if it finds this port to be already in use. Its default is unchecked as its use is highly discouraged. If you have a special need for using this option, contact FDR/UPSTREAM Tech Support first.

25.1.4. Configurator Message Logging And Status Tab

The Message Logging And Status tab follows:



The fields displayed on the Message Logging And Status tab are:

- **Message File Name:** This is the name of the FDR/UPSTREAM Local message file. This file contains the text of all of the FDR/UPSTREAM Local messages in ASCII text format. The default is UPSTREAM.MSG and should not need to be changed.

- **Log File Name:** This is the name of the file to which FDR/UPSTREAM Local will log its messages. The default is UPSTREAM.LOG, but can be changed if you want to have the messages written elsewhere.

- **Display Messages For n Seconds:** This is the number of seconds that FDR/UPSTREAM Local will display messages that are not displayed on either the Backup Status or Restore Status dialogs. The default of 0 means that FDR/UPSTREAM Local will leave the messages displayed indefinitely when it is running in attended mode. If this value is set to 0, FDR/UPSTREAM Local will apply a 15 second time limit when it is running in unattended mode.

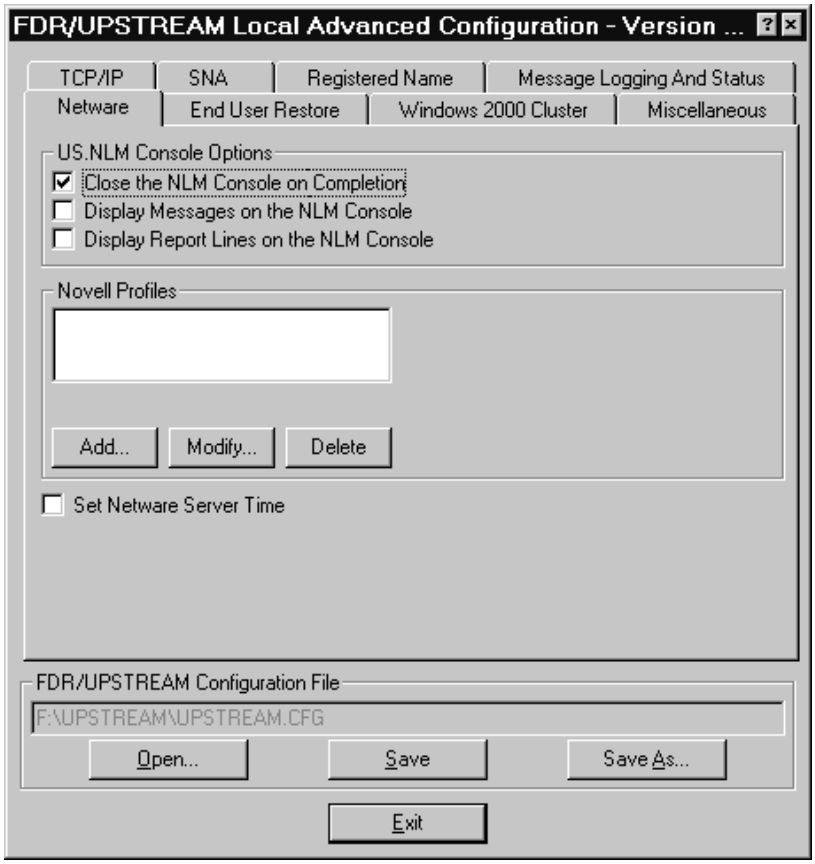
- **Display a Maximum of n Message Lines on the Status Window:** This is the maximum number of message lines that FDR/UPSTREAM Local will display on either the Backup Status or Restore Status dialogs.

- **Refresh Status Window Every n Milliseconds:** This is the interval in milliseconds that FDR/UPSTREAM Local will use to refresh the status information on the Backup Status and Restore Status dialogs.

- **Refresh Command Line Status Every n Percent:** This is the percent interval that the Command Line version of FDR/UPSTREAM Local (USCmd.exe) will use to refresh the status on a Command Prompt window. Every n percent of backup or restore progress, the Command Line version of FDR/UPSTREAM Local will display another status line.

25.1.5. Configurator Netware Tab

The Netware tab follows:

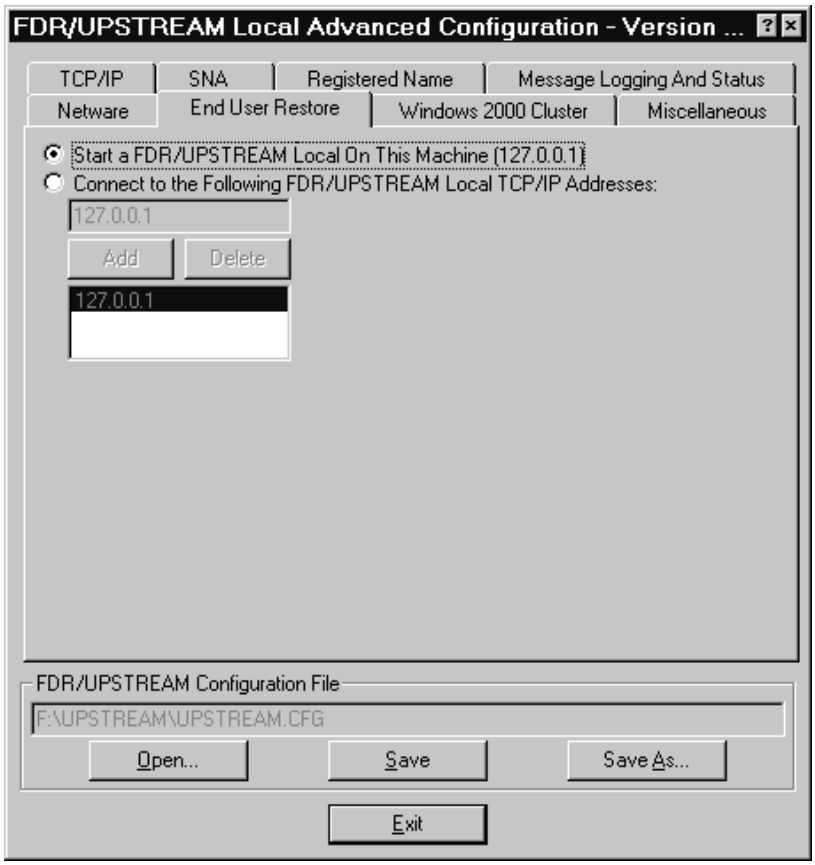


The fields displayed on the Netware tab are:

- **Close the NLM Console on Completion:** Check this checkbox to have the NLM version of FDR/UPSTREAM Local close its console session when it completes a backup or restore operation.
- **Display Messages on the NLM Console:** Check this checkbox to have the NLM version of FDR/UPSTREAM Local display its messages on the console.
- **Display Report Lines on the NLM Console:** Check this checkbox to have the NLM version of FDR/UPSTREAM Local display its report lines on the console.
- **Novell Profile List:** This is the list of currently configured Novell Profiles. Double-click an entry in this list to modify it.
- **Add...:** Click this button to create a new Novell Profile.
- **Modify...:** Click this button to modify the currently selected Novell Profile.
- **Delete:** Click this button to delete the currently selected Novell Profile.
- **Set Netware Server Time:** Check this checkbox to cause the NLM version of FDR/UPSTREAM Local to set the time of the Netware server to the time of FDR/UPSTREAM Server at the start of each backup.

25.1.6. Configurator End User Restore Tab

The End User Restore tab follows:



The fields displayed on the End User Restore tab are:

- **Start a FDR/UPSTREAM Local On This Machine (127.0.0.1):** Check this radio button to have the FDR/UPSTREAM End User Restore application start a new instance of FDR/UPSTREAM Local in order to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

- **Connect to the Following FDR/UPSTREAM Local TCP/IP Addresses:** Check this radio button to have the FDR/UPSTREAM End User Restore application connect to one or more running instances of FDR/UPSTREAM Local to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

- **FDR/UPSTREAM Local TCP/IP Address:** Enter the TCP/IP address of a FDR/UPSTREAM Local and then click the Add button to create a list of TCP/IP addresses to which the FDR/UPSTREAM End User Restore application will connect to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

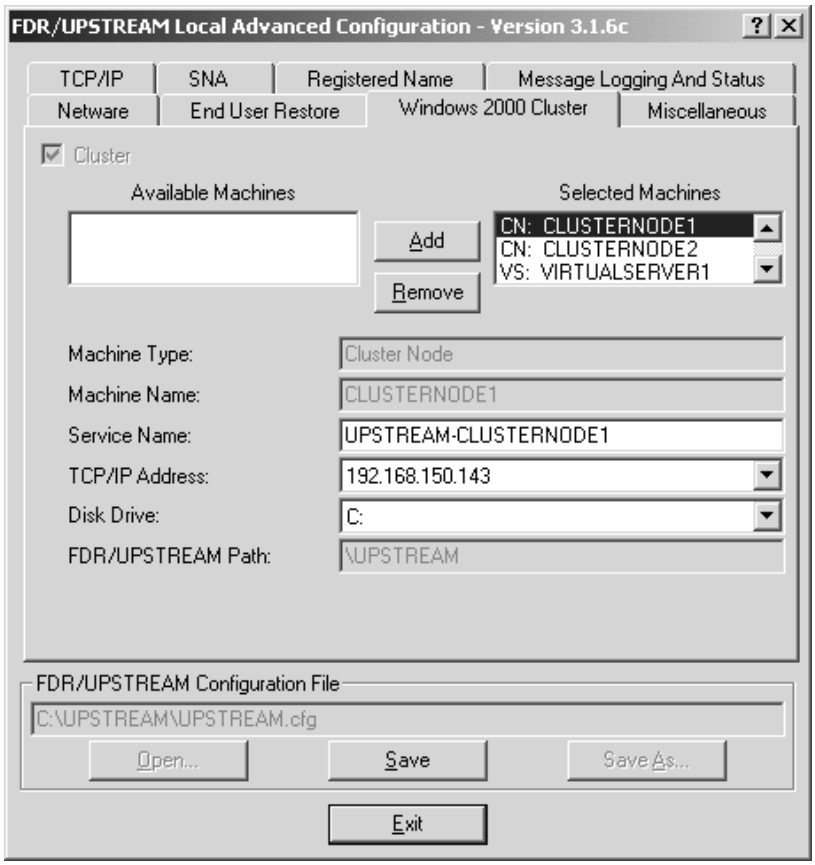
- **Add:** Click this button to add the FDR/UPSTREAM Local TCP/IP address that has been entered in the field above to the list of TCP/IP addresses to which the FDR/UPSTREAM End User Restore application will connect to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

- **Delete:** Click this button to remove the currently highlighted FDR/UPSTREAM Local TCP/IP address from the list of TCP/IP addresses to which the FDR/UPSTREAM End User Restore application will connect to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

- **FDR/UPSTREAM Local TCP/IP Address List:** This is the list of FDR/UPSTREAM Local TCP/IP addresses to which the FDR/UPSTREAM End User Restore application will connect to perform a restore. This has no effect on FDR/UPSTREAM Local itself, as this is an End User Restore application configuration option.

25.1.7. Configurator Windows 2000 Cluster Tab

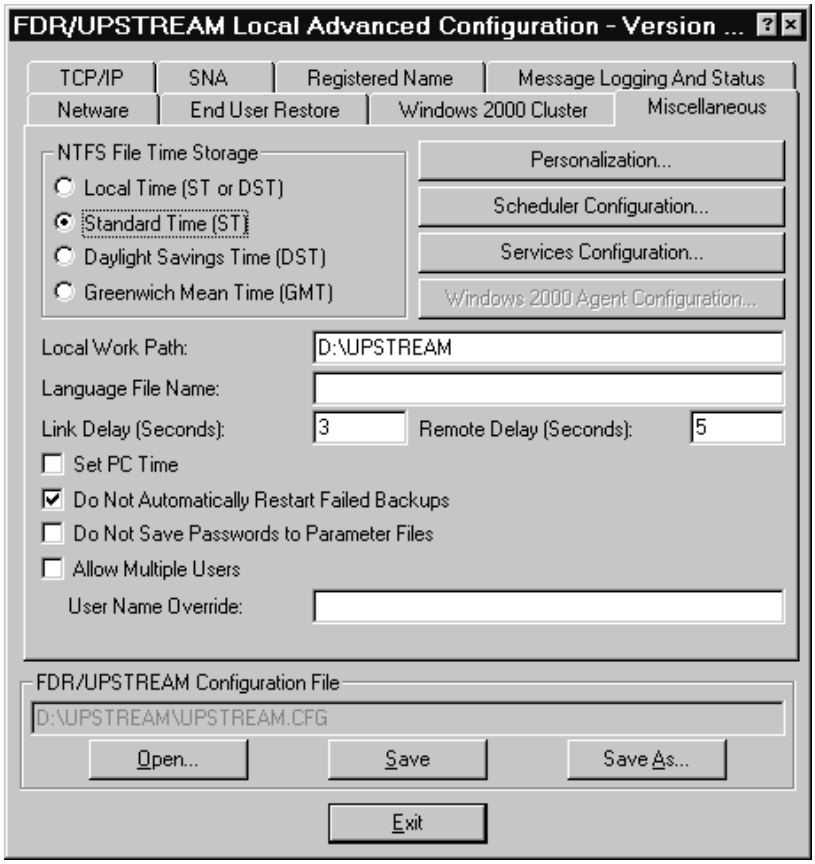
The Windows 2000 Cluster tab follows:



The fields on the Windows 2000 Cluster tab are enabled only if the Configurator is run on a cluster system. A complete description of the Windows 2000 Cluster tab is provided in Section 13.12.

25.1.8. Configurator Miscellaneous Tab

The Miscellaneous tab follows:



The fields displayed on the Miscellaneous tab are:

- **Local Time (ST or DST):** Check this radio button to have FDR/UPSTREAM Local record file time-stamps on FDR/UPSTREAM Server according to the current time zone period. This will be either Standard Time (ST) or Daylight Savings Time (DST) depending on the time of the year. Using this option may cause FDR/UPSTREAM to, in effect, perform a First Time Full Merge backup twice a year on the Full Merge backup that immediately follows the time period change. For more information, read the NTFSTime.txt file in the FDR/UPSTREAM Local directory (C:\UPSTREAM by default). The use of this option is highly discouraged.

- **Standard Time (ST):** Check this radio button to have FDR/UPSTREAM Local record file time-stamps on FDR/UPSTREAM Server in Standard Time only. This prevents the file times from appearing to change for the two times of the year that the time zone period changes (i.e. from ST to DST and from DST to ST). For more information, read the NTFSTime.txt file in the FDR/UPSTREAM Local directory (C:\UPSTREAM by default). Check this radio button if you have not yet performed your first merge backup or if your last merge backup was performed during the Standard Time part of the year. If your last merge backup was performed during the Daylight Savings Time part of the year, check the Daylight Savings Time (DST) radio button instead.

- **Daylight Savings Time (DST):** Check this radio button to have FDR/UPSTREAM Local record file time-stamps on FDR/UPSTREAM Server in Daylight Savings Time form only. This prevents the file times from appearing to change for the two times of the year that the time zone period changes (i.e. from ST to DST and from DST to ST). For more information, read the NTFSTime.txt file in the FDR/UPSTREAM Local directory (C:\UPSTREAM by default). Check this radio button if your last merge backup was performed during the Daylight Savings Time part of the year. If you have not yet performed your first merge backup or your last merge backup was performed during the Standard Time part of the year, check the Standard Time (ST) radio button instead.

- **Greenwich Mean Time (GMT):** Check this radio button to have FDR/UPSTREAM Local record the file time-stamps on FDR/UPSTREAM Server in Greenwich Mean Time form only. This prevents the file times from appearing to change for the two times of the year that the time zone period changes (i.e. from ST to DST and from DST to ST). For more information, read the NTFSTime.txt file in the FDR/UPSTREAM Local directory (C:\UPSTREAM by default). Check this radio button if you are backing up file servers that reside in different time zones to the same FDR/UPSTREAM Server.

- **Local Work Path:** This is the name of a directory that FDR/UPSTREAM Local will use to create temporary work files. The default is the FDR/UPSTREAM Local installation directory.

- **Language File Name:** This is the name of the file that FDR/UPSTREAM Local will read in order to localize the text on its various dialogs. English speaking users do not need to use a language file.

- **Link Delay (Seconds):** This is the number of seconds between the activation of a SNA link and the activation of a session on that link at startup.

- **Remote Delay (Seconds):** This is the number of seconds between the time that FDR/UPSTREAM Local receives a remotely initiated request and when the requested operation is started. This allows FDR/UPSTREAM Local to verify that there are no other remotely initiated requests pending execution.

- **Set PC Time:** Check this checkbox to have FDR/UPSTREAM Local set the time of the machine that it is running on to the time of the FDR/UPSTREAM Server at the start of each backup. This can be used to synchronize the clocks of the two machines. Its use is discouraged in a Windows 2000 domain where the use of Windows 2000 time synchronization methods is more suited to the task.

- **Do Not Automatically Restart Failed Backups:** Check this checkbox to prevent FDR/UPSTREAM Local from attempting to restart failed restartable backups when it is started. It is recommended that you check this checkbox.

- **Do Not Save Passwords to Parameter Files:** Check this checkbox to prevent FDR/UPSTREAM Local from saving passwords to parameter files. There are a number of passwords that FDR/UPSTREAM Local will save in parameter files in a lightly encrypted form if this checkbox is not checked.

- **Allow Multiple Users:** Check this checkbox to cause FDR/UPSTREAM Local to operate in its old multi-user functionality mode. The use of this checkbox is not recommended as this is an option for an older version of FDR/UPSTREAM Local and the current version has a more superior multi-user functionality mode that requires that this checkbox not be checked.

- **User Name Override:** Use this field to give FDR/UPSTREAM Local the name of a user that is different from that of the Windows account it is running under. The use of this field is not recommended as this is an option for an older version of FDR/UPSTREAM Local and the current version has a more superior multi-user functionality mode that requires that this field not be used.

- **Personalization...:** Click this button to display the FDR/UPSTREAM Personalization dialog. This dialog is used to personalize FDR/UPSTREAM Local for use by various users who require varying levels of authorization.

- **Scheduler Configuration...:** Click this button to display the FDR/UPSTREAM Scheduler Configuration dialog. This dialog is used for creating scheduled tasks to be controlled by the FDR/UPSTREAM Scheduler.

- **Services Configuration...:** Click this button to display the FDR/UPSTREAM Transaction Program Configuration dialog. This dialog is used for creating services.

- **Windows 2000 Agent Configuration...:** Click this button to display the FDR/UPSTREAM Windows 2000 Agent Service Installer/Uninstaller dialog. This dialog is used for installing and uninstalling the FDR/UPSTREAM Windows 2000 Agent service on Windows 2000 machines.

25.1.9. Configurator Termination

When the FDR/UPSTREAM Configurator terminates (when you click the Exit button), it performs some final processing depending on whether the system is a cluster system or not. If the system is not a cluster system and the last configuration file you were working with is owned by the system that the Configurator is running on, the Configurator will check all of the services in the system to determine if any of them are UPSTREAM services.

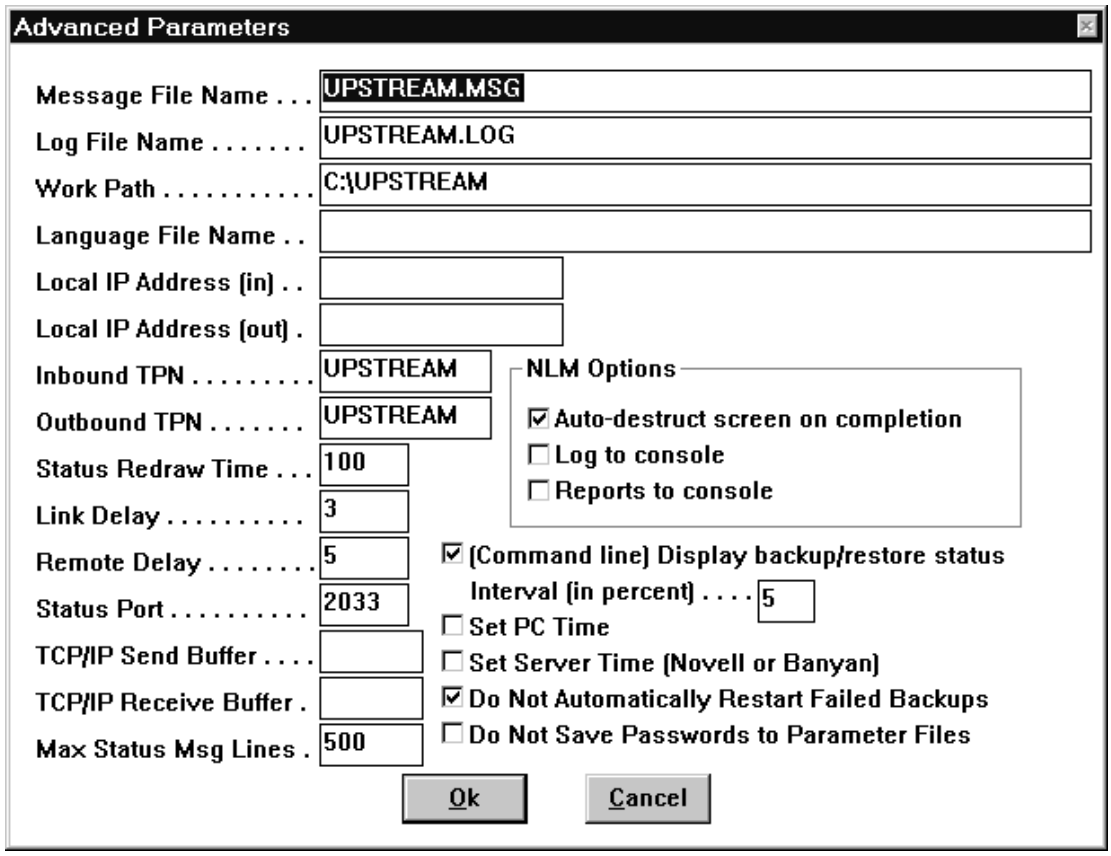
On a Windows NT/2000/2003/XP system, if the Configurator does not find at least one UPSTREAM service it will ask you if you want to create an UPSTREAM service. If you click the **Yes** button, the Configurator will create the UPSTREAM service with a set of default options.

If the system is a cluster system, the Configurator will perform a number of tasks to ensure that FDR/UPSTREAM is properly installed and configured on all of the cluster nodes of the cluster and those virtual servers of the cluster that you specified that FDR/UPSTREAM should be installed on. This is discussed fully in Section 13.12.

25.2. Non-Windows Advanced Configuration Options

This section describes how to use the non-Windows version of the FDR/UPSTREAM Configurator to set the advanced configuration parameters.

You specify advanced options in the configurator by pulling down the Action menu from the full screen and selecting Advanced. The accelerator for this is [ALT]V. This displays the Advanced Configuration Options dialog (see figure below). Some of these parameters are not used for some APPC's or TCP/IP or in various operating systems. See your APPC manual and the notes below for more information.



The meaning of the edit field parameters are:

- **Message File Name:** This is the name of the file which FDR/UPSTREAM predefined messages are read from. A reason for changing this name might be to have messages specific to your environment or to change the path from which it is obtained. This is a 80 character field, the default is UPSTREAM.MSG, and it is required.

- **Log File Name:** This is the name of the file which FDR/UPSTREAM writes significant system events to. A reason for changing this name might be to change the path. This is a 80 character field, the default is UPSTREAM.LOG, and it is required.

- **Work Path:** This is the drive and directory where temporary files are written. These files include the Backup Description File, which describes the files being backed up, and the data saved from the foreground environment by

USSTART.EXE. Since this data could potentially be quite large, it is recommended that this path indicate a path not part of the backup. This is a 80 character field, the default is blank which uses the default directory, and it is optional.

- **Language File Name:** Enter the name of a supplied or user customized dialog language file. This file allows you to customize most of UPSTREAM's displays for non-English or internal display use. The supplied files are **japanese.lng** (Japanese language) or **german.lng** (German language). We recommend that the file name be fully qualified. If not specified, displays are not customized. See the *Advanced UPSTREAM* chapter for a detailed description of this facility.

- **Local IP Address (in):** Used only for multi-adapter computers, specify the IP address for the adapter that you wish to accept inbound UPSTREAM requests on. All requests for other adapters will result in "Connection refused" on the remote system. If you leave this field blank, UPSTREAM will accept remote requests on all adapters. The default is blank.

- **Local IP Address (out):** Used only for multi-adapter computers, specify the IP address for the adapter that you wish to have your outbound UPSTREAM requests on. If you leave this field blank, UPSTREAM will use the default adapter. The default is blank.

- **Inbound TPN:** The transaction program name that FDR/UPSTREAM uses when checking for and verifying remotely requested functions. This value must match the host parameter TPNAME. Not used for TCP/IP. Specify up to 8 characters and the default is UPSTREAM.

- **Outbound TPN:** The transaction program name that FDR/UPSTREAM uses when starting a conversation with the remote system. FDR/UPSTREAM MVS does not check this value, but other PCs do and it must match the Inbound TPN specified on those PCs if performing a PC-to-PC request (not through the host). There are almost no situations that require changing this value. Not used for TCP/IP. Specify up to 8 characters and the default is UPSTREAM.

- **Status Redraw Time:** This is a performance enhancing parameter. Specify a number which represents the number of milliseconds between backup or restore status screen display updates (if status screen displays are enabled). This parameter is not used for the command line versions of FDR/UPSTREAM. 0 indicates that status messages are updated continuously. For totally unattended environments, it is recommended that you specify no displays at all. For partially attended or performance test environments, it is recommended that this value be 2 or 3 seconds (2000 or 3000). 0 is the default and should be used when initially testing or where screen update performance is not impacting total system performance.

- **Link Delay:** The number of seconds between the activation of the link and the activation of the session on startup. This is also used as the maximum amount of time that an allocation failure - retry (primary return code = 3, secondary return code = 5) is retried. APPC/PC may require this on some Token-Ring connections and it may be useful on SDLC (in lieu of the "Dial remote now" message). Not recommended for AdaptSNA connections as it has its own link time out. Not used for TCP/IP. This is an integer from 0 to 255 and the default is 3.

- **Remote Delay:** The number of seconds that FDR/UPSTREAM waits after receiving a remotely initiated request before performing any other functions. Specify a higher number if you are using a slow line and you get rejected or timed out host requests. This is an integer from 0 to 65535 and the default is 5.

- **Status Port:** Used for End-User Restores and remote TCP/IP tracing. FDR/UPSTREAM actually uses the specified status port and the next one in sequence (a total of 2 ports used). If you are running multiple copies of FDR/UPSTREAM, status ports must be separated by at least 2. Disable binding to the status port by specifying 0. The default is 2033.

- **TCP/IP Send Buffer:** Allows you to adjust the internal TCP/IP buffering size for sends. See the Performance chapter for additional details. The default is 65535. You can specify blank to use system defaults.

- ☐ **TCP/IP Receive Buffer:** Allows you to adjust the internal TCP/IP buffering size for receives. See the Performance chapter for additional details. The default is 65535. You can specify blank to use system defaults.

- ☐ **Max Status Msg Lines:** Backup and restore status screens display a messages list box which contains the errors, warnings and other significant events encountered during the operation. Since list boxes in many environments can not contain infinite lines, you specify here the maximum number of lines in the list before the oldest messages are removed. You can specify 0 to indicate no limit (not recommended) or -1 to suppress logging to the screen which may improve speed slightly. The default is 500.

The NLM Options are described in the Novell chapter.

The command line version of FDR/UPSTREAM specific options are:

- ☐ **(Command line) Display backup/restore status:** Check this box if you wish command line versions of UPSTREAM (US.NLM or USCMD for UNIX, Win32 or DOS) to display the current completion of a backup/restore is percent to the screen/console. The default is checked.

- ☐ **Internal (in percent):** Enabled if Display backup/restore status above is checked, the percentage interval between updates. The default is updates every 5 percent.

There are two clock setting check boxes. They are:

- ☐ **Set PC Time:** Check this box if you wish the PC's clock to be synchronized to the mainframe's clock when a backup is run. The clock is set using standard DOS calls; some PCs may reset their clock when they are rebooted or powered off. See your hardware users manual for more information. The default is not checked.

- ☐ **Set Server Time (Novell):** Check this box if you wish your Novell NetWare server's clock to be synchronized to the mainframe's clock. The default is not checked.

The remaining checkboxes are:

- ☐ **Do Not Automatically Restart Failed Backups:** Check this box to keep FDR/UPSTREAM from automatically restarting a failed backup (failed backups can still be restarted manually or via host control). The default is checked.

- ☐ **Do Not Save Passwords to Parameter Files:** Check this box to keep FDR/UPSTREAM from writing passwords to parameter files as an additional security feature. The default is not checked.

There are two buttons. They are:

- ☐ **Ok:** Press this button to indicate that you are satisfied with your parameters. This will bring up the save parameters dialog. Pressing the ENTER key has the same effect.

- ☐ **Cancel:** Press this button to abandon your changes. Pressing the ESC key has the same effect.

25.3. Setting Configuration Parameters

You can set configuration parameters using several prioritized methods. A configuration parameter set using a higher priority method will override the same parameter set using a lower priority method. If two parameters are set using the same method (with the same priority), then the newer parameter will overwrite the older. The methods from the lowest priority level to highest are:

- **Default:** Used if a default is known and it is acceptable.
- **Parameter File:** This is a value obtained from the default configuration file (UPSTREAM.cfg) or a configuration file specified from a higher priority. For example, in UPSTREAM.cfg you will see a line like:

```
MESSAGEFILE UPSTREAM.msg
```

- **Environment:** These are values set using the DOS SET=<name> command. You can set these values from the command line or from a batch file. For example, you could add a line to your AUTOEXEC.BAT that would say:

```
SET CONFIGFILE=C:\UPSTREAM\US1.CFG
```

- **Command Line:** When you run USCfg.exe, US.exe or USCmd.exe, add the parameter on the same line, parameters separated by spaces. For example, you could start FDR/UPSTREAM:

```
US CONFIGFILE=C:\UPSTREAM\US1.CFG
```

- **User (dialog):** When you enter parameters from a dialog, these values are ALWAYS used.

You set a configuration parameter using a keyword (upper and lower case can be mixed), followed by a separator (a blank or an equal sign) followed by the value. Parameters from the DOS environment and the command line must use an equal sign as the separator. Parameters are listed in the order they appear in the file.

There are two types of parameters: configuration and frequency. Table 1 describes the configuration parameters. These parameters do not repeat.

Table 2 describes the frequency parameters. These parameters repeat for each frequency defined.

Name	Default	Req.	Description
ADAPTERADDRESS (DOS APPC only)	40000000000	No	For IBM APPC/PC® Token-ring, the Token-ring address of the immediate node you are connected to.
AUTOACTIVATE (DOS APPC only)	Y	No	Whether the session should be automatically activated.
CONFIGFILE	Upstream.cfg	Yes	The name (and optionally the path) of the configuration file to read parameters from.
DIALREMOTE (DOS APPC only)	N	No	For IBM APPC/PC® SDLC, if 'Y' you will be prompted with a message window to dial the modem.
DLCINFO (DOS APPC only)	NONE	No	For NetWare for SAA Custom configurations, any controller adapter configuration information (such as a channel address).
DLCNAME (DOS APPC only)	CUSTOM	No	The DLCNAME used for Custom configurations. FDR/UPSTREAM will automatically insert ITRN or SDLC for IBM APPC/PC or Other definitions. For Custom NetWare for SAA definitions, you must enter CUSTOM.
DLCNUMBER (DOS APPC only)	0	No	For NetWare for SAA Custom configurations, the DLC number. Use a value from 0 to 255.
DLCTYPE	2 (APPC/PC Token-ring)	Yes	The DLC type for this PC: 0 = Non-IBM APPC/PC® 1 = IBM APPC/PC® SDLC 2 = IBM APPC/PC® Token-ring 3 = NetWare for SAA Custom 4 = TCP/IP (any vendor). 5 = (UNIX) Use side info profile.
DONTSAVEPASSWORD	N	No	If 'Y', passwords will not be saved to parameter files in UPSTREAM.
GATEWAYNAME	USGATEWAY	No	Not used at this time.
GATEWAYPASSWORD	None	No	Not used at this time.
GUICLIENTTCPADDRESS	127.0.0.1	No	(Java Client) One or more addresses (comma separated) of the UPSTREAM process that the Java client will connect to.
GUISTARTCLIENTLOCAL	Y	No	(Java Client) Whether the Java client will start UPSTREAM itself (Y) or connect to a running UPSTREAM process (N). If 'N', you must specify a GUICLIENTTCPADDRESS.
INPORT (TCP/IP only)	1972	No	The IP port used to allow other computers to request functions (including host initiates).

Name	Default	Req.	Description
INTPN (APPC only)	UPSTREAM	No	The transaction program name used for remote initiated functions. Specified on MVS using TPNAME=
INTPNPROF (UNIX APPC only)	UPSTREAMP	No	The transaction program profile name defined in the SNA server configuration.
LANGUAGEFILE	None	No	If specified, the UPSTREAM dialog text replacement file used to customize UPSTREAM's dialogs (usually for non-English support).
LINKDELAY (APPC only)	3	No	The number of seconds between an activate link and an activate session and the number of seconds that an ALLOCATION_FAILURE - RETRY will be retried. *Very* useful for APPC/PC® Token-Ring connections.
LOGFILE	upstream.log	Yes	The name (and optionally the path) of the log file to write the error and other messages to.
LULOCALADDRESS (DOS APPC only)	2	Yes	The LU local address of this PC in decimal. 0 is used for independent LUs. Dependent LUs are defined from 1 to 255. Not used by AdaptSNA or NS/DOS.
LUNAME (APPC only)	NONE	Yes	Your logical unit name. For OS/2, Windows, Windows NT and UNIX this is the local alias name.
MAXRUSIZE (DOS APPC only)	1024	No	The maximum RU size. For APPC/PC® this must be the same as the minimum RU size. The range depends on your APPC. Not used for AdaptSNA, NS/DOS or DCA/Microsoft Comm Server DOS requestors.
MAXSTATUSMSGLINES	500	No	Backup and restore status screens display a messages list box which contains the errors, warnings and other significant events encountered during the operation. This specifies the maximum number of lines in the list before the oldest messages are removed. 0 indicates no limit (not recommended), -1 suppresses screen logging.
MESSAGEFILE	upstream.msg	Yes	The name (and optionally the path) of the message file to read the predefined messages from.
MESSAGETIMELIMIT	0	No	A number indicating the number of seconds that predefined messages should be displayed for: -1 = Do NOT display any messages. 0 = Display messages until released. *number* = Number of seconds.
MINRUSIZE (DOS APPC only)	1024	No	The minimum RU size (after negotiation). For APPC/PC® this must be the same as the maximum RU size. The range depends on your APPC. Not used for AdaptSNA, NS/DOS or DCA/Microsoft Comm Server DOS requestors.

Name	Default	Req.	Description
MODENAME (APPC only)	#INTER	Yes	The mode name you wish to use.
MULTIUSER (Win32 and OS/2 only)	N	No	Whether you are running in single or multi-user mode.
NETNAME (DOS APPC only)	NONE	No	The SNA network name this PC is defined within. Usually not required.
NORESTART	N	No	If specified as 'Y', restarts will not be attempted on UPSTREAM program entry.
OUTPORT (TCP/IP only)	1972	Yes	The IP port used to contact the host.
OUTTPN (APPC only)	UPSTREAM	No	The remote computer's transaction program name.
PACING (DOS APPC only)	8	No	The receive pacing count. The range depends on your APPC. Not used for AdaptSNA, NS/DOS or DCA/Microsoft Comm Server DOS requestors. NEVER set pacing to zero with IBM APPC/PC.
PARTNERLUNAME (APPC only)	NONE	Yes	The LU name of FDR/UPSTREAM MVS. For OS/2, Windows, Windows NT and UNIX this is the partner alias name.
PERCENTINTERVAL	5	No	If you have enable percentage completion status messages (USNLMOPTIONS 8 bit on), how often completion messages are displayed.
PCUSERNAME (Win32 and OS/2 only)	NONE	No	A multi-user user name override.
PRIMARYADAPTER (DOS APPC only)	Y	No	For IBM APPC/PC® Token-ring, 'Y' indicates that you will be using the primary Token-ring adapter, 'N' indicates that you will be using the secondary adapter.
PUNAME (DOS APPC only)	NONE	No	The SNA physical unit name of this PC. Usually not required.
REMOTEDELAY	5	No	The number of seconds that FDR/UPSTREAM will wait after receiving a remotely initiated request before performing other functions.
SETPCTIME	N	No	Whether the PC clock should be synchronized to the mainframe clock when backups are run.
SETSERVERTIME	N	No	Whether the Novell NetWare server clock should be synchronized to the mainframe clock when backups are run.

Name	Default	Req.	Description
STATUSPORT	2033 (for NLM, Win32 and UNIX) 0 (all others)	No	If specified, UPSTREAM will listen for status type requests. Used for tracing and the Java facilities, this is a base number; UPSTREAM actually uses three ports.
STATUSREDRAWINTERVAL	100	No	The number of milliseconds between backup or restore status screen refreshes.
TARGETNAME	None	No	The target (registered) name to transmit to the host.
TARGETNAMEINTERVAL	1440	No	How often (in minutes) the registered name will be retransmitted to the host. 0 means to only transmit the name on UPSTREAM program entry.
TCPADDRESS (TCP/IP only)	None	Yes	The IP address of the host.
TCPINADAPTER (TCP/IP only)	Blank (all)	No	Allows you to specify the local IP adapter address which you will accept remote requests on. The default (blank) accepts requests on all adapters.
TCPOUTADAPTER (TCP/IP only)	Blank (default)	No	Allows you to specify the local IP adapter address which will be used for outbound TCP/IP requests. The default (blank) uses the default system adapter.
TCPRECVBUFFER (TCP/IP only)	65535	No	Specify the total per-socket buffer space reserved for receives. This is unrelated to the size of a TCP window.
TCPSENDBUFFER (TCP/IP only)	65535	No	Specify the total per-socket buffer space reserved for sends. This is unrelated to the size of a TCP window.
TCPOPTIONLEVEL (TCP/IP only)	0	No	All TCP/IP advanced options use 65535 except for TCP_NODELAY which uses 6.
TCPOPTIONNUMBER (TCP/IP only)	0	No	If specified, the advanced TCP/IP option: 1: (TCP_NODELAY). Disables the Nagle algorithm for send coalescing. Use a BOOL OptionValue and an OptionLevel of 6. 1: (SO_DEBUG). Record debugging information. Use a BOOL OptionValue. 8: (SO_KEEPALIVE). Send keep alives. Use a BOOL OptionValue. 16: (SO_DONTROUTE). Don't route; send directly to interface. Use a BOOL OptionValue. 4097: (SO_SNDBUF). Specify buffer size for sends. Use an INT OptionValue. 4098: (SO_RCVBUF). Specify buffer size for receives. Use an INT OptionValue.
TCPOPTIONVALUE (TCP/IP only)	0	No	Specify the new value for the option. For BOOL values, specify 1 to enable, 0 to disable; for INT values, specify the value you wish to set.

Name	Default	Req.	Description
TCPOPTIONVALUELENGTH (TCP/IP only)	0	No	The number of bytes used by OptionValue, which is processor dependent. For most implementations use 4 for both BOOL and INT.
TESTCONNECT (DOS APPC only)	N	No	If specified as 'Y', a test conversation will be initiated to the host.
TIMECONVERSION (Win32)	0	No	During backups, how NTFS and LAN file modification times are stored on the host. Can be overridden using the overall parameter TIMEOVERRIDE. 0 = Local time. 1 = Standard time. 2 = Daylight savings time. 3 = Greenwich Mean Time.
USETARGETNAME	N	No	Whether a target (registered) name is to be transmitted on program entry.
USNLMOPTIONS	9	No	A bit map of command line/NLM options: 1 = (NLM) Auto-destruct screen on termination. 2 = (NLM) Log messages are also written to the system console. 4 = (NLM) Report and percentage completion messages are also written to the system console. 8 = Display percentage completion status messages.
WINNER (DOS APPC only)	Y	No	Whether you wish this to be a contention winner session. Required for auto-activation. Not used by AdaptSNA, NS/DOS requestors.
WORKPATH	(UPSTREAM directory)	No	The name of a drive and directory where temporary and trace files will be written. It is recommended that this path NOT be part of any file spec to be backed up.

Table 1
Configuration Parameters

Name	Default	Req.	Description
DAY	NONE	Yes (monthly, quarterly, yearly)	The day of the month to run the monthly, quarterly or yearly frequency. A number from 1..31.
EXCLUSIVE	Yes	No	If you have two or more frequencies scheduled within an hour of each other, this determines if the subsequent one will be run.
FREQPARAM	upstream.dat	No	The first parameter passed on the command line to the program automatically activated. Generally this is the parameter file to be used.
FREQTYPE	1	Yes	The frequency interval: 1 = Daily 2 = Weekly 3 = Monthly 4 = Quarterly 5 = Yearly 6 = Weekdays
MONTH	1	Yes (quarterly, yearly)	For yearly frequencies, this is the month (1-12). For quarterly frequencies, this is the month in the quarter (1-3).
NUMFREQ	1	Yes	The header to this frequency. Each frequency begins with a NUMFREQ definition with an ascending number starting at 1.
STARTBATCH	US.EXE	Yes	The name of the program or batch file to be automatically started.
TIME	NONE	Yes	The time when the frequency will be scheduled. The format must be HH:MM:SS.
WEEKDAY	NONE	Yes (weekly)	The day of the week to run the weekly frequency. 0 = Monday, 1 = Tuesday, ..., 6 = Sunday.

Table 2
Frequency Parameters (Repeating)

26 Advanced UPSTREAM

26.1. Overview

This chapter discusses some of the miscellaneous advanced features of the FDR/UPSTREAM program US.EXE that have not been covered in previous chapters.

- FDR/UPSTREAM returns program return codes which can be used to determine the success or failure of FDR/UPSTREAM functions.
- Remote FDR/UPSTREAM systems can run programs, and batch jobs on your workstation and you can request that programs and batch jobs be run on an ULTra workstation as well as the host.
- FDR/UPSTREAM functions can be specified remotely either from mainframe batch jobs or from a PC. This section describes how to initiate these functions from a PC.
- FDR/UPSTREAM has its own internal ASCII-to-EBCDIC translation table which it uses for communications parameters and file name specifications. Non-U.S. users can modify this table to support other single-byte character sets.
- Sequential disk backups require that the size of the MVS dataset be known in advance. Normally FDR/UPSTREAM will calculate the value close enough to work. There are additional tuning parameters which allow you to ensure that the dataset is allocated to the correct size.
- FDR/UPSTREAM uses fixed (mono-spaced) fonts for various displays. You can specify a specific font to be used if you wish.
- If you have a number of FDR/UPSTREAM parameter files, and you wish to change one or more parameters at a time in a number of files, a program, USMODIFY is provided to allow you to do this easily.
- FDR/UPSTREAM allows you to set its parameters in other ways than through the dialog panels. Use of these parameters allows you to tailor your environment to best suit your needs. This section describes how to do this and lists these parameters. It then goes on to describe how to make it easy for untrained users to take advantage of FDR/UPSTREAM.

26.2. Program Return Codes

FDR/UPSTREAM returns program return codes to indicate success or failure of particular FDR/UPSTREAM functions. Program return codes can be read from batch files using the ERRORLEVEL command or as return codes from calling programs.

FDR/UPSTREAM program return codes are coded as a bit map. The values are added together to produce the total returned value.

Note that when using ERRORLEVEL to check the program return code in a batch file that ERRORLEVEL returns success if the return code is the requested value or higher. Thus, a check for ERRORLEVEL 1, will return true if the program return code is greater than 0.

Table 1 shows the return code values.

Meaning	Value
No errors	0
Backup failed	1
Restore failed	2
As of...Restore failed	4
Remote requested received failed	8
Remote requested failed	16
Running the requested job failed	32
Running the requested host report failed	64
Internal function (for example, version deletion) failed	128

Table 1
Program Return Codes

For example, if a remote request and a backup both failed, you would get a return code of 9 (1 + 8).

A file is created in the WORKPATH or default directory, US.RET which holds a more comprehensive return code which adds in the values above, plus values indicating which functions were performed. Table 2 shows the added values.

Meaning	Value
No functions performed	0
Backup completed	256
Restore completed	512
As of...Restore completed	1024
Remote request received	2048
Remote request performed	4096
Requested job started successfully	8192
Requested host report run successfully	16384
Internal function (for example version deletion) ran successfully.	32768

Table 2
Program Return Codes

26.2.1. RETCODE.EXE

The program, RETCODE.EXE allows you to read the US.RET file and recover the original program return code to a fresh program return code (if it was lost due to running another program).

It also reads interprets the value of US.RET and displays the meanings on the screen. It can be quicker to use this program to determine if FDR/UPSTREAM ran successfully than checking the FDR/UPSTREAM log.

26.3. Job Execution

FDR/UPSTREAM includes a feature which allows remote computers (MVS and other workstation/servers) to run a batch file or program on your workstation/server or for you to submit existing host jobs. The workstation/server aspect of this facility is particularly useful, and is used, in the FDR/UPSTREAM Auto-Update facility (see the *Management* chapter for a detailed description of that facility).

You can also run batch jobs or programs on an ULTra attached workstation. These can be specified from the host, from the run job dialog, or automated from the FDR/UPSTREAM machine.

Finally, the job execution facility can be used to remotely terminate the FDR/UPSTREAM or ULTra software.

WARNING: Jobs must not expect user input. Under most operating systems this will hang UPSTREAM which will require external intervention to kill both UPSTREAM and the job.

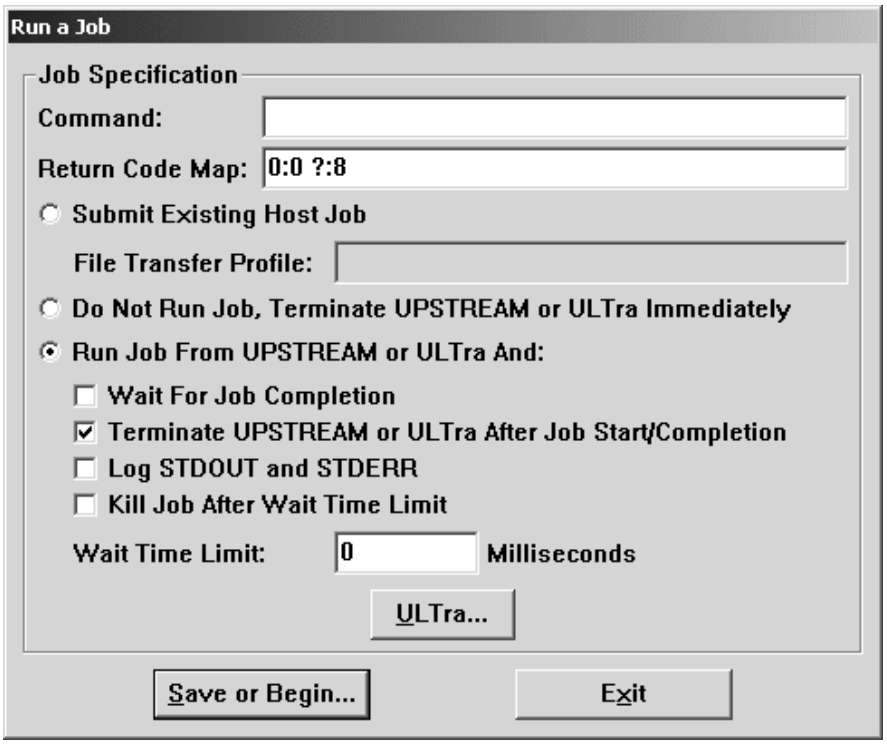
26.3.1. Locally Specifying

FDR/UPSTREAM includes a dialog which allows you to specify the parameters necessary to run a job. Use this dialog:

- To submit a job stored on the host.
- To build a parameter file for workstation or host job automated execution.
- Run a job on an ULTra attached workstation.

To access this dialog, pull down the Action menu and select Run a Job. The accelerator for this is [ALT]J. See figure below.

In the UPSTREAM Director, press the **Run Job** tab for a similar window.



- **Command:** Enter the command line of the program or batch file you wish to run. You must use the fully qualified path to the program or batch file to run, followed by any command line parameters that you wish to use. This field is usually required and the default is blank. This is the only required parameter for submitting host jobs.

  If you don't want to specify the full path for the program/batch file, start the command line with the back quote character (`). In this case all the rules of the operating system or shell running your command apply (default file extensions, PATH etc.). Otherwise, if you do not specify the leading back quote (`), UPSTREAM will verify the existence of the program to execute and will do some other processing on the spec.

  (Win32) If the program or batch file specification includes long file names with spaces you must use the following syntax:
  `"fully qualified file name" [parameter1][parameter2] [...]
  (Back quote, double quote, fully qualified file name, double quote, space, and then parameters if needed)

  It is strongly recommended to specify the program/batch file with the appropriate extension. [Win32] if you don't specify the extension we will add ".exe" to your spec.

  (Win32) If a parameter has spaces within it and you are running a batch/command file (not a 32-bit program), you need to specify double-quotes around the entire list of parameters and then double quotes around each parameter. For example:
  C:\winnt\system32\cmd.exe /c ""fully qualified batch file name" "first parameter" ["second one"] [...]"

- **Return Code Map:** This is used only for CONV=WAIT or CONV=KEEP host jobs running on a workstation/server, this parameter allows you to map the job return code to a return code consistent with the way that host return codes work. The syntax is described below. The default is 0:0 ?:8 which will map a workstation 0 return code to a host 0 return code and all other workstation return codes to a host return code of 8. This field is not used for host jobs. You can specify ?:? to have unspecified return codes returned to the caller uninterpreteted.

  The following radio buttons are:

- ☐ **Submit existing host job:** If you press this radio button, the command line specifies the name of an existing file on the host with properly formatted JCL, ready for submission. If you select this radio button the following field is enabled:
  - **Transfer Profile:** If you select Submit existing host job, you must enter a valid file transfer backup profile.
- ☐ **Do not run job, terminate UPSTREAM or ULTra immediately:** If you press this radio button, not job is run. This is merely an indication that UPSTREAM or ULTra should be terminated. If UPSTREAM is running in automatic attach manager mode, the parent as well as the child will be terminated. This is not the default radio button and is rarely used.
- ☐ **Run job from UPSTREAM or ULTra and:** Pressing this radio button causes the job on the command line to be run and it is the default. If you press this radio button, the two check boxes beneath it are active.

The run job checkboxes are:

- ☐ **Wait for job completion:** If checked this causes FDR/UPSTREAM to wait in a suspended state until the job has completed. Otherwise, FDR/UPSTREAM will start the job and continue. The default is not checked.
- ☐ **Terminate UPSTREAM or ULTra after job start/completion:** If checked this causes FDR/UPSTREAM to terminate after the job has been started (if Wait for job completion has not been checked above) or terminate after the job has completed (if Wait for job completion has been checked above). If not checked, FDR/UPSTREAM will not terminate as a result of running the job (it may terminate for other reasons including a remote time limit expiration). The default is checked.
- ☐ **Log STDOUT and STDERR:** If checked, the standard output (STDOUT) and standard error output (STDERR) from the job will be written to the upstream.log file, but not displayed. If this checkbox is checked, the Wait For Job Completion checkbox will also be checked. This option does not apply to jobs run under ULTra. This option is recommended as it allows you to capture the output from your jobs.
- ☐ **Kill Job After Wait Time Limit:** If checked, the job will be forcefully terminated after waiting the number of milliseconds specified by the Wait Time Limit value or if UPSTREAM itself is terminated. If this checkbox is checked, the Wait For Job Completion checkbox will also be checked. This option does not apply to jobs run under ULTra.
- ☐ **Wait Time Limit:** Use this field to specify the number of milliseconds that UPSTREAM should wait for the job to complete processing. If the wait time limit expires before the job completes, UPSTREAM will either forcefully terminate the job if the Kill Job After Wait Time Limit checkbox is checked or leave the job running in an orphaned state. A value of 0 means that UPSTREAM will wait indefinitely for the job to complete. This option does not apply to jobs run under ULTra.

WARNING: Most users will want to CHECK “Wait for job completion” and “Log STDOUT and STDERR” and NOT CHECK “Terminate UPSTREAM or ULTra after job start/completion” as this is the expected behavior for jobs.

The push buttons are:

- ☐ **ULTra...:** Press this button to specify parameters so that you can submit jobs or terminate ULTra on LAN attached workstations. See the *ULTra* chapter for more information.
- ☐ **Save or Begin....:** Press this button to save your selections to a parameter file for later execution and/or execute them now.

- **Exit:** Press to leave this dialog without saving any of you selections.

26.3.2. Job Return Codes

FDR/UPSTREAM MVS CONV=WAIT batch jobs return a return code indicating whether the requested function has successfully completed. For backups or restores, this return code indicates whether the backup or restore worked successfully (return code 0), had some warnings (return code 4) and so on. These return codes are used for host reporting and are often used with a scheduling system to determine whether to perform additional functions or notify an administrator.

This process becomes more complex when you are running a workstation job. Is the job successful if it merely runs? What constitutes working?

This problem is exacerbated by the differences in PC and UNIX system return codes and mainframe return codes. On the mainframe, there is a convention of how return codes work (0 = success, 4 = minor problems, 8 = failure, ...). If a workstation program returns a return code at all, it often is simply 0 for successes and non-zero for failure.

To help map workstation return codes to host return codes, a mapping facility is provided (Return Code Map on the workstation dialog or the parameter JOBRETURNCODEMAP). It's syntax is:

```
<workstation return code>:<host return code> ...
```

Where:

- **<workstation return code>** is the ERRORLEVEL or program return code from the application or batch file. You can specify:
  - A single numeric value: 0, 1, etc.
  - A range of values: 1-4, 8-12, etc.
  - A question mark (?): This indicates any value which is not directly specified as a single numeric value a value in a range.
- **<host return code>** is the value which the host job will return.

The combination of <workstation return code>:<host return code> can be repeated multiple times, separated by spaces or tabs.

For example, the default of 0:0 ?:8 will cause the host batch job to return:

- 0 if the workstation program returns a program return code of 0.
- 8 if the workstation program returns a program return code which is non-zero.
- 12 or 16 depending upon the type of failure if the workstation does not run the job at all (due to some type of communications or other failure).

(UNIX) If there are errors in starting a remotely requested job, these errors are stored in the file **usjob.out** in the WORKPATH directory.

26.3.3. Windows 9.x Jobs

By default, when a Windows 9.x job terminates the Window that the job was in remains open. To have the Window close automatically perform the following steps:

- Copy c:\windows\dosprmpt.pif to c:\windows_default.pif

- Using the Explorer, highlight _default.pif and bring up its **Properties**. In the **Program** tab, check **Close on exit** and press the **Ok** button.
- Reboot the computer. By default, job windows will automatically close

26.3.4. Host Initiation

Host initiation of jobs is via UPSTREAM parameters. The important ones are:

- **ACTION 5** Specifies that a job is to be run.
- **JOBOPTIONS** Usually specified as **35** to have UPSTREAM run the job, wait for it to complete, log its output and return its return code to the host. Allowing it to default to 0 will cause UPSTREAM to terminate.
- **JOBRETURNCODEMAP** See section 26.3.2., 28.3.2.
- **FILES** The full command line for the job you wish to execute.

WARNING: Do not allow JOBOPTIONS to default to 0 unless you specifically wish UPSTREAM to terminate.

26.3.5. Killing Jobs

If you accidently specify a job which requires user input or your job hangs or ends up in an infinite loop, both UPSTREAM and the job will have to be killed manually. This is done differently depending upon your operating system; some of the less complex ones:

- UNIX. Use the ps command to get the process number and the kill command to kill the process.
- OS/2. Jobs can be killed (Closed) with a right mouse click from the Window List.
- NLM: UNLOAD <program> will kill the program.
- Windows NT: The Task Manager allows you to kill programs, unless it was started from UPSTREAM running as a service.

For Windows NT, if UPSTREAM is running as a service, you can use USTPCFG to create a service which starts the task manager program (usually c:\winnt\system32\taskmgr.exe). This program can then terminate jobs which are running as services.

26.4. Requesting a Remote UPSTREAM Function

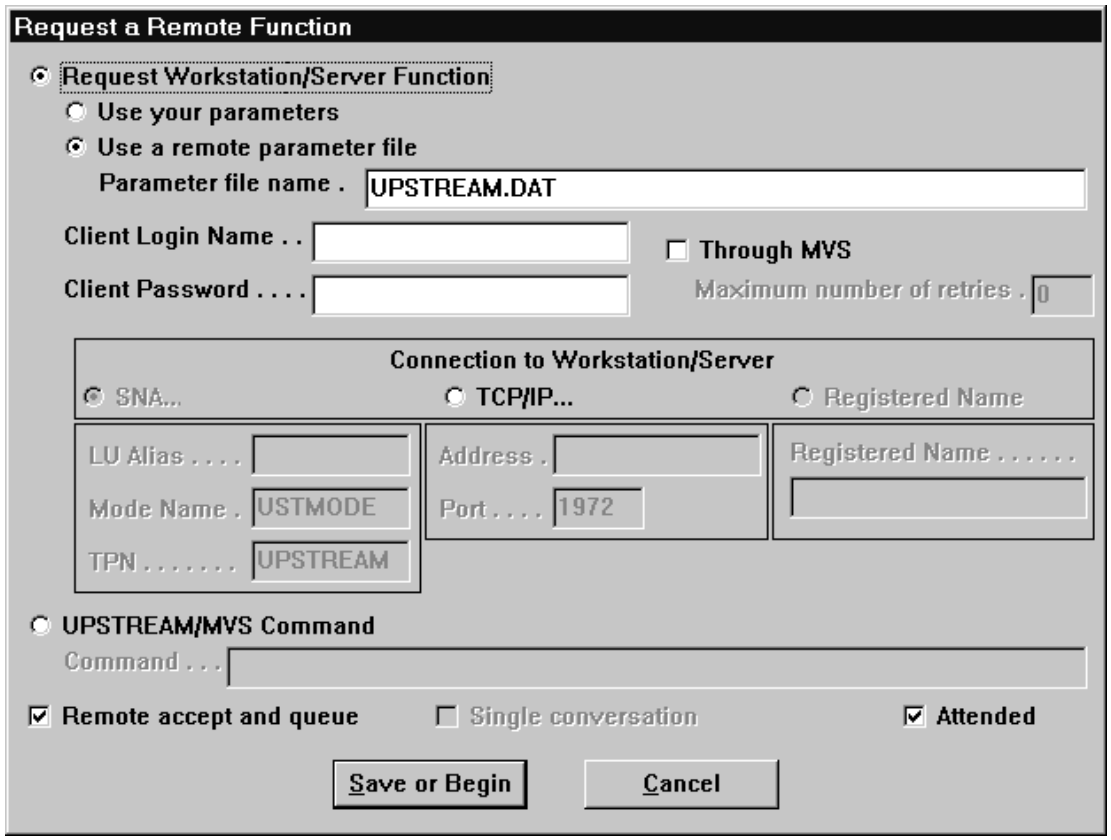
FDR/UPSTREAM allows you to specify backups or restores from MVS batch jobs or from other workstations/servers. Remote workstation/server specified functions can be done through FDR/UPSTREAM MVS or directly PC-to-PC (through TCP/IP, APPN or low-entry networking). Note that the UPSTREAM Director offers this function and is the recommended method of requesting remote UPSTREAM functions when available.

Remote PC specified functions can be saved and executed from parameter files. You can even use this facility to control all of your PCs from a central PC.

This facility can also be used to send FDR/UPSTREAM/MVS commands. These include such commands as FLUSHLOG, USTMAINT, etc.

Remote FDR/UPSTREAM functions are accomplished by sending FDR/UPSTREAM parameters to the remote workstation/server (specified in a dialog or using one of the other ways of entering FDR/UPSTREAM parameters), or using parameters (in a parameter file) on the remote workstation/server.

To specify remotely initiated functions, pull down the Remote menu from the main FDR/UPSTREAM screen and select Request Remote Function. You can also use the accelerator, [ALT]Q. You will see the Request a Remote Function dialog.



The main selection radio buttons are:

- ☐ **Request Workstation/Server Function:** Select this option if you are requesting a workstation/server function such as a backup, restore, job execution, etc. When selected, the fields indented below the option are made available for entry and the fields beneath UPSTREAM/MVS Command are grayed. This is the default option.

- ☐ **UPSTREAM/MVS Command:** Select this option to send a command to the FDR/UPSTREAM host. When selected, the Command field indented below it is made available and the options indented under Request Workstation/Server function are grayed.

The parameters for requesting a remote function are:

- ☐ **Use your parameters:** If you select this radio button, then the remote function will use the parameters that you specified in a backup, restore or as of...restore dialog, as if you were at that PC. Do not check this button if you wish to use a parameter file stored on the remote PC. If you wish to use a parameter file on your PC, use the Open command from the File Menu and enter a password in the appropriate dialog before executing this function. The default is not checked.

- ☐ **Use a remote parameter file:** If you select this radio button you are requesting the execution of a parameter file that currently exists on the remote system. This parameter file must be complete. If you select this option, you must also enter a parameter file name. The default is checked.

- ☐ **Parameter file name:** This field is grayed and unavailable unless you checked Use a remote parameter file (above). Enter the fully qualified file name of a FDR/UPSTREAM parameter file. The default is UPSTREAM.DAT.

If the system you are performing the request on has enabled Remote Security in Personalization requiring remote client computers to enter a User ID/password, enter your user ID and password on that machine in this fields below. Note that for new installations this is the default and must be entered even if you are using Novell Profiles. See the Security chapter for more information.

- ☐ **Client Login Name:** Enter your user name on the system you are connecting to if the remote system requires connecting computers to login. The default is blank.

- ☐ **Client Password**: Enter your password on the system you are connecting to if the remote system requires connection computers to login. The default is blank.

MVS connection options:

- ☐ **Through MVS:** If you check this box, your computer connects to FDR/UPSTREAM MVS, which in tern connects to the remote computer. All requests are directly forwarded by FDR/UPSTREAM MVS. Your connection is held open until the remote computer receives and accepts the request. If you check this option, you can also specify a Maximum number of retries. The default is checked.

  You can not check this box if your connection to the host is TCP/IP. If you do not check this box you will be directly connecting to the remote computer using TCP/IP or SNA low-entry networking or APPN. You can not use a registered name as that requires the FDR/UPSTREAM host.

- ☐ **Maximum number of retries:** This option is only available when Through MVS (above) is checked. You can set the number of times that FDR/UPSTREAM MVS will retry the connection to the remote PC before abandoning the attach. The retry interval is set on the mainframe. The PC is held (locked) until the number of retries have been exceeded. Specify a number from 0 to 255. The default is 0.

Connection to the Workstation/Server can be one of the following three options:

- ☐ **SNA...:** If you press this radio button, the remote computer is connected via SNA/APPC and you must also enter the Remote LU Name and Remote Mode Name parameters.

- ☐ **LU Alias:** Enter the LU Name of the PC you are attaching to. For direct PC-to-PC requests this is the alias of the remote PC. This field is required. The default is blank.

- ☐ **Mode Name:** Enter the Mode Name for the connection to the remote PC. For requests through FDR/UPSTREAM MVS, this mode name is only used for the connection from FDR/UPSTREAM MVS to the remote PC, and can be different than the mode name for the connection between your PC and FDR/UPSTREAM MVS. This field is required. The default is USTMODE.

- ☐ **TPN:** Enter the transaction program name posted on the remote PC. The default is UPSTREAM. This field is particularly important in APPCs where multiple copies of UPSTREAM are running and you wish to direct your request to a particular copy.

or

- ☐ **TCP/IP..:** If you press this radio button, the remote computer is connected via TCP/IP and you must also enter the TCP/IP Address and Port parameters.

- ☐ **Address:** Enter the IP address of the remote PC. Use the dotted decimal notation. This field is required.

- ☐ **Port:** Enter the IP port that FDR/UPSTREAM uses on the remote PC, in decimal. This field is required.

or

- ☐ **Registered Name...:** If you press this radio button, you know the registered name of the remote computer. This option is only available if you checked the Through MVS checkbox above.

- ☐ **Registered Name:** Enter the registered name of the remote computer as specified in the remote computer's configuration.

The parameters for an UPSTREAM/MVS command are:

- ☐ **Command:** Enter the UPSTREAM/MVS command, with all parameters, that you wish to execute. These include FLUSHLOG, USTMAINT, etc. This is a required field.

The check boxes beneath the connection type are:

- ☐ **Remote accept and queue:** If this button is checked and the remote computer is beginning a process it can't easily interrupt (a backup or restore), then the remote computer will queue it until it becomes free and will process the request then. If this box is not checked, the remote will reject the request if it can't service it immediately. The default is checked.

- ☐ **Single conversation:** If this button is checked then the conversation between FDR/UPSTREAM MVS and the target PC that requested the function will be used for the conversation for the backup and restore. Otherwise the request will be a separate conversation from the backup or restore. Checking the box is preferred as the host software can keep better track of the complete request for host reporting. This option requires FDR/UPSTREAM PC v2.4.0a or later and FDR/UPSTREAM MVS v2.4.0 or later and can only be used Through MVS. The default is not checked.

- ☐ **Attended:** If this button is checked this process (the remote request), even if saved to a parameter file, will be attended. If this button is not checked and you save these parameters to a parameter file, this process can be unat-

tended. The default is checked. **NOTE:** The remote action will be attended or unattended based on the parameters that are used, NOT this value. This value only affects the process of requesting the remote function.

- **Save or Begin...:** Press this button (or the [ENTER] key) to save the values entered above to a parameter file and/or begin the remote request..
- **Cancel:** Press this button (or the [ESC] key) to exit this dialog without saving or executing the request.

If you press the <Save and Begin> or <Begin> buttons after pressing <Save or Begin...>, you will be asked for the name of the parameter file to save this request to, and then you will see the status of the request. Do not be alarmed if the state continues to remain at "Confirm request" for some time, particularly if you specified a retry count. This is normal.

When the remote request has been submitted (but not serviced), you are returned to the FDR/UPSTREAM main window. In unattended mode, FDR/UPSTREAM will terminate.

26.5. User Defined Translation Tables

PC and most UNIX operating systems use the ASCII character set. The host needs file and a number of other names in EBCDIC so that they can be displayed and selected.

NOTE: We recommend using one of the sample tables rather than the default ASCII-to-EBCDIC tables.

FDR/UPSTREAM has its own internal ASCII-to-EBCDIC and EBCDIC-to-ASCII translation table which it uses for communications parameters and file name specifications. For users of FDR/UPSTREAM in the United States, this will work correctly for most file names. However, if you have a non-U.S. codepage loaded on your PC, have a non-standard name space loaded (such as a Macintosh file system) or have overseas users, characters which use values not defined in the ASCII-7 character set (which includes characters with accents and umlauts) may find that file names displayed incorrectly on the host or the client.

In particular, note that the internal UPSTREAM translation tables are not one-to-one. There are a number of characters that do not map back to their original values.

To remedy this situation, FDR/UPSTREAM supports user loadable ASCII-to-EBCDIC and EBCDIC-to-ASCII translation tables.

We have enclosed translation tables which address some of the following problems:

- There are a number of characters including non English characters (è, ö, etc.) and special locale specific characters (¢, £, etc.) which are available in the enhanced EBCDIC character set. The new translation tables allow access to these characters in file names when viewed in ISPF panels.
- Our default ASCII-to-EBCDIC and EBCDIC-to-ASCII tables are not anywhere near one to one. This means that a number of characters in ASCII were mapped to a single EBCDIC character. This can lead to multiple files mapping to the same name, errors attempting to view or display files in ISPF and files restored to a different file name than their original. The new tables are still not one to one (as this is impossible), but they are much closer.

The supplied tables map to EBCDIC (4), code page 037.

Within ASCII, there are a number of character sets. DOS, Windows 3.1, Windows 95, Novell, OS/2, AIX and a number of other operating systems use the OEM character set which includes line drawing characters. DOS, Windows 3.1 and other operating systems require code page support loaded for support of non English characters; see the operating system manuals for locale specific details.

Windows NT generally uses the ANSI character set (unless you have specified a different character set for display). ANSI has no line drawing characters and supports a larger number of locale specific characters. UPSTREAM for Windows NT has been designed to support exact display of file names.

To support both environments, we include in the **\samples** directory two sets of translation tables: oematoe.tab and oemetoa.tab for the OEM character set and ansiatoe.tab and ansietoa.tab for the ANSI character set.

To use these tables, we recommend that you copy the appropriate tables to the **usatoe.tab** and **usetoa.tab** files in the UPSTREAM directory. If UPSTREAM sees these files it will use them on program start.

If you wish to change translation tables the parameter file entries **ASCTOEBC** (ASCII-to-EBCDIC, default USATOE.TAB) and **EBCTOASC** (EBCDIC-to-ASCII, default USETOA.TAB) specify user loadable translation tables. You can specify the translation table file name in the Backup or Restore More... dialogs. Whenever a parameter file is opened or one of these values is received from a remote system (and a new table is specified), the tables are loaded immediately. Thus you can use different tables for backups than for file transfers.

When FDR/UPSTREAM loads a translation table it logs message #1225I with the table name in the message log.

Note that if you have existing backups, by changing your translation tables, the FDR/ UPSTREAM host may see these files as new files - causing a larger than normal number of files to be transmitted in phase 3 of a merge full backup.

The recommended tables are:

- **Windows NT/2000: ANS2ATOE.TAB** (ASCII-to-EBCDIC) and **ANS2ETOA.TAB** (EBCDIC-to-ASCII)
- **All other PC operating systems: OEM2ATOE.TAB** (ASCII-to-EBCDIC) and **OEM2ETOA.TAB** (EBCDIC-to-ASCII)
- **UNIX:** For best display on the mainframe use **unixatoe.tab** (ASCII-to-EBCDIC) and **unixetoa.tab**(EBCDIC-to-ASCII); if you need one-to-one translation tables and if you are unsure which tables to use, use **ans2etoa.tab** and **ans2etoa.tab**.

26.5.1. Translation Tables in the Director

Some pair of translation tables is always used when viewing Profile Versions (backups) in the restore action version content view window. It is very important that the translation tables that are loaded are the ones that were used for the particular backup you are viewing - if not, the characters and file names may not be legible in the viewer.

The Director loads and sets the translation tables from the target system itself. There is a new section in the "View Options" dialog for doing this. Also, when a parameter file is loaded for use, the translation tables specified in it are now also loaded from the target system.

26.5.2. Building Your Own Translation Tables

To build your own translation table, follow these guidelines:

- Each file should have 256 lines, one line per character to translate.
- Each line represents a position. Line 32 (decimal) of the ASCII-to-EBCDIC file will represent the number what you wish the space character translated to.
- Specify the value to translate to in decimal or hexadecimal. If you are using hex, then precede each value with a 0x. For example to specify 2a hex, enter 0x2a (the hex letter digits can be upper or lower case).
- You may enter comments on each line if you separate the value and the comment with at least one space.
- Remember that conversions should be symmetric. If you define a value in the ASCII-to-EBCDIC table, don’t forget to define the converse value in the EBCDIC-to-ASCII table.

- The default ASCII-to-EBCDIC translation file is named USATOE.TAB.
- The default EBCDIC-to-ASCII translation file is named USETOA.TAB.

We recommend that you test translation by backing up and restoring to files using non-English characters specific to your language before putting these into production.

Note that characters in file names that are translated to non-printable EBCDIC characters will display incorrectly in the FDR/UPSTREAM MVS log if there is an error. There are no adverse affects in PC inquiries or restores.

There are a number of EBCDIC values which must not be used to avoid problems in UPSTREAM - these values should not be in your ASCII-to-EBCDIC table. These include (in hex), 00, 01, 02, 03 and FF. The ASCII values which should not be in your EBCDIC to ASCII table are (in hex) 00, and FF.

26.6. Sequential Disk Size Allocation

If you are using the Sequential Disk backup type, you may occasionally have problems in that FDR/UPSTREAM will allocate the size of the MVS dataset either too large, which can have negative impacts on your system as a whole (though any excess space is freed when the backup is complete), or too small which will keep the backup from working correctly.

UPSTREAM/SOS also uses the estimated size of the backup to decide how much space in the local backup volume to allocate. If this value is too small, it will wrap too many times resulting in poor performance.

Also the size estimate is used to display the percent complete on the backup or restore status screen (or command line). If the size estimate is wrong, the calculation will be incorrect.

FDR/UPSTREAM goes to great lengths in calculating the size of the MVS file where the data backed up is stored. Most users will have no problems and can ignore this section. However if you are having problems, this section can help you.

FDR/UPSTREAM PC transmits the number of bytes which it found in file data while building the backup file to FDR/UPSTREAM MVS which then converts this to the correct allocation in blocks. This value can be wrong for several reasons:

- Databases. For many database systems (SQL-BackTrack for example), there is no way to get the size estimate in advance.
- FDR/UPSTREAM PC does not by default include the number of bytes of non-file data (NetWare Directory Services, other Novell information or extended attributes), as this can potentially add significantly to the amount of time that it takes to build the backup file. In extreme cases this can be all or almost all of the data in the backup. In these cases the MVS file allocation may go into extents or may even fail.
- FDR/UPSTREAM PC does not include the savings of compression. If you are using high compression or your data compresses well this can cause FDR/UPSTREAM to over-allocate the size of the file.
- FDR/UPSTREAM MVS takes the value received from the PC, adds a certain amount for overhead and converts it into blocks. In most cases this is going to be very close to the amount of space required. Even so, it is not exact and there may be a small variation causing a slight over or underestimation of the size.

If you are finding that the file created by FDR/UPSTREAM to hold the sequential backup is either over or under allocated or your local backups are wrapping too many times, you can control this from FDR/UPSTREAM PC. We do not recommend solving this problem by modifying the DASD block size on FDR/UPSTREAM MVS.

There are two parameter file parameters designed to help you solve this problem.

- ☐ **CALCDASDSIZE:** The default is ‘N’. If ‘Y’, then FDR/UPSTREAM PC will calculate, during the backup file build, the total number of bytes of non-file data and add this to the size of the file data in its calculation that it sends to FDR/UPSTREAM MVS. Specify ‘Y’ if you are performing a backup with a large percentage of non-file data compared to file data and are willing to accept a significantly longer amount of time to build the backup file. This parameter can not be used for database backups.

  This parameter is not shown on the screens but can be modified in the parameter file, from the command line or from the environment (it is also documented later in this chapter).

- **DASDOVERRIDE:** Available on the Backup and Migration More... dialog. The default is 100%. Allows you to specifically tailor the calculation of the size of the backup. The calculated total referenced below either indicates the size of the file data only (if CALCDASDSIZE=N) or the size of the file data plus the non-file data. There are 4 forms of this parameter:

  - +<number>: Add the given number of bytes to the total calculated.
  - -<number>: Subtract the given number of bytes from the total calculated.
  - <number>%: Use the given percentage against the total calculated.
  - <number>: Use this number to override any calculated value.

  For example, if you are performing a backup of a Novell file server with only Directory Trustee Rights checked, and high compression, you may find that FDR/UPSTREAM consistently overallocates the file twice as large as it needs to be. Therefore, you would want to specify a DASDOVERRIDE of 50% (or 55% to allow some variation in the format of the data) to have it allocated correctly.

  Another example would be if you are backing up StreetTalk only (with no file services included). FDR/UPSTREAM would normally calculate the size of the file data as 0 causing the backup to fail. You can correct this problem by specifying CALCDASDSIZE as Y.

26.7. Hard Links

26.7.1. Introduction

Hard links are a feature in UNIX and Windows NT in NTFS where a file appears to be multiple places in the directory structure but the data is actually resides on disk in only one place. Thus a file has multiple names, but there is not a single "owner" of the file; there are multiple links to the same file. In UNIX, the **ln** command is used to create hard links from the command line. A similar **ln** command is available in the Windows NT Resource Kit for NTFS drives. All hard links must exist on the same disk - they cannot cross file system boundaries. Hard links are common in operating system files. UPSTREAM itself uses hard links in its terminal support - in the /termcap directory under the UPSTREAM directory in UNIX.

You can see if a file is a hard link using the directory listing command **ls -l** command. The second column is the *link count*, the number of pointers to the given data. You should ignore the link count for directories; hard links can only link files.

A UNIX Symbolic links is somewhat different - you create pointers in the directory to an existing file which really owns the data. Symbolic links can link directories and can cross file system or even LAN boundaries. UPSTREAM backs up the link as a pointer. The owning file or directory itself is only backed up when it is encountered in the file structure. UPSTREAM/UNIX has supported symbolic links since the product's inception.

26.7.2. Backups

There is a checkbox in the **Spec Detail**, **More...** (WinNT...) dialog for Windows and UNIX systems, **Hard Links** (**NTFS Hard Links** in Windows). If checked, UPSTREAM will perform special handling for hard links during the backup. The default is checked for UNIX and not checked for Windows because of the extra overhead.

NOTE: Enabling hard links in Windows will slow the build backup process. It is only recommended if you believe that there are hard links on your NTFS disk. It has no affect on UNIX backup performance (other to improve it).

The file spec parameter is **HARDLINKS** and should be set to the value **Y** to include them on backups or restores.

26.7.3. Inquires and Restores

When you perform a file inquiry in the **us** program (either list and restore or restore and inquiry old), the size field displays the text **<H-LNK>** for hard links with a shortened size for the size of the data the link points to.

Since files may move on disk, UPSTREAM will only create hard links for files selected in a single restore. Thus if you have 10 files which were originally hard linked, and only restored 7 of them back to their original locations, you would have two sets of hard links, the original 3 (which were not restored) and the 7 which were restored.

Thus if you restore a single directory which contains files with hard links to other directories, the hard links will not be restored - there will be multiple copies of the file. You must specify all files linked together within a single restore to have the hard links correctly recovered.

You must check the Hard Links checkbox (or set the file spec parameter HARDLINKS Y) to include hard links in a restore; otherwise they will be skipped.

When you start a restore which includes hard links, all non-hard link files are restored first. If hard links are included in the restore (even if there is only one instance of a hard link) UPSTREAM then automatically redrives the restore process at least one more time. Thus for a single restore request, UPSTREAM will perform at least two actual restores. Again, this process requires no user intervention.

26.7.4. Notes and Warnings

- Backups and restores containing hard links can be marked restartable and can be restarted in any phase.
- Since a hard link is a pointer to a specific location on disk, UPSTREAM stores the data with a file name which is made up using the location on disk. For example, if on a UNIX system you have two hard links: \tmp\file1 and \tmp\file2, there will be a link count of two for each of the files. UPSTREAM will determine the device ID and file ID (the components of the location on disk) and construct a third file, internally named: <LNK:(8 character device ID):(16 character file ID)>. This file is hidden and is not included in any UPSTREAM file inquiries. However they are visible in host inquiries and host and client reports. They should not be directly selected for restore.
- If you have an FDR/UPSTREAM host version before 3.12, CONV=WAIT batch jobs will terminate after the first pass has completed. FDR/UPSTREAM host versions 3.12 or later will wait until the restore has run through all passes and return the correct return code.
- In hard link restores, there may be more than two passes depending on the number of hard links (data not directory entries) to be restored. Each hard link requires one file spec. By default UPSTREAM will use the maximum number of file specs in each pass (up to 65535 minus the number of original specs). You can reduce this number by specifying the environment variable USHARDLINKSET which will increase the number of passes.

26.8. Fixed Fonts

A fixed pitch font is vital for the treelike display in the new restore facility as well as columnar displays in Profile Management, Registered Named and more.

UPSTREAM will choose a reasonable fixed font in Windows and OS/2 that will work well in most circumstances. However, there is a new environment variable which allows you the ability to select the font pitch and name: USMONOFONT.

Note that UPSTREAM can only used installed fonts and they must be non-proportional (moonscape).

Name	Default	Description
USMONOFONT	OEM_FIXED_FONT (Windows) 8.Courier (OS/2)	The fixed pitch font that will be used when UPSTREAM needs a fixed font. The format is: <size>.<name>. You can specify a size without specifying a name.

Depending upon your display adapter driver, you may find that the none of the OS/2 fonts will display an adequate number of lines in the new restore panel. So we have included a font USFONT.FON in the UPSTREAM OS/2 distribution. To install a font in OS/2, use the Font Palette in the OS/2 System Setup icon view. Select Edit font... and press the Add button. Specify the drive/directory where USFONT exists and the file will be copied. Use the environment variable override (above) to use the new font.

See the *Windows NT/2000/2003/XP Considerations* chapter for additional description about fonts and Unicode for Windows NT.

26.9. Customizing UPSTREAM Screens

FDR/UPSTREAM comes with a number of installable language files which will modify the appearance of UPSTREAM's screens and dialogs. This same facility is user customizable - you can modify virtually all of UPSTREAM's displays so that it will display text of your choice.

Non-English language support is provided for Japanese and German and is active for both the UPSTREAM program (us) and the UPSTREAM Configurator (uscfg). You can use this for all Windows, OS/2 and UNIX versions of UPSTREAM.

To install, enter the UPSTREAM Configurator (uscfg), cancel out of the first dialog, pull down the **Action** menu and select **Advanced**.

- **Language File Name:** Enter the name of a supplied or user customized dialog language file. This file allows you to customize most of UPSTREAM's displays for non-English or internal display use. The supplied files are **japanese.lng** (Japanese language) or **german.lng** (German language). We recommend that the file name be fully qualified. If not specified, displays are not customized.

  Virtually all text in UPSTREAM can be translated. This includes:

  - The welcome banner ("Welcome to FDR/UPSTREAM").
  - Menus (menus can not be customized in OS/2). You can add tabs and keyboard accelerators of your choice to menus.
  - Dialog titles.
  - Most controls including static text, frame, push buttons, checkboxes, and radio buttons. You can even add keyboard accelerators to buttons and checkboxes. This includes text dynamically updated by UPSTREAM during execution.

  The few items which can not be translated include list box entries and menus in OS/2.

26.9.1. Creating a Language File

A language file allows you to modify the text displayed in a static text field, a checkbox, radio button, push button, or menu (non-OS/2) to text of your choosing.

A language file is a plain text file. You must use a plain text editor which does not add formatting characters (like the Windows notepad) to create or modify these files.

Any line which does not begin with a double quote (") is considered a comment. Active lines have the format:

```
"<Original text>" "<Replacement text>"
```

For example, to replace the text *Backup Profile* with the text *Profil de sauvegarde* (the French version), the following line will be in your language file:

```
"Backup Profile" "Profil de sauvegarde"
```

To ease development of your own customized language file, a sample example.lng is included with UPSTREAM. We recommend that you use a different name for your file to avoid the loss of this file during an UPSTREAM upgrade.

There are a number of rules for this file:

- An original text string can only occur one time in the language file. Thus, in example.lng, to avoid conflicts, fields are commented out which occur in dialogs but are specified above in the file.
- Case is not sensitive in the original text string. Thus “Backup Profile” and “backup profile” are the same.
- All occurrences of the original text string will be replaced. Watch out for fields being changed in dialogs other than the one you think you are modifying.
- The length of dialog fields may require that you abbreviate your descriptions.
- All characters in the original text string must match for the field to be overridden. However, trailing dots (.) and spaces are not included in the comparison. Thus, the original text string “Backup Profile” will override “Backup Profile...” but will not override “Backup Profile Name”.
- You can enable keyboard “Accelerator Keys” for buttons and checkboxes (usually activated by the user by pressing [ALT] and the accelerator key). Merely prefix the character in the replacement text that you wish to use as the accelerator with an ampersand (’&’).

  For example, replacement text of “&Add” will make the letter ‘A’ an accelerator within all dialogs it occurs. You must not put an accelerator in the original text string (even if one is there already).
- You can use FDR/UPSTREAM’s modified unicodes to insert characters which may not be in the ASCII sequence of the font you are using. Contact Innovation Technical support for help in creating these

Menus are somewhat different as they may have embedded tabs between the menu item and a description of the accelerator. To add a tab to either the original or replacement text, use the digraph ‘\n’. You must match the number of tabs in the original string to have the items match. Thus, to override the “Backup” menu item, you must specify the original text string “Backup\tALT+B”.

As UPSTREAM evolves, there may be changes to the dialogs. However, this method is the most portable of techniques for handling language translation and general UPSTREAM customization.

26.10. USMODIFY

A new program USMODIFY is included with FDR/UPSTREAM to allow command line or batch file tailoring of any overall parameter within a parameter or configuration file or group of files. It is particularly useful for regular changes to passwords for all of your parameter files.

USMODIFY is a bound program: the same executable will work in both DOS and OS/2. The command line syntax is:

```
USMODIFY [/?] DATSPEC=<FileList> [@<Override File>]
              [parm[=[value]]...]CFGSPEC=<FileList>
```

Where:

- **/?** (or /h, -?, -h or no parameters at all) displays help text.
- **DATSPEC= <FileList>:** Designates a list of one or more FDR/UPSTREAM parameter file specifications (*.DAT) which may contain wildcards. The prefix of DATSPEC is the default if you do not specify a prefix. In the FileList, you can specify multiple files, each separated by a semicolon (';').
- **CFGSPEC= <FileList>:** Designates a list of one or more FDR/UPSTREAM configuration file specifications (*.CFG) which may contain wildcards. In the FileList, you can specify multiple files, each separated by a semicolon (';').
- **@<Override File>:** If you have a number of parameters that you wish to change (too many for the command line), then you can enter them in an override file, and specify it alone on the command line with the '@' prefix.
- **parm[=value]:** One or more override parameters. If you specify just the parameter title with no equal sign and no value, you will be prompted for the value. If you specify a parameter title with an equal sign but no value, a blank value will be used. Override parameters specified on the command line take precedence over parameters specified in an override file.

26.10.1. Example 1 - Changing Passwords

For example, if you wished to change the password in all of your parameter files and wish to be prompted for the new password, enter:

```
USMODIFY DATSPEC=*.DAT PASSWORD
```

You will then be prompted for the new password (which will not be displayed) and all of the parameter files will be updated. The list of files updated can be found in the UPSTREAM.LOG file.

26.10.2. Example 2 - Changing several parameters

If you wish to change your User ID, password, and backup profile name in two parameter files (DAY.DAT and WEEK.DAT), you could create an override file (OVERRIDE.MOD) as follows:

```
USERID NEWUSER
BACKUPPROFILE SERVER1
```

Then, from the command line, specify the following:

```
USMODIFY DATSPEC=DAY.DAT;WEEK.DAT @OVERRIDE.MOD PASSWORD
```

You will be prompted for the password and then the two parameter files will be updated with the results placed in UPSTREAM.LOG.

26.10.3. Notes

Some notes on this facility:

- The name of the log file is determined from the configuration file (UPSTREAM.CFG) and cannot be overridden. You should also have the UPSTREAM.MSG file available as it is used for logging.
- File specification level parameters (file name, archive bit, etc.) and frequency definition configuration parameters are likely to cause problems with this facility as there is no way to separate each specification or frequency. Thus, we do not recommend that you use USMODIFY to modify these parameters.

26.11. FDR/UPSTREAM Tuning

There are several ways to fine-tune FDR/UPSTREAM. These issues include:

- Setting the priority of the FDR/UPSTREAM program.
- FDR/UPSTREAM opens up to 3 files in advance in a backup, and reads up to 64K of data at a time. You can specify the number of files in advance and the size of this data buffer.
- FDR/UPSTREAM creates a temporary file during the backup. The maximum file size (including drive and path) impacts the size of the backup file. You can set this value.
- When idle, FDR/UPSTREAM uses a certain amount of CPU time. You can tune this amount of time.
- FDR/UPSTREAM supports a facility known a record packing where a number of logical records are combined into a very large single transmission record. You can vary the transmission record size.

Many of these fine-tuning options are controlled through environment variables. Environment variables can be set in the OS/2 session that you are running in or in the CONFIG.SYS, in which case it will be propagated to all OS/2 sessions. Environment variables are set using the SET <variable>=value.

More information about the environment variables defined in FDR/UPSTREAM can be found on page 27-19.

26.11.1. Program Priority (OS/2 and Windows NT only)

In OS/2 and Windows NT, each process (complete program) is given a priority by the operating system. This priority is used to determine how much of the CPU's processor time is dedicated for each task.

Extensive testing has shown that increasing the program priority level can have a significant performance improvement impact if the PC is not bottlenecked in disk or communications I/O. For example, OS/2 automatically increases the priority of the foreground process (the program with the focus), so you can get some priority improvement by just making FDR/UPSTREAM the active window.

On the other hand, an increased priority for FDR/UPSTREAM means that other tasks have less CPU time to execute producing unacceptable performance in other tasks. The ability to change your priority addresses both issues.

This priority is represented by two separate values: a priority class and a modifier priority level. The priority classes are Idle-time, Regular (which is the default), Time-critical and Fixed-high. The priority level is a modifier from 0-31 (OS/2) or 2-8 (Windows NT, 0 or 1 are taken as 8) which indicates how your process will be dispatched within the given level; the default is 1 for OS/2 and 6 for Windows.

FDR/UPSTREAM allows two separate ways to modify the program priority:

- For this execution of FDR/UPSTREAM. To do this, pull down the Action menu and select Priority. Adjusting your priority does not affect future executions of FDR/UPSTREAM.
- For a given request. You can save the priority settings to a parameter file which will then be used whenever you open a parameter file or specify a file from the host.

Either method displays the priority dialog (see figure 25-).

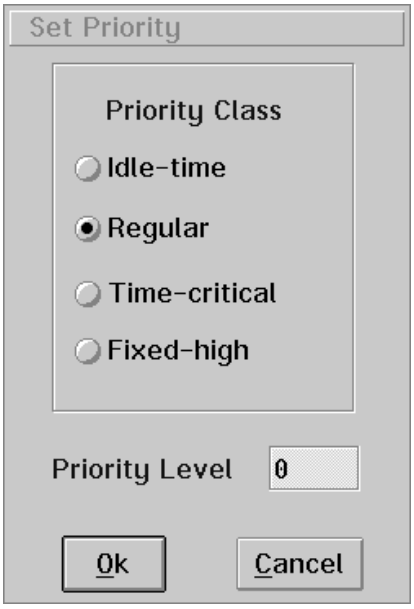


Figure 26-1
Set Program Priority

Warning: Indiscriminate priority modifications can cause PCs to hang. Perform testing during off-hours or on PCs which can be rebooted.

26.11.2. Backup fine tuning

When performing a backup, FDR/UPSTREAM will pre-open a certain number of files before it begins to back them up. In many environments this improves performance. FDR/UPSTREAM will also read data is very large blocks, up to 64K bytes at a time. You can set these values through environment variables:

- **NUMBACKUPTHREADS:** ***(OS/2 only)*** The file pre-opens are performed in a backup thread. Through this environment variable you set the number of files that the separate thread will pre-open The default is 3. Valid range is from 1-50. If you set this value to 1, there will be no file pre-opens.

- **BACKUPBUFFERSIZE:** ***(non DOS only)*** FDR/UPSTREAM takes 32000 and even divides it by the record size to determine the data read size. Thus if you specify a record size of 6000, FDR/UPSTREAM will always read data in 30000 byte pieces (it will still send them to the host in 6000 byte records). The default is 10000. Valid range is the record size up to 32000.

26.11.3. Backup file tuning

The FDR/UPSTREAM backup file (UPSTREAM.BKP) can grow extremely large when backing up a server with a large number of files. The size of this file is the product of the maximum possible file size (including drive and path) multiplied by the number of files, with some additional overhead.

If this file is becoming too large for your PC, or the default size is too small for the possible files size on your PC or server, you may need to change this value.

- **MAXFILENAMESIZE:** The maximum number of bytes that a file can be (including drive and path) to be included in the backup. The default is 255 bytes (230 bytes for FDR/UPSTREAM host earlier than v3.1.4). The valid range is 20-255 bytes.

26.11.4. Record Packing

FDR/UPSTREAM Workstation/Server and MVS supports a facility known a record packing where multiple logical records are combined into a single, very large record. Testing has shown that there are significant performance improvements and a reduction in CPU utilization in TCP/IP and to a lesser extent SNA.

You can specify the record packing value on the Backup or Restore More... dialogs as **Packing Size** , or from the host or parameter files as PACKRECSIZE.

However, there are also situations where record packing will reduce performance (particularly for TCP/IP). When optimizing backup performance, you should try disabling record racking (by setting PACKRECSIZE to 0) to see if it improves performance.

Record packing is enabled by default for both backups and restores when using a high enough version of FDR/UPSTREAM on both the host and workstation/server sides (except for DOS where it must be explicitly enabled).

This size can be varied using the parameter PACKRECSIZE. The default record packing size is 32700. We do not recommend using a larger block size due to various system unknowns about memory and record management.

You can somewhat limit record packing by setting the PACKFLUSHAFTERFILE parameter to Y which causes UPSTREAM to send a packed record after each file. This may help somewhat in a high host CPU load environment.

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27 FDR/UPSTREAM Parameters

As for the configurator, UPSTREAM allows you to set parameters in several prioritized ways. Each priority level higher will override the value of a lower value. If two parameters are set the same way, then the newer will overwrite the older. The ways from lowest to highest are:

- Default: Used if a default is known and it is acceptable.
- Parameter File: This is a value obtained from the default parameter file (UPSTREAM.DAT) or a parameter file specified from a higher priority. For example, in UPSTREAM.DAT you will see a line like:

```
DISPLAY Y
```

- Environment: These are values set using the DOS SET=<name> command. You can set these values from the command line or from a batch file. For example, you could add a line to your AUTOEXEC.BAT that would say:

```
SET PARAMETER=C:\UPSTREAM\US1.DAT
```

- Command Line: When you run US.EXE, you add the parameter on the same line, parameters separated by spaces. For example, you could start FDR/UPSTREAM:

```
US PARAMETER=C:\UPSTREAM\US1.CFG
```

- User (dialog): When you enter parameters from a dialog, these values are ALWAYS used.

You set a parameter using a keyword (upper and lower case can be mixed), followed by a separator (a blank or an equal sign) followed by the value. Parameters from the environment and the command line must use an equal sign as the separator.

If you use the dialogs in the UPSTREAM local program or the UPSTREAM Director and you save your parameters to a parameter file, you can print out the results to see how parameters can be specified.

27.1 Non-Repeating Parameters

The following table describes the overall parameters. These parameters do not repeat and are listed before the first SPECNUMBER parameter.

Name	Default	Required	Description
ACCEPTPCREMOTE	Y	No	Y = Accept and process remote requests originating from a PC (not a MVS batch job). N = Reject remote requests from PCs.
ACCEPTREMOTE	N	No	Y = Accept and process remote requests. N = Reject (but look for) remote requests.
ACTION	1	Yes	The function to be performed: 0 = Restore (or workstation receive file transfer) 1 = Backup (or workstation send file transfer) 2 = As of...Restore 3 = Wait for remote initiate 4 = Restart only 5 = Run a job 6 = Kill last restartable backup 7 = Run host report 8 = Restart restores only 9 = Kill restartable restore 10 = Submit a host job 11 = Migration 12 = Inquire Versions 13 = Performance test 14 = Physical disk/FDRSOS restore 15 = Physical disk backup 16 = Delete backup 17 = Register target name 18 = Inquire files 19 = UPSTREAM/SOS Local Backup Disk Report
ACTIVATEONENTRY (DOS only)	Y	No	Y = Activate the session on startup. N = Do not start APPC on US.EXE start.
ASCTOEBC	USATOE.TAB	No	When specified, the user loadable ASCII-to-EBCDIC translation table gets loaded.
ASRBACKUP	0	No	Describes whether ASR recovery files are generated: 0 = Don’t generate ASR recovery files 1 = Generate the ASR files to disk. 2 = Generate the ASR files and create the diskette while performing the backup.
ATTENDED	Y	No	Y = It is assumed that there is a user present to make prompted decisions. N = Unattended mode. It is recommended that you also specify a MESSAGETIMELIMIT as well.

Name	Default	Required	Description
AUTHORITATIVE (Windows 2000/2003/XP)	N	No	Controls how a replicated resource such as a domain controller's Active Directory and SYSVOL or a cluster's database should be handled.
BACKUPPROFILE	NONE	Yes	The profile name used for backups, restores and as of...restores. You can specify up to 8 characters.
BACKUPPROFILE2	NONE	No	No longer used.
BACKUPVERIFY	N	No	Only used for full-merge backups. If Y, UPSTREAM will read, and compress the data, but not send it to the host. A checksum of the data will be compared against a checksum on the host. If a mismatch occurs, the file will be transmitted. As it degrades performance, it is only recommended with slow lines when you wish to verify non-file data.
BLANKTRUNC (File Transfer only)	Y	No	(Only used if LINEBLOCK=Y) Y = Trailing blanks at the end of each record are removed. N = Trailing blanks are retained.
CALCDASDSIZE	N	No	N = If you are performing a sequential disk backup the amount of space allocate on MVS for the backup depends on the amount of file data found. Y = If you are performing a sequential disk backup the amount of space allocated on MVS depends on the amount of file and non-file data found.
COMPRESSLEVEL (Backups only)	1	No	Specifies the compression level: 0 = No compression 1 = Fast compression 2 = High compression 1 3 = High compression 2 4 = High compression 3
CONTROLFILE	None	No	If USECONTROLFILE is active, the name of the control file/pipe for controlling UPSTREAM functions from an outside program.
DASDOVERRIDE	100%	No	Allows you to override the amount of space (bytes) requested on a sequential disk backup. 4 forms: +<number>: Add the given number of bytes to the total calculated. -<number>: Subtract the given number of bytes from the total calculated. <number>%: Use the given percentage to calculate the total. <number>: Use the given number to override any calculated value. If specified for a local backup restore, can be used to increase the space allocated for the restore. Can only be specified as a hard number in this mode (+,-,% are disallowed).
DISASTERRECOVERY	N	No	Should be 'N', unless you are restoring a completely dead system (possibly with different hardware).

Name	Default	Required	Description
DISPLAY	Y	No	Y = Backup or restore status information continually updated. N = No status display during the backup or restore.
DUALCOPY	N	No	Not used.
DUPDAYS (Backups only)	30	No	If duplicate checking is enabled, the number of days since the file was modified and has the archive bit on before it can be considered eligible for duplicate handling.
DUPLICATE (Backups only)	N	No	Whether you wish to use duplicate file checking. N = No special duplicate file handling. Y = UPSTREAM on the workstation will send up placeholder records for many files with the archive bit on for both fulls and incrementals (see DUPDAYS).
EBCTOASC	USETOA.TAB	No	When specified, the user loadable EBCDIC-to-ASCII translation table gets loaded.
EXCLUDELISTNAME	None	No	Enter an exclude list file name, formatted as described in the Exclude List section.
FAILJOB	None	No	If specified, this job will be run if the current function fails and UPSTREAM is in unattended or host initiated mode.
FILETRANSFER	N	No	Y = This is a file transfer (the ACTION parameter controls whether it is a send or a receive). N = This is a backup or restore.
GETREMOTEFILES (Backups only)	Y	No	Whether the “Show” checkbox is checked in the backup dialog.
HOLDTAPE	N	No	If ‘Y’, UPSTREAM will hold the tape for 2-3 minutes after a tape backup waiting for another one for the same profile to come in. This is primarily used for DataTools backups.
HOLDUSERDIRS	N	No	If specified as ‘Y’, all user home directories are accessed and held throughout the duration of the backup. Particularly useful for OS/390 Unix full system backups where the auto-mounter is used to mount user’s file systems.
HOSTFILENAME (File Transfer only)	None	No	If specified the name of the host file. If not specified, the FDR/UPSTREAM MVS will generate a name for workstation sends, or will use the latest recorded file transfer for workstation receives.
HOSTRECORD (File Transfer workstation sends only)	Y	No	Y = Transferred files are recorded in the FDR/UPSTREAM MVS database for easy retrieval. N = Transferred files are not recorded in the FDR/UPSTREAM MVS database.
HOSTSORT (Restores only)	N	No	Y = You wish the host sort utility used for restores. N = You do not wish the host sort utility used for restores.

Name	Default	Required	Description
INCRDB	N	No	If set to Y, UPSTREAM will maintain a local database of files backed up in the work path.
INQOPTIONS (Merge Inquiries and Restores)	2	No	(New value) A bit map of options used during an inquiry and restore: 0 = Inquiries and restores only show normal files and the highlighted backup. 1 = Inquires show migrated files as well as normal files. 2 = Inquires and restores use “Highlighted back to full”. This option must be on for “Highlighted back to FDRSOS” (32). 4 = Inquires operate from the currently highlighted backup to the first version “Highlighted back to oldest” 8 = (not used) 16 = Only display migrated files in an inquiry. 32 = Restore “Highlighted back to FDRSOS”. You must also have value 2 on as well “Highlighted back to full”. 64 = Expiration date is displayed for migrated files.
IGNOREPLUGINSFORRESTORE	N	No	If specified as ‘Y’, a file (or logical file) backed up with a PlugIn can be restored to a regular file. This method is turned on only when you do a restore of a PlugIn controlled file from the “Restore and Inquiry (old)” panel.
JOBOPTIONS (Request job)	0	No	A bit map of options used when a job is requested and started: 0 = Start job and immediately terminate UPSTREAM. 1 = Start job and do not terminate UPSTREAM. 2 = Wait for job to be terminated. 4 = Kill the job if it runs longer than the JOBWAITTIMELIMIT number of milliseconds or when UPSTREAM terminates. Also sets value 2. Not supported for ULTra. 8 = No job, terminate the current UPSTREAM or ULTra program. Terminates the parent as well if running in automatic attach manager mode. 16 = (UNIX) Run the job using exec() (Internal use only) 32 = Write the STDOUT and STDERR output from the job to the UPSTREAM log and back to the host (if CONV=WAIT and value 1 is specified above). Implicitly sets value 2 above. Not supported for ULTra.
JOBRETURNCODEMAP (Request job)	0:0 ?:8	No	For CONV=WAIT jobs, a mapping between the workstation return code and the host job return code. You can specify multiple mappings (including workstation return code ranges), the ‘?’ used for all unassigned workstation return codes.
JOBWAITTIMELIMIT (Request job)	0	No	The number of milliseconds that UPSTREAM should wait for the job to complete. Not supported by ULTra.
KEEPALIVE	2	No	For FDRSOS Local Backups, this parameter allows you to tune how often (in seconds) “Keep Alives” are transmitted to the host. Keep Alives are used to tell the host how much data the PC has written and allows the host to read the data from the disk as the PC is writing it.

Name	Default	Required	Description
LANINTERFACE (ULTra)	0	No	The communications protocol used to access the ULTra workstation: 0 = IPX/SPX (TLI) 1 = NetBIOS 2 = TCP/IP
LANWSNAME (ULTra)	NONE	No	(FDR/UPSTREAM ULTra) If you are using the LAN Workstation facility this is the name of the workstation that you are operating on behalf of, or if it is preceded with an '@' sign, it is the profile name which was set to a list of workstations to be used.
LANWSPASSWORD (ULTra)	NONE	No	(FDR/UPSTREAM ULTra) If you are specifying a LANWSNAME and the workstation is password protected, then this is the password to enter. If parameter file stored, it is stored encrypted.
LATESTVERSION (Restores only)	Y	No	Y = You wish to restore the latest backup available for the backup profile (VERSIONDATE ignored). N = You will specify a specific backup with VERSIONDATE.
LINEBLOCK (File Transfer only)	Y	No	Y = Records are separated by CR/LF (LF only for UNIX) for workstation sends; CR/LF (LF for UNIX) is added at the end of each record for workstation receives. N = All records are separated by the record size (workstation sends).
LINETRUNC (File Transfer only)	Y	No	(Only used if LINEBLOCK=Y for workstation sends) Y = Data exceeding the record size is truncated. N = Data exceeding the record size is sent as a separate record.
LISTENFORREMOTE	N (Y for uscmd)	No	Y = Your system will listen for remote requests. N = Your system will not listen for remote requests (should only be 'N' if you will NEVER receive a host or remote PC request or you're running in attended mode).
LOCALBACKUP	0	No	0 = Host storage is used exclusively for backups and restores. 1 = Whether during a backup files should be stored locally as well as the host; during a restore whether files should be taken from local storage whenever possible. 2 = Local backups are stored on shared EMC FDRSOS Local Backup disks.
LOCALBACKUPDIR	None	Yes (for FDRSOS backups)	If local backups are enabled to: - Disk (LOCALBACKUP=1) the name of the directory where the local backup files will be stored. - FDRSOS (LOCALBACKUP=2) the internal UPSTREAM name of the disk where the data will be stored.
LOCALBACKUPMAX (Backups only)	3	No	The maximum number of local backup files (each backup is one file) stored on a workstation.
LOCALBACKUPMAXFILESIZE (Backups only)	10000000	No	The largest file that will be stored locally if local backups are enabled.

Name	Default	Required	Description
LOCALBACKUPMAXSIZE (Backups only)	100000000	No	The largest that a local backup file will grow to.
LOCALPASSWORD	None	No	The password of the remote user who wishes to logon to this system.
LOCALRESTORE (UPSTREAM/SOS Restores)	Y	No	Y =UPSTREAM/SOS restores will flow entirely through the local backup disk, with little network overhead. This entails creating a new “backup” to hold the data which doesn’t currently exist on the disk. N = UPSTREAM/SOS restores will use the data on the local backup disk if it currently is stored there - all other data will flow through the network.
LOCALUSER	None	No	The local user name of the remote user who wishes to logon to this system.
LOGNONFATAL	0	No	0 (or ‘N’) = Nonfatal errors during a backup or restore are not logged or displayed. 1 (or ‘Y’) = Nonfatal errors during a backup or restores are logged and displayed. 2 = Only messages during a backup which result in a skipped file are transmitted to the host.
MAXBACKUPTIME	0	No	The number of minutes before a backup or migration will terminate due to excessive time. 0 indicates no termination for time.
MAXDUPS	10 (1 for DOS)	No	The maximum number of duplicate files that can be simultaneously written in a duplicate file restore. 0 or 1 disables duplicate file restores.
MAXKFILESIZE	0	No	Allows you to exclude files which are larger than the specified size (in 1024 byte multiples). 0 indicates no file size exclusion.
MAXLOGDAYS	0	No	If non-zero, clears out old log file entries after a backup. Specifies the number of days worth of log information to preserve.
MAXRESTORETIME	0	No	The number of minutes before a restore will terminate due to excessive time. 0 indicates no termination for time.
MAXRPTDAYS	0	No	The number of days to keep in the current report file. 0 prevents clearing.
MERGE (Backups only)	0	No	The backup type 0 = No merge used 1 = Full merge 2 = Incremental merge 3 = First-time merge backup
MINIMIZE	N	No	Allows UPSTREAM, when running unattended, to start minimized.

Name	Default	Required	Description
MODIFYFILE	Y (UNIX) N (all others)	No	Y = Incrementals are determined by the last date/time FDR/UPSTREAM was run (stored in the modification file). N = Incrementals are determined by the archive bit.
NOTIFYEVENTS	769	No	If a NOTIFYTARGETS parameter is specified, the conditions in which a notification will occur. This is a bit map, where you add the notification values: 1 : Notify if the action failed 2 : Notify if the action succeeded 4 : Notify for any errors 8 : Notify for any warnings 16 : Notify for any informational messages 256: Attach the log if the action failed and value 1 is specified. 512: Attach the report if the action failed, value 1 is specified and reporting is enabled. 1024: Attach the log if the action succeeded and value 2 is specified. 2048: Attach the report if the action succeeded, value 2 is specified and reporting is enabled.
NOTIFYFAILUREATTACHMENT	None	No	The file name to send if a file should be attached on operation failure. You must also specify a NOTIFYTARGETS file.
NOTIFYSUCCESSATTACHMENT	None	No	The file name to send if a file should be attached on operation success. You must also specify a NOTIFYTARGETS file.
NOTIFYTARGETS	None	No	The name of the notification targets file name if you wish to enable notification.
NOVELLPROFILE	NONE	No	The profile name, set in SETNOV.EXE, referencing the server, user name and drive mappings to be mapped to your Novell file server.
NOVELLRECALL	Y	No	Y = This backup profile could be used to back up a Novell server which uses the FDR/UPSTREAM auto-recall facility. N = This backup profile will never be used to backup a Novell server which uses the FDR/UPSTREAM auto-recall facility.
NTREGRESTORE	0	No	Windows NT registry restore options: 0 = “legacy”. Replace the registry with no additional prompting. 1 = “keep”. Keep existing registry entries, but prompt allowing user interaction if attended. 2 = “replace”. Replace registry entries, but prompt allowing user interaction if attended.
PACKFLUSHAFTERFILE	N	No	Y = Forces a packed record in a backup to be transmitted after each file. N = Records are fully packed.
PACKRECSIZE	32700 (0 for DOS)	No	The maximum number of bytes transmitted or received from the host. Specify 0 to disable record packing.

Name	Default	Required	Description
PARAMETER	upstream.dat	Yes	The name (and optionally the path) of the parameter file to read parameters from.
PASSWORD	NONE	No	Your password. This is usually required if the user ID is required. You can specify up to 32 characters. If FDR/UPSTREAM generates this field in a parameter file, then it is encrypted. In attended mode the password is not read from a parameter file (but can be accepted from the command line or environment).
PERFORMBITMAP	96	No	A bit map of performance tests you wish to run: 1 = CPU test 2 = Screen I/O test. 4 = File I/O (read) test. 8 = Backup, No I/O test 16 = VSAM performance test 32 = Raw communications test, PC send 64 = Raw communications test, MVS send. 128 = Backup - no communications
PERFORMNUMRECORDS	100	No	The number of records sent/received on raw communications performance tests.
PERFORMRECORDSIZE	32700	No	The size of records send/received on raw communications performance tests.
POSTJOB	None	No	If defined, this is the name of a program, batch file or script file which will be run after the unattended UPSTREAM function.
PREJOB	None	No	If defined, this is the name of a program, batch file or script file which will be run before the unattended UPSTREAM function.
PRTYCLASS (OS/2, Windows only)	4	No	The priority class for the requested action: 1 = Idle-time 2 = Regular 3 = Time-critical (VERY DANGEROUS) 4 = Fixed-high
PRTYLEVEL (OS/2, Windows only)	1 (OS/2) 8 (Windows)	No	A number from 0 to 31 (OS/2) or 0 to 8 (Windows, where 0 and 1 are resolved as 8) modifying the priority class.
RECALLCLEANUP	N	No	Y = FDR/UPSTREAM will examine Novell auto-recall stub files to determine if any have expired, and if any have, they will be deleted. N = Auto-recall stub files will not be deleted.
RECORDSIZE	8192	No	The data blocking size. This is a memory/performance tool.
REMOTEADDR (Remote requests only)	None	No	If the remote PC is connected via TCP/IP, this is its IP address.

Name	Default	Required	Description
REMOTECONNECTTYPE (Remote requests only)	0	No	The method use to send the request to the remote PC. 0 = The remote request is via FDR/UPSTREAM MVS and the LUNAME or TCP/IP address/port number are specified. 1 = The remote request is directly PC-to-PC. 2 = The remote request is via FDR/UPSTREAM MVS and a registered name is specified.
REMOTEFLAGS (Remote requests only)	0	No	A bit map indicating how a PC-to-host-to-PC request will be handled. 1 = The request is queued on the remote PC. 2 = There is a single conversation between the host and the remote PC; the PC does not deallocate when the request is received. 4 = The requesting PC will wait until the process has completed on the remote PC. 8 = This is a FDR/ UPSTREAM host command rather than a PC-PC request. If specified you must also specify a REMOTEPARAMETERFILE with the command.
REMOTELOCALPARAMETERS (Remote requests only)	N	No	Y = Use parameters defined on your PC. N = Use a remote parameter file (and you must specify a REMOTEPARAMETERFILE).
REMOTELUNAME (Remote requests only)	NONE	Yes	The LU name (or alias if DCA/Microsoft select PC-to-PC) of the remote system.
REMOTEMAXRETRIES (Remote requests only)	0	No	If REMOTEPCTOPC=N, this is the number of times FDR/UPSTREAM MVS will attempt to connect to the remote PC.
REMOTEMODENAME (Remote requests only)	USTMODE	No	The mode name used to contact the remote system.
REMOTEPARAMETERFILE (Remote requests only)	upstream.dat	Yes (see above)	The parameter file on the remote PC to execute (if REMOTELOCALPARAMETERS=N). If you specified REMOTEFLAGS with a value of 8, then this is the FDR/UPSTREAM host command to execute.
REMOTEPORT (Remote requests only)	1972	No	If the remote PC is connected via TCP/IP, this is its IP port.
REMOTEREQUEST	N	No	Y = You are requesting a function be performed on another PC. N = You are requesting a local function. Unless you are requesting another PC to perform a remote function specify ‘N’.
REMOTETARGETNAME (Remote requests only)	None	No	Fill in a value if you wish to find the remote computer by registered name rather than LU name or IP address.
REMOTETCP (Remote requests only)	N	No	Y = The remote PC is connected via TCP/IP. N = The remote PC is connected via SNA.
REMOTETIMEOUT (Unattended wait for remote)	0	No	The number of minutes that the PC will wait in unattended mode for a remote initiated function. 0 indicates wait until a user aborts the wait.

Name	Default	Required	Description
REMOTETPN (Remote requests only)	UPSTREAM	No	The transaction program name to be used in initiating contact with the remote system.
REPORTNAME	US.RPT	Yes (if reporting)	The name of the file to write reporting information to.
REPORTOPTIONS	0	No	A bit map describing any of the report features you wish to enable: 1 = Files backed up/restored 2 = Files skipped during the backup 4 = Files automatically deleted 8 = Inquire versions 16 = Inquire files 32 = Specified parameters. 64 = Inquire versions summary only. 256 = Files excluded (restores only) 512 = Report in Unicode.
RESTARTLASTFILE	None	No	The file you wish your restore to start after. Allows manual restore restarts. UNC names must be specified with !:\ rather than \\
RESTARTTYPE	0	No	Specifies the action to be performed, at a restart point (usually the next time FDR/UPSTREAM is run), if there is a restartable error during a backup. Restores are automatically restartable: 0 = Never restart. 1 = Restart failed files and incomplete backups 2 = Restart only incomplete backups.
RESTARTVERSIONDATE	None	No	If you specify a restartable action type, the version date of the backup or restore which is being restarted. If the field is left blank, the most recent backup/restore is restarted.
RESTOREARCHIVEBIT	N	No	If ‘Y’, archive bits are set for files that are restored.
RESTORECHECKPOINT	120	No	The number of seconds between automatic checkpoints when performing a restartable restore or a restartable physical disk backup.
RESTOREFILEFAIL (Windows NT only)	0	No	Allows you to specify what to do if a file is locked when you attempt to restore it: 0 = Fail the file 1 = Restore the file to a generated name. 2 = Restore the file to a generated name, and rename the file to its original name after a reboot.
SENDHOSTDETAILS	N	No	N = Only the first line of an error is sent to the host. Y = All message lines of a message are sent except additional description lines from the message file.

Name	Default	Required	Description
SKIP (Restores only)	0	No	For restores using “List and Restore”, a set of options of how to process existing files: 0 = Restore all files regardless of whether there are existing files. 1 = Restore only files where there is no existing file of the same name. 2 = Restore only files where the existing file’s modification date/time and size are not the same. 3 = Restore only files which have been marked for FDR/UPSTREAM NetWare auto-recall. 4 = Restore only files which have 0 length. 5 = Restore only files which are newer than those stored on disk.
SKIPBACKUPSCAN	N	No	If enabled, UPSTREAM will not prescan the disk for files to backup. Only recommended in certain cases due to it’s impact on DASD backups.
SMSTARGETSERVICENAME (Novell SMS)	None	No	If specified, the SMS target service that UPSTREAM will use. To get a complete list, specify an invalid value and UPSTREAM will log all valid names.
SMSTSA	None	No	Allows you to override the TSA name in the Novell Profile. Must be complete: <server>.NetWare File System
SORTBACKUP	N	No	Sorts the backup in the same order as the host uses. May result in slightly reduced FILE_INFO overhead.
SPEC	None	No	Can be used in place of the combination of SPECNUMBER and FILES.
STORAGETYPE (Backups only)	3	No	How the data is stored on the mainframe. 0 = Archive backup. Will be merged to tape when the next archive is performed on the mainframe. 1 = Keyed/duplicate backup. Stored on mainframe disk until rolled off. 2 = Sequential disk. Stored on mainframe flat files. 3 = Sequential tape. Stored directly to mainframe tape.
SWITCHTOTAPEMB	0	No	If non-zero, disk backups will be sent to tape if the calculated size of the backup (after DASDOVERRIDE is applied) is greater than or equal to this value. Specify in megabytes (1,048,576 bytes).
TCPTIMEOUT	0	No	The number of seconds of inactivity before a TCP/IP send or receive times out. 0 disables the timeout. If you specify a non-zero timeout, you should also specify a large (65535) configuration TCPSENDBUFFER and TCPRECVBUFFER.
TIMEOVERRIDE (Win32)	0	No	Overrides the time settings specified in the configuration for a given backup: 0 = Local time 1 = Standard time 2 = Daylight savings time 3 = Greenwich Mean Time

Name	Default	Required	Description
TRACE	N	No	Use only when instructed by FDR/UPSTREAM technical support.
TRANSLATE (File Transfers only)	Y	No	Y = ASCII/EBCDIC translation is performed on all data (assumes text). N = No translation of the data (assumes binary).
ULTRACOMP (ULTra)	4	No	The maximum level of compression supported by ULTra: 0 = No compression 1 = Fast compression 2 = High compression 1 3 = High compression 2 4 = High compression 3
ULTREG (ULTra Backups only)	N	No	Whether the LAN Workstation Name will be registered to the host.
ULTUPD (ULTra Backups only)	N	No	Whether the ULTra workstation can participate in automatic updates.
USECONTROLFILE	N	No	If 'Y' you can control UPSTREAM functions from an outside program via a pipe or file.
USERID	NONE	No	Your security identifier. This may be required by some MVS systems (see your system administrator). You can specify up to 32 characters.
UTF8 (Win NT/2000)	N	No	'Y" = UTF-8 unicode encoding 'N' = UPSTREAM unicode encoding.
VERSIONDATE (Restores only)	NONE	No	For a restore, if you specified LATESTVERSION=N, then you are required to specify a complete version date. This is usually used with an inquire versions command. The version date is exactly 12 numeric characters.
XFERECORDSIZE (File Transfers only)	8192	No	The record blocking size for file transfers. Users will often use 80 for text files as well.
XFERRECSEP (File transfer)	10	No	Specifies the record separator if you have specified LINEBLOCK=Y. Most of the time you want to use the line feed (decimal 10).
XFERRECUSECR (File transfer)	Y (PC) N (UNIX)	No	Indicates whether a preceding carriage return should be stripped or added to a file being file transferred.

Table 1
FDR/UPSTREAM Overall Parameters

27.2 Repeating Parameters

The following table describes the file spec parameters. These parameters repeat for each file spec (SPECNUMBER) defined.

Name	Default	Required	Description
ARCHIVEBIT (Backups only)	Y	No	Y = The archive bit is reset for all files successfully backed up. N = The archive bit is not reset.
AUTHORITATIVERESTORE (Win 2000)	N	No	No longer used.
BACKUPREPARSEFILES (Windows 2000)	1	No	0 = Skip files with Reparse Points 1 = Open files without using Reparse Points 2 = Open files using Reparse Points
CHANGEDIRATTRIBS (UNIX)	Y	No	If set, UPSTREAM will change owner/group/mode for existing directories; otherwise existing directory attributes will be preserved.
DATELIMIT (Backups only)	N	No	Allows inclusion or migration of files based on modification date. If you enable this parameter you must also specify a LATESTDATE. 0 (or N): This feature is disabled. 1 (or Y): Files after the LATESTDATE (and LATESTTIME for UNIX) are included/migrated. 2: Files before the LATESTDATE (and LATESTTIME for UNIX) are included/migrated.
DAYSOLD (Backups only)	180	No	The number of days (less 1) that a file has not been accessed before inclusion in the backup or migration.
DELETED	N	No	Not used at this time.
DELETEPROMPTS (Backups only)	0	No	0 = No prompts; delete the files without waiting (unattended). 1 = Prompt for each file before deleting 2 = Prompt for the files in each directory before deleting.
DESTINATION (Restores only)	NONE	No	This parameter allows you to specify that files be restored to a different file or path name from which they were originally backed up. The wildcard specifications must match the wildcard specifications in the FILES parameter. You can specify up to 128 characters.
DIRDELETE (Backups only)	Y	No	Y = If automatically deleting files, remove directories which ad all the files deleted. N = Leave the directories which were just emptied.

Name	Default	Required	Description
DIRSONLY (Restores only)	N	No	Whether ONLY directories and no files should be restored: Y = Restore only directories (no files) N = Restore files and directories.
DRIVEALIAS (Backups only)	None	No	If specified, the drive letter transmitted to the host in lieu of the one specified in the FILES parameter. Allows you to move drive mappings without affecting merge backups. Specify a single letter (no trailing colon).
FAILIFNOFILES	N	No	If 'Y', and UPSTREAM finds no files for this file spec, the backup will fail.
FAILRESTOREONERROR	N	No	'Y': The entire restore will be failed if there is a file open or write error to any file in this spec. 'N': File errors are logged and the restore continues.
FILEDATE	NONE	No	The last modified date of a specific file to be restored. For internal use only.
FILEDELETE (Backups only)	N	No	Y = Delete the files which were successfully backed up. N = Do not delete the files which were successfully backed up.
FILES	NONE	Yes	The file specification to be backed up or restored or the name of the job to run. This can include wildcards. (If physical disk/FDRSOS backup/restore) For restores of physical disk backups, specify: <:\location*.* where location is the internal FDR/UPSTREAM physical disk form. For restores of FDRSOS backups, specify />_FDRSOS_BACKUP if the source was a UNIX disk or >:*.* if the source was a PC disk.
FILESOPENFORUPDAT	N (AIX) Y (others)	No	Y = The maximum number of files will be backed up: Win32 and OS/2: backups will NOT use the DENY_WRITE file open attribute. AIX: files opened for update by other applications will be included. Not supported for other UNIX systems. SMS backups: files will be opened with the NO_LOCK_NO_PROTECTION attribute. N = Standard file opens will be performed.
HARDLINKS	Y (UNIX) N (Win32)	No	Enables/disables hard links support for backups or restores.
HIDDENFILES (Backups only)	Y	No	Whether hidden and system files should be backed up as well as normal files.
INCREMENTAL (Non-merge backups only)	N	No	Y = Only those files with the archive bit set (files which have changed) will be backed up. N = All files specified will be backed up.
INSTALLWIN2KAGENT	2	No	0 = Do not automatically install the USW2KAgt service. 1 = Automatically install the USW2KAgt service if needed. 2 = Automatically updates the USW2KAgt service if it is not installed or if it has a back-leveled version number.

Name	Default	Required	Description
LASTACCESS (Backups only)	N	No	Y = Only include files which have not been accessed for the number of days (or more) specified in the DAYSOLD parameter. N = Don't restrict by last access date.
LATESTDATE (Backups only)	NONE	No	This parameter is only used if you specify DATELIMIT=Y. This field must be 8 characters and specify the date in the format MM-DD-YY, or it can be a +<number> or -<number> which indicates an offset in days from the current date.
LATESTTIME (UNIX Backups only)	NONE	No	The time, within the LATESTDATE to back up the files. In HH:MM:SS form.
MIGRATED (Obsolete - Use MIGRBITS instead))	N	No	Y = Include migrated files in the restore. N = Include only specified files in the restore.
MIGRBITS (Restores only)	0	No	How migrated files should be treated in a restore: 1 = Include migrated files in the restore. 2 = Include only migrated files (no regular files).
MOUNTPOINTS (Windows 2000)	N	No	'Y' if you wish to include a mount point and all of its files in a backup. 'N' to exclude the mount point and all files from the backup.
NDS	N	No	Y = This is a NetWare Directory Services backup specification. N = This is a non-NDS spec.
NFSBELOW (UNIX Backups)	N	No	Y = Include NFS file systems in your backup. N = Do not include NFS file systems in your backup.
NODIRFORINCREMENTAL	N	No	If specified as 'Y', UPSTREAM will not send directory entries to the host for incremental backups. This may cause important security information not to be backed up until the full, but will result in significantly smaller incremental backups.
NONFILEDATABITMAP	64511	No	An integer which defines the types of non-file data FDR/UPSTREAM will attempt to backup or restore. The separate values are coded as powers of 2 and are then added to reach the total value. The default is all options on except 1024. 1 = OS/2 or NT extended attributes (files) 2 = OS/2 or NT extended attributes (dirs) 4 = Novell directory info 8 = Novell directory restrictions 16 = Novell directory trustees 32 = Novell file info 64 = *Novell file trustees 256 = Reset last access date 512 = Novell set archive date 16384 = HPFS or NTFS ACLs 32768 = Windows NT registry files.

Name	Default	Required	Description
NOVELLMIGRATE (Migration specs only)	N	No	Y = Leave a Novell migration stub instead of deleting the file after the file has been successfully backed up. N = Delete the file after it has been successfully backed up.
NOVELLMIGRATEADDEXT (Migration specs only)	N	No	(Novell auto-recall) If you have NOVELLMIGRATE enabled and specify 'Y', this option adds the extension ".UPSTREAM_MIGRATED" to all migrated stub files to keep Windows Explorer from recalling files in directory listings.
NTFSADDPERMISSION	N	No	If enabled, and an UPSTREAM directory or file access fails for security on a NTFS volume, the user that UPSTREAM is running as will be added to the ACLs for that directory or file.
PLUGIN	None	No	Allows you to specify the name of a DLL or shared library which can be used to extend UPSTREAM's functionality. For Windows, plugins must be in the \plugin directory directly beneath the UPSTREAM directory and you specify the name of the plugin file (like notesr5.dll). For UNIX or Novell, you specify the name of the plugin without any file prefix or suffix (like notesr5).
PLUGINPARAMETERS	None	No	Parameters specific to the PlugIn. See the documentation for the PlugIn for more details.
RECALLOFFLINEFILES (Windows 2000)	N	No	Only used if BACKUPREPARSEFILES is 2. Y = Recall offline files. N = Backup offline files but do not recover them to disk.
RESTOREMOUNTPOINTS (Windows 2000)	0	No	Whether or how Windows 2000 mount points are restored: 0 = Do not restore 1 = Verify before restoring 2 = Recreate if necessary 3 = Restore without verification
RETAIN (Migration specs only)	90	No	In a migration spec, the number of days that the file should be merged forward onto new full backups.
ROOTENTRY	Y	No	'Y' = A fake file: <Volume Information> will be created for Windows NT and NLM backups containing non-file data for the volume itself. 'N' = This file is not created.
SINGLEFS (UNIX Backups)	N	No	Y = Backup only the files in the file system specified in the file spec. N = Backup all files in the file spec.
SKIPOLD (Restores only)	N	No	Y = Only those files which are newer on the mainframe will be restored. N = All files will be restored.
SOSDISK	None	Yes	The source for backups and the destination for physical disk/FDRSOS restores, using the internal FDR/UPSTREAM physical disk format.

Name	Default	Required	Description
SOSTIMESTAMP	N	No	Y = Create a FDRSOS Timestamp file during the backup which is used at restore time to determine if a FDRSOS restore has been done if the Highlighted Back to FDRSOS restore option is selected. N = Do not create a FDRSOS Timestamp file.
SOSTIMESTAMPPATH	None	No	If SOSTIMESTAMP=Y, if specified, this is the path where the FDRSOS timestamp file is written (for backups) or read from (for restores). If not specified the file is written/read at the specified backup directory.
SPECNUMBER	1	Yes	The header to this file set. Each file set begins with a SPECNUMBER definition with an ascending number starting at 1.
SPECTYPE	0	No	0 = File specification is files to be included in the backup or restore. 1 = File specification is files to be excluded from the backup or restore. 2 = File specification is files to be migrated during the backup.
SUBDIRECTORIES	Y	No	Y = All subdirectories under the specified one will be checked for files which match the file specification. N = Only those files in the specified or default directory which match the file specification will be transferred.
UNCMACHINEALIAS (non-UNIX)	None	No	If specified with a UNC file spec, UPSTREAM will substitute the specified name for the real machine name in the spec sent to the host. This value must be the same size or smaller than the original machine name. This is particularly useful in Novell cluster environments - use the cluster name as the UNCMACHINEALIAS so that you can avoid first-time fulls if the cluster fails over.
USEGID	N	No	If specified as ‘Y’, UPSTREAM will restore files and directories by GID number rather than name.
USEUID	N	No	If specified as ‘Y’, UPSTREAM will restore files and directories by UID number rather than name.
WRITESPARSE	0	No	The boundary number of bytes that a sparse file will be written. Typically this is 8192.

Table 2
FDR/UPSTREAM File Spec Parameters

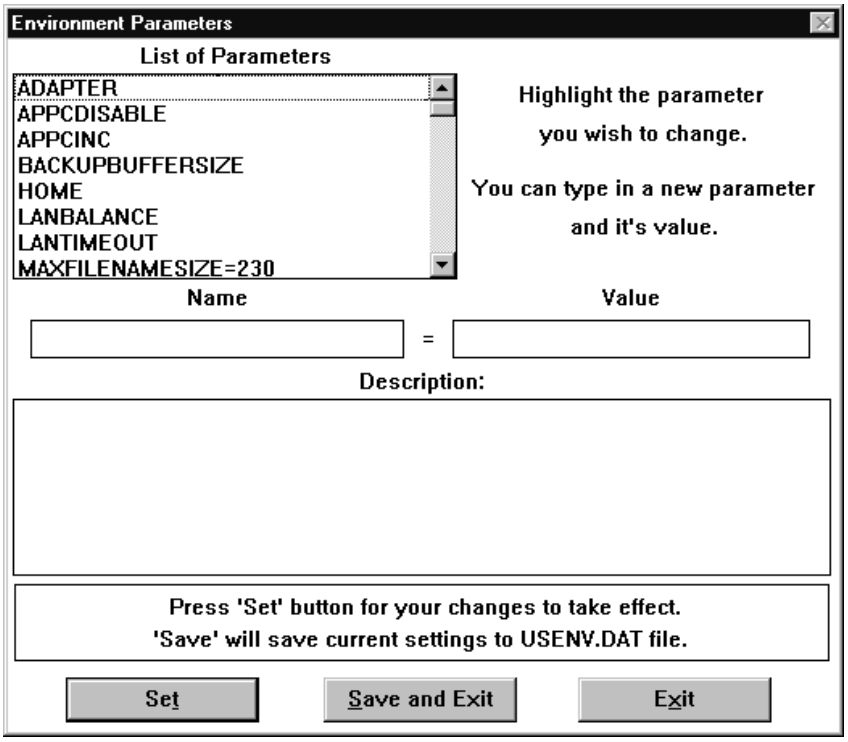
27.3 Environment Variables

FDR/UPSTREAM can be controlled in a variety of ways through environment variables. Environment variables are values which are set using the SET <variable>=<value> command from the command line.

You can also specify these values interactively within FDR/UPSTREAM, from a FDR/UPSTREAM parameter file, from the host, or from a new environment file (USENV.DAT) as well as the environment.

To specify these values interactively or to save these values to a configuration or parameter file, pull down the Action menu and select **Set Environment** from within FDR/UPSTREAM. You can also use the [ALT]N accelerator. This will display the environment parameters dialog.

NOTE: Several environment variables are tested before USENV.DAT file is read or cannot be changed from host jobs. If you have questions about a particular environment variable, contact FDR/UPSTREAM technical support.



- **List of Parameters:** When you select a given environment parameter, the Name field is changed to display the selected name, the value has it's current value (blank indicates that it's not currently set) and the description contains a description of the environment parameter. Note that parameters do not have to be in this list to be active, this list only contains those values with descriptions in the FDR/UPSTREAM help file (us.hlp).

- **Name:** The environment variable title.

- **Value:** This is the environment variable's value. If this value is blank, it reverts to its default.
- **Description:** Describes the environment variable. This list box is scrollable both horizontally and vertically (if necessary).
- **Set:** Press this button to use the specify name/value pair. When set, the value may be active immediately or may require a shutdown of FDR/UPSTREAM to become active, depending upon the variable. If the value needs to be retained between executions of FDR/UPSTREAM you should save it to a file.
- **Save and Exit:** Press this button to optionally save these settings. We recommend that you always use the default file name USENV.DAT.
- **Exit:** Press this button to leave the dialog without saving your settings to a file. Note that setting changes may already be in affect for this execution of UPSTREAM.

Environment variable settings most often are not in affect until UPSTREAM is restarted. Note that changes must be saved in parameter or configuration files to be placed in affect.

If you use USENV.DAT, it must be in the UPSTREAM directory as it is loaded immediately on UPSTREAM start (before configuration or parameter files).

Many of these parameters can be inserted into host jobs as well as defined locally and will now be recognized. At this time they must be manually inserted into the job stream but they are not positional and can be inserted anywhere. If they are inserted in host jobs, you should specify the USTBATCH parameter VERIFY=NO (above the workstation/server parameters) to keep USTBATCH from verifying these values against standard UPSTREAM parameters.

Many of these parameters must be actually defined in the environment. If you are unsure, contact UPSTREAM technical support.

Many of these values are listed in other sections. This table is given as a convenience to allow a single point of reference for these values.

Name	Default	Description
ADAPTER (ULTra NetBIOS)	0	The NetBIOS adapter number to use. 0 is the primary adapter; 1 is the secondary adapter.
BACKUPBUFFERSIZE	32768	(OS/2, Windows, Windows NT and UNIX) The number of bytes requested in each file block read and write. Since BACKUPBUFFERSIZE is used for file I/O, the RECORDSIZE parameter is thus only used for blocking to the host, not in reading/writing data off the disk. Very large numbers may significantly degrade performance on Novell LANs.
HOME (UNIX only)	None	The default UPSTREAM work path.
LANBALANCE	0 (US) 1 (ULTra)	(ULTra) How the send/receive buffers are allocated by default: 0 = Mostly receive 1 = Mostly send 2 = Evenly

Name	Default	Description
LANBUFFER	4096 (OS/2 or Windows) 2048 (DOS)	(ULTra) The buffer size used for file I/O in LAN communications.
LANTIMEOUT	0	(ULTra) The receive/send timeout (in seconds) for both NetBIOS and IPX/SPX as well as both the UPSTREAM PC and the workstation. 0 indicates no timeout.
MAXFILENAMESIZE	230 (MVS <v3.1.3) 255 (MVS >=3.1.4)	The maximum number of bytes that can be accepted in a file name. Range is 20...255. Smaller values reduce the backup file size, but may cause long names to be skipped.
NOMVSWILDCARDS	disabled	Use for successful inquiries and restores when using FDR/UPSTREAM PC v2.3.3 or later and FDR/UPSTREAM MVS v2.3.1 or earlier.
NOSAP	disabled	(ULTra) The default is to use the NetWare Service Advertising Protocol, where each workstation registers itself once a minute with every file server on the internetwork. You can disable this feature to reduce the amount of overhead on the internetwork by specifying a value for NOSAP. However, you will lose the ability to cross bridges and routers.
NUMBACKUPTHREADS	3	(OS/2 and Windows NT) The maximum number of file open threads that will be started and running. Specify 1 to disable the multithreaded facility. Max value is 50.
NUMECBS	10	The number of event control blocks used in the data transfer. A larger number increases LAN performance at the expense of memory. Do not set this value lower than 5 or greater than 254.
RMTWAIT	disabled	(OS/2) If this variable exists, multithreading will be disabled. Used for checking for remote allocates.
SERVERTYPE	29631	(ULTra) When using the Service Advertising Protocol, this is the TYPE advertised by the workstation. It is specified in inverted byte format.
SOCKET	9026	(ULTra) The IPX socket used for communications. If you have a socket conflict, specify a different value. This value is in inverted byte order.
TRCBUF	1024	The number of bytes used for trace buffering (trace buffering is disabled when TRCFLUSH is enabled).
TRCCONSOLE (Win32 only)	disabled	If enabled, tracing is written to a separate window.
TRCDIR	Work path	The directory where UPSTREAM trace files will be created.
TRCFAST	disabled	If this variable exists, buffer data will not be traced.
TRCFLUSH	disabled	If this variable exists, the trace information is flushed to disk after each message. Slows the trace significantly but should be used if there is a chance that FDR/UPSTREAM will crash.

Name	Default	Description
TRCMEM	disabled	If this variable exists, memory tracing will begin immediately upon FDR/UPSTREAM start. This tracing is extensive. The trace file(s) may be placed in different directories than if the trace is activated later.
TRCNOMESSAGEBOX	disabled	If set to any value, UPSTREAM will not display message boxes related to tracing.
TRCNOPIPE (OS/2 and Win32 only)	disabled	If enabled, tracing is written in the same way as for other version of UPSTREAM.
TRCNOTCP (NLM)	(disabled)	If enabled, TCP tracing will not be used.
TRCPRN	disabled	If this variable exists, trace information is written to LPT1:.
TRCSCR	disabled	(DOS) If this variable exists trace information is written to the screen rather than the trace files.
TRCSIZE	100000	The number of bytes that will be written to a trace file before it wraps to the alternate file.
TRCTCP (NLM and Win32 only)	Enabled (NLM) Disabled (Win32)	If enabled, tracing is accomplished via TCP/IP to a cooperating program (TRCTCP.EXE).
TRCTYPE	0xffff (all tracing)	The tracing level. Allows you to selectively enable tracing. Specified as a bit map, this value can be specified in decimal or hex (if hex, there must be a leading 0x). Values are: 0x0001 : Novell 0x0004 : ULTra 0x0008 : File 0x0010 : Host communications 0x0020 : Backup/restore/file transfer/submit job 0x0040 : Memory allocations 0x0080 : Block tracing (regardless of package) 0x0100 : Error logging 0x0200 : Parameter management 0x0400 : Win 32s
ULTRACOMPR (ULTra workstations only)	4	The maximum compression level to perform on the workstation. 0 = No compression 1 = Fast compression 2 = High compression 1 3 = High compression 2 4 = High compression 3
UPSTREAMPATH (UNIX only)	none	The path used to find the UPSTREAM resource and help files.
USADOBJUSNINCREASE (Windows 2000/2003/XP)	100000	Used for controlling the Active Directory object USN increase for authoritative restores that are performed by using the new full-system file spec (\\.).
USASYNCHOSTCOMM	Not defined	If defined, FDR/UPSTREAM will multitask its communications with the host.

Name	Default	Description
USBACKFILEDAYSOLD (Windows and UNIX)	7	Specifies the retention period in days for restartable backup and restore files.
USBACKUPFILEBLOCK	100	The number of backup file records that will be buffered.
USBACKUPOPENNOSHARE	disabled	If enabled, files backed up are opened denying other users access to them.
USBANIGNOREMAPERROR	Not defined	If defined, drive mapping errors will be logged but will not stop the backup.
USBLOCKWRITERESTORES	(Not defined)	(Windows NT) If defined, UPSTREAM will block writes for restores into BACKUPBUFFERSIZE (if defined in the environment) or 16K blocks.
USBUFFEREDFILEIO	(Not defined)	(Windows NT) If defined, UPSTREAM will use buffered I/O for file access. The default is non-buffered I/O which is slightly faster.
USCANCELTIMELIMIT	(Not defined)	For UPSTREAM error boxes where the Ok button changes to Cancel (for file deletions for example), the number of seconds to wait before timing out and automatically performing the process. This overrides the Messages Time Out value specified in the configurator.
USCLOSEREMOTECHECKINTERVAL	250	How often UPSTREAM checks for remote initiates (in milliseconds) during shutdown.
USCOMPRESSSTACK	15000	The size of the internal high decompression stack. Increase it if you get errors in high decompression; decrease to save memory.
USDATAGRAMTO	5	(SetNov.EXE) The number of seconds that SetNov will wait to detect NetBIOS connected active ULTra workstations. Increase this value if you do not see all your workstations when entering the ULTra profile facility.
USDELETETIME	10	The number of seconds between when the backup completes and file deletes begin that you can abort the entire deletion process.
USDONTLOGEXCLUDEDFILES	Not defined	UPSTREAM will log the names of files that are excluded from a restore. Setting this environment variable to any value will cause UPSTREAM to not log these messages.
USDONTRESTOREDIRABOVE	disabled	(V2.5.6c) If enabled, UPSTREAM will not restore directories above when they are created.
USDONTSENDPLACEHODERFORDIR (Win32)	disabled	If set to any value, forces UPSTREAM to send full directory entry information for all the directories instead of just placeholders for unmodified directories during merge backup, which was the default behavior up to version 3.1.3.
USDONTTESTLOSTSERVER	(Not defined)	(Windows NT)(v3.0.1b) If defined, UPSTREAM will not attempt to detect when a server connection has been lost.

Name	Default	Description
USFILEBACKUPSEMANTICS	(Not defined)	(Windows NT) If defined, UPSTREAM will use the BackupRead function instead of ReadFile to read normal file data.
USFILECHARSET	0	(Windows NT) If defined, specifies the Windows NT character set number for the USFILEFONT specified font. Values are: 0: ANSI_CHARSET 1 : DEFAULT_CHARSET 2 : SYMBOL_CHARSET 77 : MAC_CHARSET 128 : SHIFTJIS_CHARSET 129 : HANGEUL_CHARSET 130 : JOHAB_CHARSET 134 : GB2312_CHARSET 136 : CHINESEBIG5_CHARSET 161 : GREEK_CHARSET 162 : TURKISH_CHARSET 177 : HEBREW_CHARSET 178 : ARABIC_CHARSET 186 : BALTIC_CHARSET 204 : RUSSIAN_CHARSET 222 : THAI_CHARSET 238 : EASTEUROPE_CHARSET 255 : OEM_CHARSET
USFILEFLUSH (Win32)	Not defined	If defined, UPSTREAM will flush all writes to disk at file close. Only recommended on Windows machines when writing to a NetWare drive as it degrades performance when not needed.
USFILEFONT	(Not defined)	(Windows NT) The file specification font to use. This can be a monospace or proportional font. Format: <size>.<Font name> For example, 12.Terminal The default is the System font.
USFILEMAPPING (Win32 only)	disabled	If enabled, file mapping is used to improve file access performance. See the USNOFILEMAP environment variables for modifying the behavior of file mapping.
USFILENOASYNC (Win32 only)	disabled	(V2.5.6c) If enabled, UPSTREAM will not use asynchronous I/O to improve backup performance.
USFILEOPENRETRY	1	Specifies the maximum number of times that FDR/UPSTREAM will attempt to open a file if the file open fails. Specify if you believe that file opens may succeed if retried. Retries are separated by 1 second intervals. The default is 0 (no retries). This parameter must come from the environment (can not come from the environment file)
USFILESERVERERRORRETRY	30	The number of seconds that UPSTREAM will wait for the server to reconnect before determining that the backup/restore must be fatally terminated.
USFREENOTES (Notes - Linux only)	None	If set to any value, UPSTREAM will free the Notes library when it has completed running with the PlugIn.
USHARDLINKSET	65535	The maximum number of hard link files that can be restored in a secondary hard link restore pass.

Name	Default	Description
USLAPS (OS/2 NetBIOS ULTra)	disabled	If specified, force the use of the LAPS interface rather than the LAN Server interface.
USLISTINCR	250 (25 for DOS)	The number of additional lines before/after the line which caused a List and Restore or Restore file list to be refreshed.
USLISTTHRESH	10	The number of lines between the highlighted item and the top or bottom of a List and Restore or Restore file list when the list is refreshed with previous or subsequent lines.
USLISTWINDOW	500 (50 for DOS)	The maximum number of lines that will be displayed in a List and Restore or Restore file list. Note that there is a bug in OS/2 v2.1 where 1000 or more entries in any list box will make OS/2 unstable.
USLOGASYNCRETRIES	(Not defined)	A performance measurement tool. If defined, UPSTREAM will log the number of retries for each file - showing the amount of potential overlap.
USMAPFILEREGIONSIZEMB (Windows only)	8	The number of megabytes FDR/UPSTREAM will use for a file mapping buffer when it uses file mapping to improve backup performance.
USMAXBACKUPSIZE	(Not defined)	Restricts the maximum size of a backup in bytes.
USMAXCPU	(Not defined)	(OS/390 UNIX) Sets the maximum CPU time.
USMAXFILEHANDLES (OS/2 only)	50	The maximum number of simultaneously open files. This value may need to be increased if you specify a large NUMBACKUPTHREADS.
USMEMORYMESSAGEDISABLE	(Not defined)	If defined, UPSTREAM will take as much as 1MB less memory at the expense of slightly slower message logging.
USMEMSUBALLOCBLOCKSIZE (OS/2 32-bit only)	16384	The size that UPSTREAM uses for internal memory suballocation.
USMEMSUBALLOCLOWTHRESHOLD (OS/2 32-bit only)	24	The smallest memory block that UPSTREAM 32-bit memory allocation will allow.
USMEMSUBALLOCHIGHTHRESHOLD (OS/2 32-bit only)	2040	The largest memory block that UPSTREAM 32-bit memory allocation will internally manage.

Name	Default	Description
USMONOCHARSET	255	(Windows NT) If defined, specifies the Windows NT character set number for the USMONOFONT specified font. Values are: 0: ANSI_CHARSET 1 : DEFAULT_CHARSET 2 : SYMBOL_CHARSET 77 : MAC_CHARSET 128 : SHIFTJIS_CHARSET 129 : HANGEUL_CHARSET 130 : JOHAB_CHARSET 134 : GB2312_CHARSET 136 : CHINESEBIT5_CHARSET 161 : GREEK_CHARSET 162 : TURKISH_CHARSET 177 : HEBREW_CHARSET 178 : ARABIC_CHARSET 186 : BALTIC_CHARSET 204 : RUSSIAN_CHARSET 222 : THAI_CHARSET 238 : EASTEUROPE_CHARSET 255: OEM_CHARSET)
USMONOFONT (OS/2 and Windows only)	System mono-space font	The mono space font to use. Format: <size>.<Font name> Windows uses 12.Terminal
USMSGQDEPTH	8	(Windows) The application message queue depth. The default is 8; the range is 8..255.
USNO32 (Windows and Windows NT only)	None	If specified, disables all 32-bit file access. It is recommended that if you wish to disable Win 32s that you use USNO32FILE.
USNO32FILE (Windows and Windows NT only)	None	If specified, disables 32-bit file access.
USNOACL	disabled	(OS/2) If specified, disables the loading of OS/2 ACL access.
USNODFSCHECK	Not defined	If defined, UPSTREAM will not performed DFS checks (used to determine if registry checks should be skipped for DFS shares).
USNODIRDELETE	Not defined	If defined, directories will not be removed during file deletions or migrations.
USNODLLCLEANUP	disabled	(Windows) Use when using a Windows APPC which does not properly handle its DLL being freed.
USNOFILEMAPLOCKEDFILES (Windows only)	disabled	If enabled and USFILEMAPPING is defined, UPSTREAM will honor record locks during file reads.
USNOFILEMAPNOVELLFILES (Win32 only)	disabled	If enabled and USFILEMAPPING is defined, UPSTREAM will not use file mapping on Novell drives.
USNOFILEMAPWINDOWS95FILES (Win32 only)	disabled	If enabled and USFILEMAPPING is defined, UPSTREAM will not use file mapping on Windows 95 machines.
USNOFREENOTES (Notes - non-Linux)	None	If set to any value, UPSTREAM will not free the Notes library when it has completed running with the PlugIn.

Name	Default	Description
USNOIPXSPX (ULTra only)	disabled	If specified, then the IPX/SPX interface will not be used for ULTra servers/requestors.
USNOLOCALUNCREFERENCE	disabled	If enabled (set to any value), prevents UPSTREAM from opening a file with its real file name (i.e. c:\some.file) when it was referenced by a UNC specification (i.e. \\server\share\some.file).
USNONETBIOS (ULTra only)	disabled	If specified, then the NetBIOS interface will not be used for ULTra servers/requestors.
USNONEWNWDLLS	disabled	(Novell OS/2 and Windows) Forces UPSTREAM to load only the old NetWare DLLs (NWCALLS, NWLOCALE, NWNET).
USNONTCOMPRESS (Windows)	None	If set to 'Y', UPSTREAM will not backup NTFS file compression information.
USNONOV	disabled	If specified, disables the loading of Novell drivers.
USNONOVERR	(Not defined)	If defined, UPSTREAM will not attempt to write or get error information for Novell errors. This may improve performance if you have a number of Novell errors you wish to suppress.
USNOOLDNWDLLS	disabled	(Novell OS/2 and Windows) Forces UPSTREAM to load only the new NetWare DLLs (CALoooss, LOCoooss, NEToooss, and CLXoooss where ooo is OS2 or WIN and ss is either 16 or 32).
USNOOPENDIR2 (OS/390 UNIX)	N	If set to Y, disables the use of the opendir2/readdir2 APIs which gets around bugs in xFS.
USNORECVONEND	disabled	If enabled, UPSTREAM will not attempt to receive at the end of a task after all data has been received. Works around an Interlink TCP/IP bug.
USNOREGADDSECURITY	disabled	If enabled (set to any value), UPSTREAM will not automatically attempt to authorize the Administrators group of SYSTEM user (depending on how you are logged on) for access to the hive and retry the attempt; UPSTREAM will skip the hive.
USNOREUSEADDR	(Not defined)	(Non Windows) If defined, UPSTREAM will not enable the SO_REUSEADDR socket option. This may potentially lock out inbound sockets after UPSTREAM terminates.
USNORMT	disabled	Disables check for remote initiates.
USNOSETTREE	(Not defined)	(Novell) Keeps UPSTREAM from obtaining and setting the NDS tree on login.
USNOSIGNAL (UNIX)	None	If set to any value, UPSTREAM will not install its signal handler.
USNOTATTMGR	Not defined	If defined, the listening UPSTREAM will process all inbound requests without starting a new process.

Name	Default	Description
USNOTCP	(Not defined)	(UPSTREAM) Disables TCP/IP for all functions (including the remote java interface). (ULTra) If specified, then the TCP/IP interface will not be used for ULTra servers/requestors.
USNOTCPBLOCKINGHOOK	(Not defined)	(Windows)(v3.0.1b) If enabled, UPSTREAM will not install a TCP/IP blocking hook and will thus become much less responsive when blocked on a send or receive call.
USNOTESALLOWLOGRESTORE (Notes)	None	If set, UPSTREAM will allow an archived transaction log to be restored manually. You may want to set this if there are errors doing the restore during the automatic recall.
USNOTESRECOVERYFLAGS	Not defined (determined by UPSTREAM)	Allows you to set recovery flags for applying Lotus Notes transaction logs to restored databases. A bit map with values: 1 : Wait 2 : ZAP DBIID 4 : Refresh backup 8 : Recover at point in time 16: ZAP replica ID 32: ZAP DBIID if necessary
USNOTESINI (NotesR5)	Not defined	Points to the fully qualified file name where the notes.ini file can be found.
USNOUIDGIDERRORS	Not defined	(UNIX only) If set to any value, 8000 and 8001 errors will not be displayed for missing UID and GID names.
USNOUNICODE	(Not defined)	(Windows NT) If specified, UPSTREAM will not use unicode names internally. This may cause files with non-ASCII characters to be skipped.
USNOUNICODECODEPAGE (Windows and UNIX)	Not defined	If specified, UPSTREAM will not use a system code page for translation, but will use a simple one to two byte translation technique. Use this method if UPSTREAM can't properly manipulate files with either the ANSI or OEM code pages (defined using the USUNICODEPAGE environment variable).
USNOUNICODETRANSLATION	(Not defined)	(Windows NT) If specified, UPSTREAM will not mangle file names which contain non-ASCII characters.
USNOVFORCECOMPRESS (Novell only)	disabled	When set to any value, UPSTREAM will set the COMPRESS_IMMEDIATE attribute (forcing the file to be compressed) if the file is already compressed. This will assure that after a backup or a restore no additional disk space will be required.
USNOVREPAIRSTUBS	(Not defined)	(Novell auto-recall) If a stub file may have been damaged (for example, by accessing the files without having the recaller loaded), enabling this environment variable will have UPSTREAM fix the damaged stubs automatically.
USNOVWAITTOSET	0	(Novell) Specify a number of seconds UPSTREAM will delay before resetting file date information to get around a NetWare v4 bug where last access dates can’t be reset for compressed files.

Name	Default	Description
USNOWINSOCK (NLM only)	Not defined	If defined, UPSTREAM will only use BSD sockets for TCP/IP. This will also disable use of the attach manager facility.
USNOWINTCPBLOCKINGHOOK	(Not defined)	(Windows) If defined, UPSTREAM will disable the TCP/IP blocking hook which allows it to respond to the operating system while waiting for TCP/IP operations.
USNTFSADDPERMISSION	(Not defined)	(Windows NT) Required to be set to 'Y' to activate the UPSTREAM parameter NTFSADDPERMISSION.
USOLDDESCFLAG	disabled	If specified causes FDR/UPSTREAM to send a 1 byte flag in the backup description rather than a 4 byte flag. This is only necessary if the host is reporting backup description flag length errors.
USPIPEOPENRETRY (Windows only)	1	Specifies the maximum number of times that FDR/UPSTREAM will attempt to open a pipe if the pipe open fails. Specify if you believe that pipe opens may succeed if retried. Retries are separated by 1 second intervals. The default is 0 (no retries). This parameter must come from the environment (can not come from the environment file)
USPGM	US.EXE	(DOS only) Name and path of the FDR/UPSTREAM child program to be run by the TCP/IP parent program.
USQUEUETIMELIMIT	120	The number of seconds that a CONV=WAIT or CONV=KEEP remote request be queued for before it times out. 0 indicates that the request should be rejected if UPSTREAM is busy; -1 indicates that it should never be timed out; any other value is the number of seconds that the request should be held for.
USRAWDISKSKIPTYPES	disabled	If specified, these are the raw disk types to be skipped: 1 = Operating system disk access. 2 = ASPI 4 = UNIX raw disk.
USRAWNOOVERLAP (Win32 only)	disabled	If enabled UPSTREAM will not use overlapped I/O's for raw disk access (physical disk and UPSTREAM/SOS).
USREADTOSKIP (Windows only)	Not defined	If defined, FDR/UPSTREAM will skip throughout data streams by actually reading the data rather than seeking throughout the data stream. This should only be enabled on systems with known problems with BackupSeek (NT v3.1 for example).
USREMOTECHECKINTERVAL	15000	How often UPSTREAM checks for remote initiates (in milliseconds).
USREMOTECHECKNODISPLAY	disabled	If enabled, the "Doing remote check" message is disabled.
USREMOTENTEVENTLOGS (Windows only)	disabled	If enabled, NT event logs on non-local systems will be included in the backup.
USREPORTWAIT	1	Number of minutes to continue retrying appending a temporary report file to the base report file.

Name	Default	Description
USRESTORENOLOGNONFATAL	(Not defined)	If defined, UPSTREAM will disable non-fatal error logging for restores.
USRESTOREPACING	Not defined	The number of hundredths of a second delay between mainframe sends for restores. Used when timing is suspected for communications failure or data corruption.
USRETRYWAIT	Not defined	If set to 'Y', then CONV=WAIT or CONV=KEEP batch job requests, where the conversation failed or timed out will be retried.
USREUSEADDR	(Not defined)	(Windows) If defined, UPSTREAM will enable the SO_REUSEADDR socket option. This may allow multiple UPSTREAM's to pick up remote data but will avoid annoying error messages binding to listening sockets.
USRMTCNTLTRACE	(Not defined)	Enable only on request of technical support.
USSENDDIRS (Win32)	disabled	If set to any value, forces UPSTREAM to send to the mainframe all directory entries (even unmodified ones) during incremental backup, which was the default behavior up to version 3.1.3.
USSETFILEAPISTOANSI (Windows)	None.	Setting this to any value causes UPSTREAM to use the ANSI character set for all operations. You may need to enable it if you are getting Windows return code 2 (no file found) for files which have extended character codes in Windows 9.x.
USSIRECORD	None	Allows you to specify a side info table entry name for CPIC.
USSMSCHECKCRC	(Not defined)	(SMS) If defined, UPSTREAM will check the CRC (if generated in the backup with the USSMSGENCRC environment variable) for data integrity. This will degrade performance slightly
USSMSEXPANDCOMPRESS	(Not defined)	If enabled, UPSTREAM will expand compressed data during SMS backups. This will result in slightly poorer performance and increased CPU overhead.
USSMSFILEREPORT	(Not defined)	(SMS) If defined, UPSTREAM generate a report file (SMSFILES.LOG) which shows the UPSTREAM name and the Novell names used during backup and restore.
USSMSGENCRC	(Not defined)	(SMS) If defined, UPSTREAM will generate a CRC during backup for data integrity checking during restore (requires SMSCHECKCRC during the restore). This will degrade performance slightly.
USSMSLONGNAMES	(Not defined)	(SMS) If defined, UPSTREAM will support file name lengths of up to the Novell maximum by truncating the name and putting in a checksum name terminator. The mangled name may be difficult to restore, and cannot be restored to a new location.
USSMSNOLONGNAMESPACE	(Not defined)	(SMS) If defined, UPSTREAM will not attempt to record the long name (if any) for files or directories. This may improve performance slightly.

Name	Default	Description
USSMSRESTOREMODEBITMAP	0	(Novell SMS) This value is logically OR'd into the restore open call. Specified as a decimal quantity. Allows you, to restrict the data restored. SMS defined values include: NWSM_NO_DATA_STREAMS: 256 NWSM_NO_EXTENDED_ATTRIBUTES: 512 NWSM_NO_PARENT_TRUSTEES: 1024 NWSM_NO_CHILD_TRUSTEES: 2048 NWSM_NO_VOLUME_RESTRICTIONS: 4096 NWSM_NO_DISK_SPACE_RESTRICTIONS: 8192
USSMSTRUNCATEREPORT (Novell SMS)	Not defined	Enables and specifies the file name of a report of truncated file names.
USSOSBUFFERSIZE	32768	The data size used for reads/writes to the local backup disk for UPSTREAM/SOS.
USSOSNOOVERLAP (Win32 only)	disabled	If enabled UPSTREAM will not use overlapped I/O's for UPSTREAM/SOS.
USSTATUSRECVBUFFERSIZE	System default	The size of the TCP/IP buffer for receives on the status port. Cannot be set from the host.
USSTATUSSENDBUFFERSIZE	System default	The size of the TCP/IP buffer for sends on the status port. Cannot be set from the host.
USSTDWINDOW	Not defined	If defined, UPSTREAM will use the prior method for waiting for remote functions.
USSUSPENDPERCENT	disabled	For testing purposes only.
USTAKEOWNERSHIP (Win32 only)	disabled	Only active if **NTFSADDPERMISSION** is on, attempts to take ownership of the file or directory on behalf of the Administrators group if denied access for security.
USTAKESECURITY (Win32 only)	disabled	Only active if **NTFSADDPERMISSION** is on and access is still denied, attempts to remove all existing ACLs and create a single ACL for full control by the Administrators group.
USTCP	Automatic	(OS/2 only) Allows you to specify the TCP/IP vendor. If not specified, UPSTREAM will automatically determine the vendor: IBM : IBM TCP/IP v2.0 or greater. NOVELL: Novell LAN Workplace for OS/2.
USTCPCONTROLTIMEOUT	600	A number of seconds that an UPSTREAM control message (deallocate, send error, etc.) will wait until it is timed out.
USTCPDGSOCKET (ULTra only)	8996	The socket ULTra will use for datagram communications.
USTCPINT	102	(DOS only) TCP/IP parent program to UPSTREAM communications interrupt.
USTCPIPTRC	disabled	(OS/2 only) Enables low-level (USTCPIP.EXE) tracing. Trace file is USTCPIP.TRC. TRCFLUSH environment variable is used.

Name	Default	Description
USTCPNAGLE	(Not defined)	(UPSTREAM/SOS, TCP/IP) If defined, UPSTREAM will use the Nagle algorithm to send “keep alive” messages to the host.
USTCPSHUTDOWNWAIT	Not defined	Allows specification of a number of seconds to wait for TCP to send all data before the socket is closed.
USTCPSOCKET (ULTra only)	8995	The socket number ULTra will use for connection oriented communications.
USTCPWINSOCKVERSION	514	(Windows) Enter the version of TCP/IP WINSOCK you wish to use. Version 1.1 is 257 (100 hex plus 1); version 2.2 is 514 (200 hex plus 2).
USTCPTRC	disabled	Enables mid-level UPSTREAM TCP/IP tracing.
USTRACE	disabled	Activates tracing before configuration/parameter processing.
USTRACELOADNETWARE	disabled	(Novell) Use only on instruction of UPSTREAM technical support.
USTRACEWIN32	disabled	(Windows/NT) Use to enable Win32 Thunk tracing.
USTRACKSENDTIME	60	If you specified SKIPBACKUPSCAN Y, this is the number of seconds between sends. If there is no send pending after this number of seconds, a NULL record is sent.
USTRUNCONCLOSE	Not defined	If defined, On restores UPSTREAM will wait until file close before removing any prior file contents. This will disable sparse files.
USUNICODEPAGE	0	(Windows NT) Allows you to specify the unicode page used for internal translation. The default is 0 (ANSI). Current Microsoft definitions include 1 for the OEM codepage and 2 for the Mac codepage.
USUSE16BITACCESS (OS/2 32-bit only)	disabled	Forces use of the 16-bit OS/2 system access routines.
USUSE32BITNETBIOS (OS/2 32-bit ULTra only)	disabled	If enabled, forces the use of the 32-bit NetBIOS interface.
USUSEINODETIMEFORINCR (UNIX only)	disabled	If enabled, the I-Node time is used as well as the last modified time to indicate whether a file has changed (in incremental backups). NOTE: If you use this method and then perform restores, all restored files will be backed up on the next backup. If you restore a large number of files you should immediately after the restore perform a small non-relevant backup using the same backup profile to have the incremental date/time file updated.
USUSELINEDRAW	(Not defined)	UPSTREAM will automatically disable the use of line drawing characters (used predominantly in list and restore) if USMONOCHARSET is defined. By defining this variable to any value, UPSTREAM will use line drawing characters.

Name	Default	Description
USUSEV4MMAPIS (NLM)	Not defined	If set to any value, UPSTREAM will use the version 4 Media Manager APIs for physical disk access, including UPSTREAM/SOS; otherwise it will detect and use v5 APIs.
USUSEWIN32ALTERNATEFILENAMES	disabled	(Windows NT and Windows 95 ULTra only) UPSTREAM will use the mangled file name rather than the long file name.
USWINADMALLOCBUFFER (Windows 2000 Active Directory)	disabled	UPSTREAM will by default use a stack based buffer for accessing active directory functions. Enable this environment variable to use an allocated buffer.
USWINTCPBLOCKINGHOOK	(Not defined)	(32-bit Windows) If enabled, UPSTREAM will install a TCP/IP blocking hook and will thus become more responsive when blocked on a send or receive call. This parameter can not be specified if you are using remote status updates (Java client).

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28 BMC SQL-Backtrack

28.1 Introduction

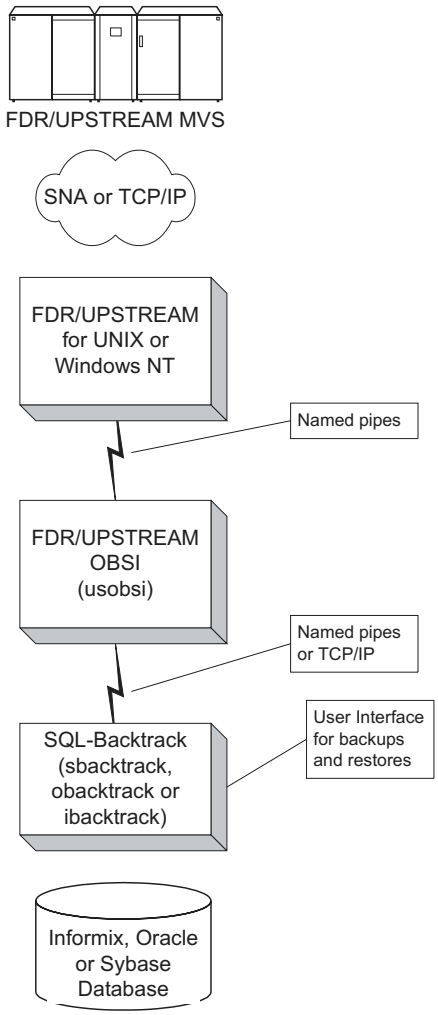
FDR/UPSTREAM provides support for BMC's DataTools SQL-Backtrack for a number of their environments including (but not limited to):

- Sun Solaris - Sybase, Informix and Oracle databases
- HP HPUX- Sybase, Informix and Oracle databases
- IBM AIX- Sybase, Informix and Oracle databases
- Compaq Tru64
- Windows NT- Oracle databases

SQL Backtrack is a BMC product providing complete backup and recovery of your databases. This includes issuing the appropriate commands to the database system, tracking backups, automatic restoration and more.

SQL-Backtrack provides the user interface including automation and tracks the data. Products which are written to their Open Backup Stream Interface (OBSI) then provide the backup storage. FDR/UPSTREAM is supplied with an OBSI interface program which can be used in conjunction with SQL-Backtrack to back up and restore your databases.

The following figure describes the process.



- You set up SQL-Backtrack to perform the backup/restore.
- It (using SQL-Backtrack defined interprocess communications) sends the data to the FDR/UPSTREAM OBSI program (usobsi).
- It starts the main FDR/UPSTREAM program and communicates with it using named pipes.
- FDR/UPSTREAM communicates the data with the host using SNA or TCP/IP.

After the installation and configuration has been completed, all of this is performed transparently and all you need to be concerned with is the SQL-Backtrack interface.

If you are using a UNIX operating system (AIX, Solaris, HPUX) see the following UNIX section. If you are using Windows NT, the proceed to section 28.3, 30.3below.

28.1.1 Backups to Tape

Since SQL-BackTrack calls UPSTREAM any number of times for a given backup request (for large Oracle databases it can call UPSTREAM hundreds of times), UPSTREAM allows these backups (which are really a single logical backup) to be placed on a single host tape.

When configuring the backup profile in the host configuration, you must use the default of **NONEWTAPE=INCR**.

When creating your usobsi.dat file on the workstation, you must specify that the backup is to **tape** and that it is a **non-merge** backup.

There is a client parameter **HOLDTAPE**. This is set during the Pool configuration within SQL-BackTrack for the usobsi OBSI. If you specify 'Y' and your backups are to tape, then the FDR/UPSTREAM host will hold the tape in the drive and not rewind it for 2-5 minutes, assuming that another backup request will be following. Note that HOLDTAPE is the default.

After this is configured, all SQL-BackTrack backups for this pool will go to the same tape. To start a new tape, you will need to perform a small backup (of any data, but it must work), using the same backup profile to DISK with the HOLDTAPE parameter set to Y (you must modify your parameter file manually to set this). This backup notifies FDR/UPSTREAM MVS that it will need to start a new tape and FDR/UPSTREAM MVS will immediately release the tape.

This disk backup must remain on disk (not be deleted) until after the next tape backup for this backup profile. We recommend that this separate backup be a job immediately following the original backup request.

For example, to host initiate a SQL-BackTrack backup which will use a single tape for the backup and start a new tape for the next backup, you will submit two jobs:

- A "run job" request (ACTION=5) to run the script generate by SQL-BackTrack.
- A backup request of a single file (us.ret for example), with **HOLDTAPE Y** using the same backup profile to disk.

If you specify the HOLDTAPE=Y parameter for backups, it also is in affect for restores; the tapes will be re-wound between SQL-BackTrack restores but will not be released for 2-5 minutes after the last restore.

Note that you will need a way (based on retention period or GDGs) to remove disk backups (after the subsequent tape backup has been run).

Note that the tape is not released until ALL backups on the tape have been deleted (either by SQL-BackTrack or manually).

28.2 UNIX

There are several files included with FDR/UPSTREAM which are relevant to SQL-BackTrack backups:

- **usobsi_install**: This is a script file which installs FDR/UPSTREAM OBSI facilities.
- **usobsi**: This is the OBSI program which is called by SQL-BackTrack to backup/restore your databases.
- **usobsi_obsi.help:** The usobsi message file. It is distributed as usobsi.msg
- **usobsi.log**: Dynamically created, logs significant events related to backups/restores.
- **usobsi.dat**: An UPSTREAM parameter file that you must pre-create, it specifies your backup profile and whether your backups go to disk or tape as well as the full variety of UPSTREAM options.

Before running the install script, you should perform the following:

- Completely install SQL-BackTrack. See the SQL-BackTrack Installation Notes and Users Guide for specific instructions; contact BMC for license information and technical support for SQL-BackTrack. Specifically, you must set the **DTBASE** and **DT_xBACKTRACK_HOME** environment variables.
- Install, configure and test FDR/UPSTREAM. You should verify that it can perform standard backups and restores.
- Set the **UPSTREAMPATH** environment variable. This environment variable must be set to the path where the UPSTREAM executables reside and it must be set whenever the usobsi program is executed..
- Create a **usobsi.dat** parameter file. This parameter file defines UPSTREAM parameters to usobsi for both backups and restores. It can be named anything, but is named usobsi.dat by convention.

  You create usobsi.dat by running the UPSTREAM program **us** and specifying the options you wish to use in the backup dialog and saving the parameters (without beginning a backup) to the usobsi.dat parameter file.

  You must specify a **backup profile** for backups and restores using SQL-BackTrack and you should specify whether you wish to backup to disk or tape. While a number of parameters are overwritten (file name, whether it is attended, etc.), there are a variety of optional parameters including compression, reporting, local backup, extended logging, etc. which you may choose to specify.

NOTE: If you are backing up to disk or you are using an UPSTREAM/SOS Local Backup disk, you must set a DASDOVERRIDE in usobsi.dat. SQL-BackTrack does not notify UPSTREAM of the size of the backup so it must be set manually.

To install the OBSI facility, execute **usobsi_install** from the UPSTREAM directory. You must enter whether SQL-BackTrack is for installed for Informix, Oracle or Sybase databases. It will then automatically create the following structure (the ‘x’ indicates the database type: ‘I’ for Informix, ‘O’ for Oracle, and ‘S’ for Sybase):

- /DT_xBACKTRACK_HOME/links/obsi.usobsi: directory entry.

- /DT_xBACKTRACK_HOME/links/obsi.usobsi/bin : directory entry
- /DT_xBACKTRACK_HOME/links/obsi.usobsi/bin/usobsi: symbolic link to usobsi in the UPSTREAM directory.
- /DT_xBACKTRACK_HOME/links/obsi.usobsi/msgs: directory entry
- /DT_xBACKTRACK_HOME/links/obsi.usobsi/msgs/usobsi_obsi.help: symbolic link to the usobsi message file.

SQL-BackTrack requires a *Pool* definition for an OBSI which is used to hold the parameters required by the OBSI. To configure the pool definition:

- ☐ Change to your SQL-BackTrack directory and run the SQL-BackTrack program. For example, for Sybase enter:
```
cd $DT_SBACKTRACK_HOME/bin
sbacktrack
```
- ☐ Select option **1** (Create a control directory for physical or logical backups). This will bring you to the "Create a New Control Directory" menu.

- ☐ Select option **1** (Create new control files for backups). Follow the instructions and return to the "Create a New Control Directory" menu.

- ☐ Select option 2 (Define/Modify backup pool information). This will bring you to the "Choose a Backup Pool" menu. FDR/UPSTREAM's OBSI does NOT support striping, do not define more than one backup pool. We recommend that you use suggested name of default by selecting option **1**.

- ☐ Choose the OBSI type: select the option **usobsi** (usually option #**3**). You will then be asked for USOBSI pool definition options. For these options, you can enter the '?' to get help.

- ☐ **Enter UPSTREAM parameter file?** Most users will enter the fully qualified location for **usobsi.dat.** Note that this parameter file must be pre-created (see above).

- ☐ **Enter UPSTREAM configuration file?** Most users will enter the fully qualified location for **upstream.cfg**.

- ☐ **Enter UPSTREAM program name?** Most users will enter the fully qualified location for the **uscmd** program.

- ☐ **Enter UPSTREAM work path?** Most users will enter the UPSTREAM directory. Note that the work path must match the one specified in the active UPSTREAM configuration file.

- ☐ **Enter hold tape?** See section 28.1.1, 30.1.1 (page 28-2) for a description of the implications of this feature. The default is 'Y' to keep the backups on a single tape. Note that we have subsequent backup recommendations.

- ☐ **Enter NODELETE. 'Y' suppresses UPSTREAM backup deletion from DataTools (Y or N)?** FDR/UPTREAM can ignore backup deletion by DataTools. This may be desirable if you wish to have the FDR/UPTREAM host manage backup retention and with to avoid spurious error messages. The default is 'N'.

  NOTE: DataTools will still think that the backup has been deleted and restores from these backups may be problematic.

- ☐ **Enter UPSTREAM OBSI IPC Type?** Enter the type of interprocess communications which should be used between SQL-BackTrack and usobsi. You can enter 'socket', 'tcpip' or 'pipe'. This is a performance tuning parameter. In most cases the default is 'socket' but most often the best performance is 'pipe'.

You will then be asked to verify that the options are correct. If they are you will be returned to the "Create a New Control Directory" menu. Select 'c' to cancel, SQL-BackTrack will create the required files and return to the main menu.

At this point you can use SQL-BackTrack to perform backups/restores.

Note that UPSTREAM does not support SQL-BackTrack backup striping; do not select this option.

As SQL-BackTrack progresses, it will write progress messages to the screen and from time-to-time start UPSTREAM. Note that UPSTREAM may be started several times.

UPSTREAM will write to the upstream.log file; USOBSI will write to a separate log file, **usobsi.log**. If you have problems, you should check both log files.

28.2.1 Using UPSTREAM/SOS Local Backup Disks

As noted above, if you are using FDR/UPSTREAM/SOS local backup disks, you must set a DASDOVERRIDE so that UPSTREAM will request a disk area on the local backup of adequate size. DASDOVERRIDE should be specified in your usobsi.dat parameter file and you specify this value in the Backup, More... dialog. We recommend that you specify at least 50000000 (50 million) bytes or more, assuming that your backups are this big.

UPSTREAM must be run as root to use UPSTREAM/SOS in UNIX. Thus, when setting up the usobsi.dat file you will need to run as root and you need to specify the local backup disk you wish to use in the Backup More... dialog.

In most cases you cannot run DataTools as root so we recommend that you set the set user ID bit for the usobsi program, which will cause it and all programs it runs (specifically uscmd) to run as root. The procedure for this is:

- su root
- cd <upstream directory>
- For Sun or HP: chown root:root usobsi
  or for AIX: chown root:system usobsi
- chmod u+s,g+s usobsi

28.2.2 Automation

In the SQL-BackTrack backup screens you can select an option to "Generate a backup script". This script will automatically invoke FDR/UPSTREAM to perform your backups. It can be executed:

- Manually
- From a UNIX scheduler such as cron or FDR/UPSTREAM's USSTART.
- From the host, using FDR/UPSTREAM's "Run a PC Job" option with the USTBATCH facility.

If you use host initiation and CONV=WAIT, FDR/UPSTREAM maintains two active conversations: one for reporting to the host the status of the job and the second for the backup. This will work for TCP/IP and for SNA if you use independent LUs. If you use dependent LUs for SNA, you must setup two copies of UPSTREAM and perform your first host request using the copy of UPSTREAM that does not use.

28.3 Windows NT

There are several files included with FDR/UPSTREAM which are relevant to SQL-BackTrack backups:

- **usobsi.exe**: This is the OBSI program which is called by SQL-BackTrack to backup/restore your databases.
- **usobsi.msg:** The usobsi message file.
- **usobsi.log**: Dynamically created, logs significant events related to backups/restores.
- **usobsi.dat**: An UPSTREAM parameter file that you must pre-create, it specifies your backup profile and whether your backups go to disk or tape as well as the full variety of UPSTREAM options.

The software is distributed on the CD or the Windows-2 diskette and is installed in the UPSTREAM directory.

Before running the install script, you should perform the following:

- Completely install SQL-BackTrack. See the SQL-BackTrack Installation Notes and Users Guide for specific instructions; contact BMC for license information and technical support for SQL-BackTrack. Specifically, you must set the **DTBASE**, **DT_OBACKTRACK_HOME**, and **DT_OBACKTRACK_PATH** environment variables.
- Install, configure and test FDR/UPSTREAM. You should verify that it can perform standard backups and restores.
- Create a **usobsi.dat** parameter file. This parameter file defines UPSTREAM parameters to usobsi for both backups and restores. It can be named anything, but is named usobsi.dat by convention.

  You create usobsi.dat by running the UPSTREAM program **US.EXE** and specifying the options you wish to use in the backup dialog and saving the parameters (without beginning a backup) to the usobsi.dat parameter file.

  You must specify a **backup profile** for backups and restores using usobsi and you should specify whether you wish to backup to disk or tape. While a number of parameters are overwritten (file name, whether it is attended, etc.), there are a variety of optional parameters including compression, reporting, local backup, extended logging, etc. which you may choose to specify.

NOTE: If you are backing up to disk or you are using an UPSTREAM/SOS Local Backup disk, you must set a DASDOVERRIDE in usobsi.dat. SQL-BackTrack does not notify UPSTREAM of the size of the backup so it must be set manually.

To install the OBSI facility, run the DataTools Config Utility (dtutil.exe). Press the **Add OBSI** button.

- ☐ **Name for OBSI module:** Enter **usobsi**.
- ☐ **Modules executable:** Enter the fully qualified file name to the usobsi.exe program. Most users will enter **c:\upstream\usobsi.exe**.
- ☐ **Modules home path:** Enter the directory to the usobsi.exe program. Most users will enter **c:\upstream**

Press the **Add** button to save your changes.

Within SQL-BackTrack you must define your profile and backup pool information. Run the SQL-BackTrack main program - **obacktrack**.

- ☐ Select option **1** "Create profile for physical backups or exports".
- ☐ Enter path for new or existing profile directory. Most users will select the default by pressing ENTER. This will bring you to the "Create a New BackTrack Profile Directory" menu.
- ☐ Select option **1** "Create a new profile for physical backups of an Oracle Database"
- ☐ Enter your Oracle SID (the default for Oracle is **ORCL**).
- ☐ Enter Oracle home directory (the default for Oracle is **C:\ORANT**).
- ☐ Enter your Oracle User name and Password. The default Username is SYSTEM and Password is MANAGER.
- ☐ Enter whether you wish to store the specified user. We recommend that whenever possible that you store this information to facilitate automation.
- ☐ Enter whether you wish backed up data compressed. We recommend that you let UPSTREAM perform your compression.
- ☐ Enter whether you wish backed up data encrypted. We recommend that you not use encryption.
- ☐ Enter minimum expiration value in days. SQL-BackTrack can expire backups for you. We recommend however, that you use host management and specify an unlimited value.
- ☐ RENAME or DELETE archivelog files after backup. We recommend that you allow SQL-BackTrack to delete these files.
- ☐ Enable physical incremental backups. We recommend that you allow these.
- ☐ Enter new or existing backup pool name. You can use the prompted value of default.
- ☐ Enter OBSI Backup Device Type: Select **usobsi** for the FDR/UPSTREAM OBSI.
- ☐ **Enter UPSTREAM parameter file?** Most users will enter the fully qualified location for **usobsi.dat.** Note that this parameter file must be pre-created (see above).
- ☐ **Enter UPSTREAM configuration file?** Most users will enter the fully qualified location for **upstream.cfg**.
- ☐ **Enter UPSTREAM program name?** Most users will enter the fully qualified location for the **US.EXE** program.
- ☐ **Enter UPSTREAM work path?** Most users will enter the UPSTREAM directory. Note that the work path must match the one specified in the active UPSTREAM configuration file. You will then be asked to verify that the options are correct.
- ☐ **Enter hold tape?** See section 28.1.1, 30.1.1 (page 28-2) for a description of the implications of this feature. The default is 'Y' to keep the backups on a single tape. Note that we have subsequent backup recommendations.

- **Enter NODELETE. 'Y' suppresses UPSTREAM backup deletion from DataTools (Y or N)?** FDR/UPTREAM can ignore backup deletion by DataTools. This may be desirable if you wish to have the FDR/UPTREAM host manage backup retention and with to avoid spurious error messages. The default is 'N'.

  NOTE: DataTools will still think that the backup has been deleted and restores from these backups may be problematic.

- **Enter UPSTREAM OBSI IPC Type?** Enter the type of interprocess communications which should be used between SQL-BackTrack and usobsi. You can enter 'socket', 'tcpip' or 'pipe'. This is a performance tuning parameter. In most cases the default is 'socket' but most often the best performance is 'pipe'.

- Do you wish to use parallel backup streams. FDR/UPSTREAM does not support these, so enter **n**.

  You will be asked to verify your options. If you enter y, then the appropriate files/directories are created for you. Press ENTER to return to the "Create a New BackTrack Profile Directory" menu. Select 'c' to cancel to return to the main menu.

  At this point you can use SQL-BackTrack to perform backups/restores. If you get SQL-BackTrack internal errors, you may need to run the "Synchronize Profile With Database" facility.

  As SQL-BackTrack progresses, it will write progress messages to the screen and from time-to-time start UPSTREAM. Note that UPSTREAM may be started several times.

  UPSTREAM will write to the upstream.log file; USOBSI will write to a separate log file, **usobsi.log**. If you have problems, you should check both log files.

  The SQL-BackTrack manuals describe automating the backup process. There are no special considerations for FDR/UPSTREAM unless you are host initiating using SNA dependent LUs. If you are, contact FDR/UPSTREAM technical support for assistance.

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29 IBM DB2 (Universal Database)

The FDR/UPSTREAM UDB agent is a full featured DB2 backup facility:

- Supports full backups as a “vendor DLL” or shared library
- Both online and offline backups
- Tablespace level backups and restores.
- The database can be recreated directly from FDR/UPSTREAM backups. You can also rename the database or restore it to a new instance.
- Multiple, simultaneous backups and restores of separate databases
- Multi-session backups and restores of a given database
- Includes a user exit for system generated incrementals if you are running in archive log mode.
- The user exit supports roll-forwards from user exit backups

FDR/UPSTREAM includes agents for IBM Universal Database (DB2) for Windows NT, OS/2, AIX, HPUX, Solaris and S/390 Linux. OS/2 only supports single session backups or restores of one database at a time - all other operating systems support multi-session backups or restores.

Note that this guide discusses a number of complex issues of backup and recovery which are more thoroughly discussed in the DB2 Administration Guide and we recommend that you read it before beginning UPSTREAM DB2 configuration. We further recommend that the database administrator be consulted throughout the installation and configuration process.

System requirements are:

- IBM Universal Database v5.0 or later (5.2 is recommended).

29.1 Installation and Configuration

There are two programs in the UPSTREAM UDB agent: USUDB.DLL for full backups and restores (usudb for UNIX), and a user exit for archiving and recovering logs (db2uext2.exe for Windows NT, db2uexit.exe for OS/2 and db2uext2 for UNIX). USUDB.DLL can be run from the UPSTREAM directory, however, the user exit must exist in a specific directory.

Note that once the user exit is copied in and ANY database is configured for a user exit, it will be called and expected to generate backups and restores (archives and retrieves). Thus it should not be copied in until database is configured and you have performed a test backup and restore with usudb.

There are several aspects to configuration:

- 1. Installing, configuring and testing UPSTREAM
- 2. (Optional) Setting up the environment.
- 3. Setting up a template UPSTREAM parameter file.
- 4. (Optional) Setting up a backup profile mapping file.
- 5. Testing backups
- 6. (Optional) Configuring DB2 for the user exit

☐ 1. Installing UPSTREAM. You should install, configure and test UPSTREAM for locally initiated, standard file backups. If you intend to initiate UPSTREAM backups and/or restores from the host you should also test host initiates.

UPSTREAM must be running as a service (Windows) or daemon (UNIX) for the DB2 agent to complete its backups. You do not need a separate installation of UPSTREAM for the DB2 agent.

In Windows, UPSTREAM can not run as a service under the Local System account as the SYSTEM user is an invalid name for DB2. You must set up your service to use a user account. Besides the UPSTREAM file requirements, the account must be authorized within DB2 for all DB2 privileges for each database that it will back up. The db2admin user is the easiest user to use, as it usually has all necessary privileges.

We strongly recommend that you specify the directories for the UPSTREAM message file and the UPSTREAM log file in the advanced options of the configurator.

The DB2 agent runs as the DB2 instance owner, and will need to access the upstream configuration file, *upstream.cfg*. We recommend that you either allow access to the default configuration file or copy the configuration file to a DB2 agent configuration file, **usudb.cfg**, and allow it access by the instance owner. Note that whenever you save to the default configuration file using the UPSTREAM configurator, the file will be rewritten, so we recommend that you copy the configuration to usudb.cfg and then allow access for the DB2 instance owner. In UNIX, the easiest way to do this is enter:

```
chmod 666 usudb.cfg
```

☐ 2. Setting up the environment. The UPSTREAM DB2 exit uses a number of environment variables. It is highly recommended that you set the USUDBDIR environment variable to point to the UPSTREAM directory, but UPSTREAM will search for it and in most cases will find it.

Since DB2 starts with the system it can be somewhat difficult to set environment variables, particularly in UNIX. In Windows, environment variables must be set from the System applet in the Control Panel. For OS/2, environment variables must be set in the CONFIG.SYS. For UNIX we recommend that you set DB2 agent values with files in the DB2 instance owner home directory.

The following table lists the environment variables for the UPSTREAM DB2 agent. Note that only USUDBDIR is recommended.

Environment Variable	Default	Meaning
USUDBDIR	\UPSTREAM (PC) /usr/lpp/fdrupstream (UNIX)	The directory where the agent will find the FDR/UPSTREAM programs. If this variable is not set, it will look for the UPSTREAMPATH environment variable, the UPSTREAM default directory for the given operating system type, the HOME environment variable and then the DB2 current directory. If a USPATH file is found throughout this search it is used.
USUDBLOG	usudb.log in the UPSTREAM directory	The fully qualified file name where the DB2 agent log will be written. By default the DB2 agent log is written to the UPSTREAM directory. You can create a USUDBLOG file as well as the environment variable.
USUDBTRACE	(Not defined)	Should only be defined on the request of UPSTREAM technical support. Trace information is written to the USUDB.LOG file and can also be activated by the existence of a usudbtrc file in the UPSTREAM directory. If there is a ustrc file in the UPSTREAM directory, UPSTREAM tracing will be enabled for this request.
USWAITDELAY	600	The number of seconds for a number of agent functions where it must wait. Generally only needs to be set if tape mounts may exceed 10 minutes.

Since the UPSTREAM DB2 agent runs as a shared library or DLL, it actually runs under the account of DB2 itself. If you wish to test the UPSTREAM DB2 and can't reboot your machine, you can create a file, **USPATH** (all upper case, no extension), which will simply hold the fully qualified path to the UPSTREAM directory. For UNIX, this file must be in the $HOME directory of the user that DB2 logs into; for PCs it is the default system directory (for Windows NT, it is usually c:\winnt\system32).

(UNIX) For example, if you installed UPSTREAM in the /usr/lpp/fdrupstream directory and the home directory for DB2 is /db2/home, then your USPATH file would be a single line in the /db2/home directory:

```
/usr/lpp/fdrupstream
```

(Windows NT) For example, if you installed UPSTREAM in the d:\upstream directory, USPATH would be a single line in the c:\winnt\system32 directory:

```
D:\upstream
```

Since the UPSTREAM agent will run as the DB2 user, you must grant the DB2 user the ability to write to the UPSTREAM directory.

☐ 3. Setting up a template parameter file. Run FDR/UPSTREAM, go into the backup dialog and set up the parameters which you wish to specify for your DB2 backups. These can include virtually every UPSTREAM function, but we highly recommend that you carefully consider your choices for the following:

- Tape or Disk (storage type)
- Compression
- FDRSOS Local Backups
- Reporting

Parameters which are not used include:

- Backup Profile (configured below)
- Full or incremental (backup type)

When you have completed your configuration save it to the parameter file **usudb.dat** in the UPSTREAM directory.

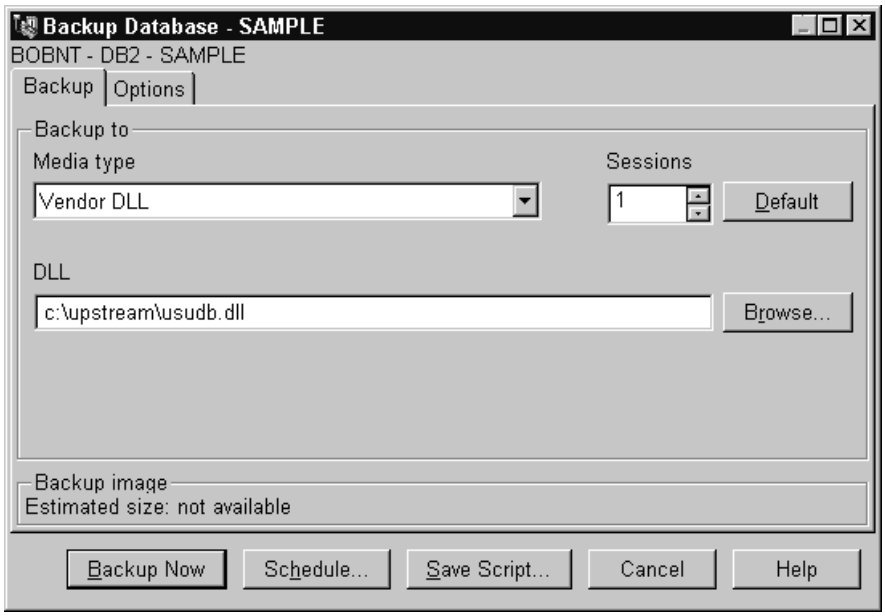
If you wish to have incremental backups (transaction log backups) use different UPSTREAM parameters (storage type, reporting options, etc.), create a separate parameter file for incrementals and name it **usudbi.dat**.

☐ 4. (Optional) Setting up a backup profile mapping file. By default, UPSTREAM will use the name of your database as the backup profile name. This may work for many users. However, if you wish to have the same database on more than one machine you will need to use a backup profile mapping file.
This file is a simple text file **usudb.prf** (in the UPSTREAM directory) which is merely a listing of database names followed by one or more spaces and the backup profile. You must use a text editor which adds no formatting such as the Windows notepad. For example, to map the database SAMPLE to backup profile PC1SMPL and IMAGES to PC1IMGS, you would have a usudb.prf which looks like:

```
SAMPLE PC1SMPL
IMAGES PC1IMGS
```

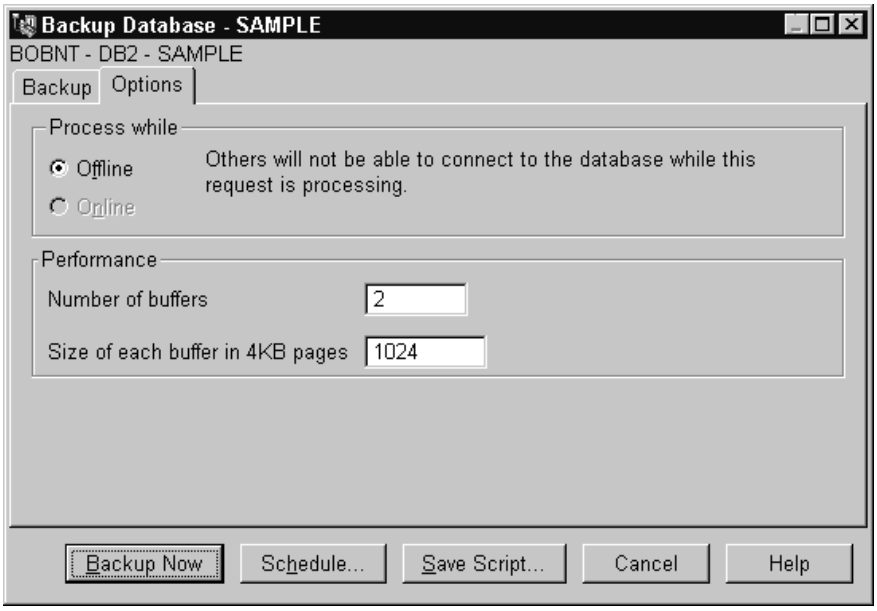
If you are going to run multiple sessions, you can create an template parameter file for each session. See section 29.1.2 below for details.

☐ 5. Testing backups. For PC operating systems, you can test backups from the DB2 Control Center. For UNIX operating systems you must use the DB2 command line (see below).
With the **Control Center** running, expand so that you can see the database you wish to test with, highlight it, pull down the **Selected** menu, select **Backup** and then **Database...**



- **Backup Type:** Select **Vendor DLL**
- **Sessions:** For your first test select **1**. Once you have a single session working, you can increase this value if you wish. See section 29.1.2 below for details.
- **DLL:** Enter the fully qualified file and path name to the UPSTREAM DB2 backup agent. Most users will enter **C:\UPSTREAM\USUDB.DLL**

Press the **Options** tab:



- **Process while:** Unless you enable your database for forward recovery or have installed a user exit (user exit installation is described below), and have performed a full online backup you can only select **Offline**.
- **Performance:** The number of buffers and buffer sizes are tuning parameters and can be generally left at their defaults.

When you have completed the specification, press the **Backup Now** button to begin the backup.

If you wish you can perform the test backup from the DB2 command line. To start the DB2 command line from PC operating systems, you may need to run the **db2cmd** program (installed in the \sqllib\bin directory) and then run **db2**. To start the command line from UNIX systems, you may be able to run **db2** directly, or may have to run **CmdLine** which sets up environment variables and then executes db2. See the Automation section below on page 29-8 for operating system specific details on running DB2 scripts. The format is:

```
DB2 BACKUP DATABASE <database name> LOAD <UPSTREAM library>
```

For example, to backup the database sample from an NT machine with UPSTREAM in the C:\UPSTREAM directory, enter:

```
DB2 BACKUP DATABASE SAMPLE LOAD c:\upstream\usudb.dll
```

The usudb library will be executed by DB2 and UPSTREAM started. Since these programs run as services, no screen will be displayed (except for OS/2). The success or failure of the backup will be logged in the DB2 Journal by DB2 and details can be found in the **usudb.log** file the upstream.log files. If you have problems, you will need to examine these two logs.

☐ 6. User exit installation and configuration. User exit programs allow UPSTREAM to store and recover database archive logs. Generally, this is recommended as it allows online database backups to be taken, reduces the number of full database backups that need to be taken (as archive logs are effectively incrementals of the full database) and allows UPSTREAM to be the central repository for all database data.

Note that you can only have one user exit program, and once installed, it will be responsible for all archive and retrieve operations for all databases.

User exit program must be installed in a specific directory. For PCs copy the **db2uext2.exe** (db2uexit.exe for OS/2) to the \sqllib\bin directory. For UNIX copy the **db2uext2** file to the $INSTHOME/sqllib/bin directory.

To have the system enabled for user exits, you can modify the database configuration in the Control Center (for purchase) or on the DB2 command line (all systems).

If you wish to use the Control Center to modify the configuration, highlight the database you wish to enable user exits for, pull down the **Selected** menu and select **Configure**. Press the Logs tab, scroll down the list and highlight **Invoke user exit for log file archiving** and press the Ok button. You will be notified that all applications must disconnect before the changes will be in affect.

If you wish to use the DB2 command line (see above for instructions on starting the DB2 command line) enter:

```
DB2 UPDATE DATABASE CONFIGURATION FOR <database> USING USEREXIT ON
```

Once all users have disconnected, the user exit will be enabled.

29.1.1 Troubleshooting

When there is a problem with the UPSTREAM agent, DB2 simply reports a non-zero return code (usually 11) and there will be an SQL message written to the output (STDOUT). If the message text provides no guidance to solving the problem, you must look to the UPSTREAM logs. There may be multiple copies of these logs, so you should look for the one with the modification date/time closest to your run.

For UNIX you should look in the UPSTREAM directory, the DB2 user's home directory, and the root. For Windows you should look in the UPSTREAM directory, \SQLLIB\BIN directory or the C:\WINNT\system32 directory.

- usudb.log. This is the log for the UPSTREAM DB2 agent messages. It will logs messages related to data access and UPSTREAM setup.
- usudberr.log. When UPSTREAM can't write to the usudb.log file, it writes to this file. It tends to contain messages related to access to the UPSTREAM control files. It is more likely to be in a directory other than the UPSTREAM directory.
- upstream.log. Any messages related to communications with the host.

During setup, the most common problem is having the usudb library find UPSTREAM. In UNIX, you almost always need to have a **USPATH** file. Note that the usudb library will fail to find UPSTREAM is there is no **usudb.dat** file.

If you still can not find a usudb.log file and are getting errors in the backup request, we recommend that you create a USUDBLOG file with the fully qualified name of a file which is accessible by all users. Place this file in the root (UNIX) or system directory (C:\WINNT\system32 for Windows), the DB2 instance home directory and the UPSTREAM directory. The usudb.log file should then be created with sufficient information to help you resolve the problem.

The DB2 agent needs to contact the UPSTREAM service or daemon. If the UPSTREAM's currently not running you will see "Connection refused" messages in the usudb.log.

(AIX) After upgrading the DB2 agent (usudb), you may need to run the system utility slibclean to have the operating system refresh its cache of shared libraries.

29.1.2 Multi-Session Backups and Restores

To use the multi-session support for your backups or restores, UPSTREAM will use a backup profile of the database name or alias name (if specified in usudb.prf) for the first session. For subsequent sessions, the numbers from 1-9 are appended, and then A-Z. Thus up to 36 sessions are supported. To use this facility, you must not specify more than 7 characters for your backup profile name to allow this extra character to be added and you may need to configure each of the backup profiles in UPSTREAM/MVS. Single session backups or restores can use the full 8 characters for the backup profile name.

Within your jobs, you specify the backup with the extra qualifier **open *xx* sessions**. For example, to perform a backup with three sessions, enter:

```
db2 backup database sample online load c:\upstream\usudb.dll open 3 sessions
```

Note that if your backup is to tape, you will need three tape drives at the time of the backup as the backups will run all at the same time.

By default, UPSTREAM will use usudb.dat (usudbi.dat if you have it defined for your incrementals) as template parameter files. For multi-sessions you can optionally have a template parameter file for each sequence number that UPSTREAM generates. These parameter files use a single character as part of the file name in the same way that backup profiles work (described above). Thus, use usudb.dat for the first session, usudb.1.dat for the second session, usudb.2.dat for the third session,...,usudb.a.dat for the eleventh session, usudb.b.dat for the twelfth session, etc.

User exits use a single session and always backup using the backup profile without the additional character.

29.2 Automation

To automate UPSTREAM backup and restore functions use the DB2 command line facility.

For PC environments, use the DB2CMD program (usually in c:\sqllib\bin) which will handle environment settings. For recent versions of DB2, you will need to run DB2CMD with some optional switches: **-c** (to close the window when complete), **-w** (to wait for it to complete), **-i** (run within the same console) and **-t** (run with the parent title). For example, command line to backup the SAMPLE database might contain the single line:

```
C:\SQLLIB\BIN\DB2CMD.EXE -c -w -i -t DB2 BACKUP DATABASE SAMPLE ONLINE LOAD C:\UP-
STREAM\USUDB.DLL WITHOUT PROMPTING
```

If you wished to backup only the SALES tablespace, your command line might be (all on one line):

```
C:\SQLLIB\BIN\DB2CMD.EXE -c -w -i -t DB2 BACKUP DATABASE SAMPLE TABLESPACE SALES ON-
LINE LOAD C:\UPSTREAM\USUDB.DLL WITHOUT PROMPTING
```

For UNIX environments, you must set your environment, either in the script file itself or in the .profile for the user and then run the **db2** program. If you can't easily set the environment, you will need to create a script which contains the environment options. We recommend that you use the DB2 CmdLine script as a sample, adding statements to the db2 command at the end of that script. For example, your script might look like the following:

```
# Statements required to run DB2 scripts (you'll have to modify these)
DB2DIR="/usr/lpp/db2_05_00"
DB2INSTANCE=db2admin
export DB2INSTANCE
INSTHOME=/db2/home
PATH=${PATH}:${INSTHOME}/sqllib/bin:${INSTHOME}/sqllib/adm
PATH=${PATH}:${INSTHOME}/sqllib/misc
export PATH
# The backup request (you'll need to modify this)
db2 BACKUP DATABASE SAMPLE LOAD /usr/lpp/fdrupstream/usudb WITHOUT PROMPTING
```

If you will be host initiating these backups, you will need to use the **Run a PC Job function** of USTBATCH. We recommend that you specify on the command line of the job to execute, simply the fully qualified name of the script or batch file to run. We also recommend that you check **Run job from UPSTREAM or ULTra** and **Wait for job completion** (JOBOPTIONS 3).

If you are using UPSTREAM Client v3.2.0 or later we recommend that the output from the job be returned to the host. Check the option **Log STDOUT and STDERR** (JOBOPTIONS 35). Otherwise output should be redirected to a file using the greater than sign (>).

(UNIX) If your system does not allow root to run DB2 backup or restore commands, you may want to run the script from the *su* command rather than running it directly. For example, if your script is /usr/lpp/fdrupstream/db2back, and your DB2 instance user is db2admin you could setup your host job FILES parameter:

```
FILES /bin/su db2admin -c /usr/lpp/fdrupstream/db2back
```

See the DB2 Administration guide for other information including security restrictions and requirements.

29.3 Recovery

The entire process of database restore and roll-forward recovery is fully described in the DB2 Administration Guide and we recommend that you follow the instructions outlined there.

When you restore a database using the control panel, you can select the backup to restore from by the DB2 backup timestamp.

If you are not using the Control Center or are creating the database on a new system from the backup, you will need the DB2 backup timestamp. The DB2 backup timestamp is generated by DB2; you can not use the UPSTREAM version date. When the backup was performed, the timestamp was written to the output of the job.

You can obtain the backup timestamp by performing a file inquiry for the backup profile that you are using for your database backups. The file name (on PCs) is:

```
\\.\PIPE\SQL<version>\<instance>\<database>\<timestamp>
```

For example, with DB2 v5.20 and the database SAMPLE, a file name may be:

```
\\.\PIPE\SQL05020\DB2\SAMPLE\19981211151720
```

Which gives us a backup timestamp of 19981211151720 (December 11, 1998 3:17:20 PM).

For UNIX the database name is:

```
<UPSTREAM directory>/SQL<version>.<instance>.<database>.<timestamp>
```

For example, if UPSTREAM is in the /usr/lpp/fdrupstream directory, the version 5.0, the database SAMPLE, and the instance db2inst2, the following line has a backup timestamp of 19981215163725 (December 15, 1998 4:37:25 PM):

```
/usr/lpp/fdrupstream/SQL05000.db2inst1.SAMPLE.19981215163725
```

In UNIX, restores must be performed using the db2 command. Thus to restore the above database, you would enter:

```
db2 RESTORE DATABASE SAMPLE LOAD /usr/lpp/fdrupstream/usudb TAKEN AT 19981215163725
```

For both PCs and UNIX, (unless otherwise specified) once the restore has completed the database in roll-forward pending mode. To complete the restore, use the ROLLFORWARD commend. For example, for the SAMPLE database:

```
db2 ROLLFORWARD DATABASE SAMPLE TO END OF LOGS AND COMPLETE
```

Note that in a rollforward, DB2 will request a number of log files generating a sequence of restores. It may actually ask for log files past the last one backed up (which it does to detect the end of the logs). In the usudb.log, there will be messages stating that it had no files to restore and this is expected.

If you are restoring to a new database instance, you will need to have UPSTREAM account for this. See section 29.4 for instructions on changing the instance so UPSTREAM will search using the original instance name.

29.4 Errata

Some additional notes for the DB2 agent:

- The DB2 agent no longer must be run as root or Administrator to use UPSTREAM/SOS as it uses TCP/IP and pipes to communicate with an UPSTREAM daemon or service which runs as root or Administrator. The dbuscmd program is no longer used.
- The UPSTREAM DB2 agent uses the DB2 database ID as the first part of the file name stored on the host. This ID is DB2 version specific and you may have problems performing restores after a DB2 upgrade. You can specify the ID by creating a single line text file **usudb.id** in the UPSTREAM directory which contains the database ID you wish to use. This parameter affects both backups and restores.
- The UPSTREAM DB2 agent uses the DB2 instance as the second part of the file name stored on the host. If you are restoring a database to a different instance, you will need to specify the new instance to the agent. You do this by creating a single line text file **<database name>.instance** in the UPSTREAM directory which contains the instance you wish to use.

  For example, for database SAMPLE, if you wish to change the instance from DB2 to SECOND, create a file: SAMPLE.instance with the single line SECOND. This change will affect both backups and restores.

30 Lotus Notes

In Lotus Notes and Domino, the organization of the data is as records (Notes) in database files (with the extension *.nsf, *.ntf and *.box).

In Notes R4 and in some cases Notes R5/R6 (depending on how you have transaction logging set up), the databases can be backed up in their entirety from the file level; basically just by backing up the contents of the \DATA directory.

If you have very large databases, whenever a user modifies a single Note in a database the archive bit will be set and even for incrementals, the entire database will be backed up. This may keep you from being able to perform daily incremental backups.

Thus FDR/UPSTREAM provides a facility for extracting only the changed Notes in a Notes or Domino Database using the program LNINCR. Page 30-2 describes this facility.

If you have Notes R5/R6, Domino will keep databases open much more often and depending upon the transaction logging options may cache sections of the database in the transaction log. Thus fulls at the file level may not be safe. Also, since they now support archive logging, backups of the transaction log will result in even less data being backed up than with the LNINCR program.

So only programs written to the Notes Backup API are recommended for Notes R5/R6. FDR/UPSTREAM includes an agent for the Notes R5/R6 Backup API for both full and incremental backups. See page 30-11for a description of this facility.

30.1 Creating a Notes Incremental

FDR/UPSTREAM provides the ability to perform an incremental backup of Lotus Notes databases. With most backup products, backup of a Lotus Notes database would result in a complete backup of the database (file) even if only a single note was modified. With FDR/UPSTREAM only those modified notes (records) are included in the backup.

FDR/UPSTREAM can also use Notes' powerful LAN facilities to create incrementals of server databases via Domino servers. A Notes password intercept facility is provided so that passwords can be provided for unattended access.

The requirements are:

- Lotus Notes or Domino version 4.5 or higher. All Notes or Domino databases must be version 4.5 or higher.
- A Windows 95, Windows NT or OS/2 workstation which has Lotus Notes installed and permissions to the databases.

Note that if you are using NotesR5/R6 we recommend that you use our Notes R5/R6 database agent rather than this facility.

30.1.1 Process

A single program LNINCR.EXE (which stands for Lotus Notes INCRemental) is provided on the supplemental diskette of UPSTREAM Windows or OS/2. On the CD it is in the Windows, Win32 or OS2 directories. This program is used to generate a separate Notes database which includes only the changed notes since the last time the program was run. After a restore, this program is then used (with different command line parameters) to apply the incrementals into the original database.

LNINCR.EXE, when run to generate an incremental database will create two files per database:

- <database>.upd - This is an update control file which contains the date of the last incremental and the incremental number.
- <database>.<num> - <num> is internally generated (from the update control file) and is the incremental changes since the last run. When LNINCR is run for backup, the prior backup is deleted.

The process is as follows:

- When you run a full, first run LNINCR, specifying on the command line that this is a full. This will cause the last incremental to be deleted and the control file updated. Then run the full backup, including your databases to be backed up.
- When you run each incremental, run LNINCR first for each database to generate the incremental. Then exclude the databases from the backup.

30.1.2 LNINCR.EXE

The command line to LNINCR.EXE is:

```
LNINCR <DB File Name> <Output path> [options...]
```

Where:

- **DB File Name** For local backups this is the fully qualified file name (file and path) for the Lotus Notes database you wish to back up. This can include wildcards. For example: C:\NOTES\DATA\MAIL*.NSF. For server backups, file specifications should be based on the \NOTES\DATA directory. For example: MAIL*.NSF.
- **Output path** is the drive and path (but not file) specification of where you wish to store your incrementals. For example: C:\NOTES\INCR.

If no options are specified an incremental will be performed. Remember that you must use the /f option for your full run before you can perform an incremental run.

Options can be specified in upper or lower case. The options used in normal operation are:

- **/f** Full run. You must use the /f option at the time of the full before you can run an incremental.
- **/s** Include Subdirectories. Use this option if you wish to have the wildcard spec applied to all subdirectories beneath the specified directory. The default is to only process those files in the specified directory. Note that the subdirectory structure is created in the output path.
- **/r<number>** Restore the incremental <number> stored in the output path. For example /r1 of database AKORSUN.NSF will apply the incrementals stored in AKORSUN.1.
- **/vi<server>** Specify that database access use Notes LAN facilities through the specified server.
- **/P<password> or /I<password>** If using the /vi option above, this is the password for access to the server. You must install the USEXTPWD.DLL UPSTREAM password intercept DLL on your machine for this to work. Use the /P option for OS/2 and the /I option for Windows NT.

The lesser used options are:

- **/b** Copy non-data notes. When specified this option will copy the non-data notes (regardless of modification date). This allows you to be able to use Notes to view a LNINCR generated incremental database.
- **/x:** UNIX Domino server. If enabled, it will be assumed that you are backing up or restoring a UNIX Domino server. Thus, you must use the /vi<server> switch with this option. See the *UNIX Domino Servers* section below.
- **/d<mod date>** Overrides the date stored in the update file. The mod date is specified in YYMMDDHHMMSS form. For example: /d970516173257 is 5/16/97 at 5:32:57 PM.
- **/n** No delete. The prior incremental file is not deleted. Without this switch the default is to delete the prior incremental.
- **/l** Do not update the incremental file. This creates a differential. Note that the last incremental number is reused. Without this switch the default is to update the incremental update file.
- **/a** Suppress the copying of database ACL information.
- **/e** Suppress the copying of database replication information.
- **/t** Enable command line tracing.
- **/o** Note-by-note copy. This is slower but provides a count of notes copied, is somewhat more complete and indicates in the trace (if enabled) some minimal information about each note.
- **/rc** Restore a single database incremental specifying the complete names.
- **/c** Create a backup of an entire database during an incremental if the database has not been seen before. For restores, create the database if the database does not exist.

- **/u** Enables enhanced return codes. With this option enabled, LNINCR reports a return code of 0 to indicate that all databases succeeded, a return code of 1 to indicate that some databases succeeded and a return code of 2 indicates a complete failure or no databases succeeded.

Note that when you run LNINCR it will copy the ACLs and replication information even if there are no modified notes.

LNINCR.EXE logs events to both the screen and to a log file USLN.LOG. You can use USLOGCLR.EXE to reduce the size of USLN.LOG.

After LNINCR has completed, there may be a short time before the database is actually closed for the operating system. While Notes can access the database, if LNINCR is run there may be errors deleting the prior incremental.

30.1.3 An example backup scenario

If you wish to back up all the Notes databases in the C:\NOTES\DATA directory, and all of its subdirectories, you'll need to:

- Create a directory for your incrementals (C:\NOTES\INCR)
- Copy LNINCR.EXE to it
- Create the following job which is a batch file: **NOTEFULL.BAT** (NOTEFULL.CMD for OS/2):

```
C:
CD\NOTES\INCR
LNINCR C:\NOTES\DATA\*.NSF C:\NOTES\INCR /f /s
```

The /f switch indicates that this is a full run, and the /s indicator requests all subdirectories.

You'll need to run NOTEFULL.BAT immediately before you run your full backup. You can add it to your PC schedule or run it from the host as a PC job. You must include the databases in your full backup file specifications.

You will need to create a batch job to create the incrementals, **NOTEINCR.BAT** (NOTEINCR.CMD for OS/2):

```
C:
CD\NOTES\INCR
LNINCR C:\NOTES\DATA\*.NSF C:\NOTES\INCR /s
```

You'll need to run NOTEINCR.BAT immediately before you run your incrementals. Your incremental specifications will need to:

- Include C:\NOTES\INCR*.*
- Exclude all the databases specifically or exclude the C:\NOTES\DATA directory if it would normally be included in your backup specifications.

30.1.4 An example restore scenario

To restore a notes database to a given point you need to:

- Restore the full database.
- Restore all the incrementals to the incremental directory.
- Run LNINCR with the /r<number> option for each incremental stored. These should be done in ascending order.

For example, to restore C:\NOTES\DATA\ADMIN.NSF to its state after two incrementals were run, you would:

Make sure that Notes is not holding ADMIN.NSF. You may need to bring down Notes.

- Restore C:\NOTES\DATA\ADMIN.NSF
- Restore C:\NOTES\INCR\ADMIN.1 and C:\NOTES\INCR\ADMIN.2
- Run LNINCR:

```
LNINCR C:\NOTES\DATA\ADMIN.NSF C:\NOTES\INCR /r1
LNINCR C:\NOTES\DATA\ADMIN.NSF C:\NOTES\INCR /r2
```

If you are running Windows NT, you can apply Notes incrementals with the LNREST program. See the *Applying Notes Incrementals* (section 30.1.12, 32.1.12, page 30-8) below.

30.1.5 Using Domino

LNINCR can also use Notes' LAN facilities to create incrementals of databases via Domino Servers. In many cases this is not necessary, however if you find that you are getting errors attempting to access databases locally you may wish to try this facility.

LNINCR is used the same way with the following exceptions:

- You must specify the /vi<server> option.
- <DB File Name> should be specified relative to the \NOTES\DATA directory.
- Your password on the server will be requested. You can enter your password manually, or install USEXTPWD.DLL (see below) and then specify the password on the command line (/p<password>).

Note that fulls will still have to be performed directly on the databases using mapped drives.

For example, to back up all the databases on the Notes server SERVER1, into the directory C:\NOTES\INCR, and your password is ME, specify.

```
LNINCR *.NSF C:\NOTES\INCR /viSERVER1 /pME
```

Restore operate in the similar way. To restore version 1 of NAMES.NSF, specify:

```
LNINCR *.NSF C:\NOTES\INCR /viSERVER1 /pME /r1
```

30.1.6 UNIX Domino Servers

The LNINCR program will only operate on 32-bit Windows and OS/2 platforms. However, since Domino is a server itself, you can use the PC version and request the entire database or only the changed Notes be transmitted and saved on the PC for backup by UPSTREAM.

You can use this facility in two ways:

- Use UPSTREAM on the UNIX box to backup the full database and LNINCR on a PC to obtain incrementals. This is generally the best method as it offers the highest performance.
- Use UPSTREAM on the PC to perform both the fulls and incrementals. While somewhat slower, this method offers the advantages of going through the Domino server for all transactions, achieving the highest level of integrity.

Procedures for the two methods are described below.

NOTE: The Domino user that runs LNINCR on a PC must be authorized for all functions (database creation, replication, etc.).

30.1.7 UNIX fulls/PC Incrementals

Performing the full consists of two steps:

- ☐ Actually backing up the *.NSF files in your Notes data directories (including subdirectories) on your UNIX machine using FDR/UPSTREAM.

- ☐ Running the LNINCR program on the PC which will be performing the incrementals, notifying it that the full was done. Assuming that you are backing up the server AIX3 and the incrementals will be stored in the d:\aix directory, use the following command:

```
LNINCR *.nsf d:\aix /viAIX3 /x /s /f /u
```

The switches mean:

- /viAIX3: /vi means that you are attaching to a Domino server and its name is AIX3.
- /x: This is a UNIX system.
- /s: Include subdirectories
- /f: A full was just performed. All prior incrementals will be removed and the last backup time modified in the update file.
- /u: Enable enhanced return codes.

The process for an incremental is:

- ☐ Using LNINCR, request incremental of the Notes databases on the server. For example, using the names above:

```
LNINCR *.nsf d:\aix /viAIX3 /x /s /u
```

- ☐ When the job has completed and has returned a return code of 0 or 1 backup the directory where the incrementals were created.

To perform a restore:

- ☐ Restore the databases on the UNIX machine using UPSTREAM.

- ☐ Restore the incremental databases using UPSTREAM on the PC.

- ☐ Then apply the incrementals from the PC using LNINCR directly or LNREST (see above).

30.1.8 Using the PC for both fulls and incrementals

The process for a full is:

- ☐ Using LNINCR, request a full of the Notes databases on the server. For example, if the server is AIX3 and you will be storing the files on D:\AIX, run a job with the following command line (note that case is important in UNIX):

```
LNINCR *.nsf d:\aix /viAIX3 /x /s /w /u
```

The switches mean:

- /viAIX3: /vi means that you are attaching to a Domino server and its name is AIX3.
- /x: This is a UNIX system.

- /s: Include subdirectories
- /w: Perform a whole database backup.
- /u: Enable enhanced return codes.

☐ When the job has completed and has returned a return code of 0 (all databases successful), or 1 (some databases failed), backup the directory where the files were copied. In the above example, this would be d:\aix.
The process for an incremental is:

☐ Using LNINCR, request incremental of the Notes databases on the server. For example, using the names above:

```
LNINCR *.nsf d:\aix /viAIX3 /x /s /u
```

☐ When the job has completed and has returned a return code of 0 or 1 backup the directory where the incrementals were created.

To perform a restore:

☐ Restore the full and all the incrementals you wish to apply to the PC; be sure you have adequate disk space.

☐ Apply the full. You can use LNINCR directory or LNREST (above). If the full already exists you will want to specify the /w command to keep it from applying the non-data notes (or check the *Skip non data notes* checkbox); otherwise specify the /c option (or check the *Create if it doesn't exist (whole backups)* checkbox) to have the database created and have the non-data notes applied.

☐ Apply the incremental databases normally.

30.1.9 Monitoring

LNINCR writes all of its output to the screen as well as the USLN.LOG file. This includes the names of each of the databases as wildcards and subdirectories are resolved as well as other status information. This can be quite voluminous. We suggest that you periodically edit the USLN.LOG file and search for all entries which are preceded by **Error:.**

These entries indicate unexpected problems in processing. Also, at the end of each run, the number of databases successfully processed as well as the number that failed will also be logged.

LNINCR returns a program return code. This will be non-zero (indicating failure) only if there was a fatal error prohibiting all processing or if the number of successful databases processed is 0. Thus you must check the log as well as the program return code to verify that all your important databases are properly processed.

30.1.10 USEXTPWD.DLL

USEXTPWD is a Notes Extension Manager application which LNINCR knows how to access to intercept Notes' password request prompt and continue, using the password specified on the LNINCR command line. It must be installed into your NOTES.INI file to be properly accessed.

First, copy the USEXTPWD.DLL from the \UPSTREAM\OS2 or \UPSTREAM\WIN32 directory on the CD to your main Notes directory (usually C:\NOTES).

In your NOTES.INI file (usually in the C:\NOTES directory or your primary system directory (C:\WINNT for Windows NT for example), add the following line:

```
EXTMGR_ADDINS=USEXTPWD.DLL
```

USEXTPWD.DLL writes to the screen and to a log file (USEXTPWD.LOG) whenever it is loaded and it logs whenever a password is used. This log can be cleaned using USLOGCLR and should be checked if you have unexpected password errors.

For Windows NT you should specify the /i<password> option rather than the /p<password> option on the LNINCR command line.

30.1.11 Migrating Old Notes

There is a command line option which allows you to migrate old data notes. This can be useful, for example, in generically migrating old email messages to a separate Notes database which can be migrated using UPSTREAM migration.

The command line option is: /m<days> where any notes which are <days> old will be migrated. When you specify this option, the /b option (include non-data notes) will be set automatically.

For example to migrate notes older than 90 days in the file C:\NOTES\DATA\BOB.NSF to the directory C:\MIGRATE enter:

```
LNINCR C:\NOTES\DATA\BOB.NSF C:\MIGRATE /m90
```

30.1.12 Applying Notes Incrementals

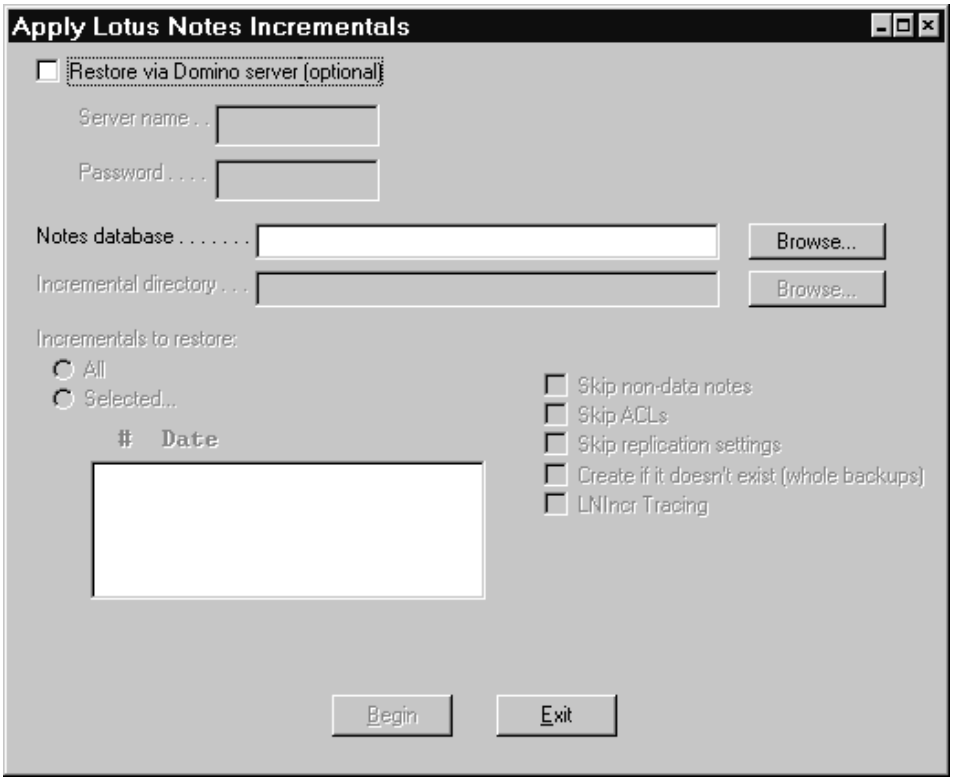
FDR/UPSTREAM now includes a graphical user interface for applying Lotus Notes Incrementals. Complementing the existing LNINCR.EXE which is designed to extract and insert changed notes (creating and applying incrementals), the new facility allows easy application of changed notes during a recovery. This facility is only available for 32-bit Windows.

This new program, LNREST.EXE, is run when you need to recover a Notes database to a specific point in time. It is significantly easier than manually running LNINCR multiple times. It is designed to be used to apply one or more incrementals from a single database.

Run LNREST after performing the following steps using UPSTREAM:

- Restore the full backup of the Notes database.
- Restore the incrementals, generated by LNINCR, that you wish to apply.

Note the directories where you performed the restores and then run the LNREST.EXE program This program must be in the UPSTREAM directory with LNINCR.



- **Restore via Domino server (optional):** Check this box if you wish to restore via a Domino server; otherwise Notes will be applied directly. The default is not checked. Ask your Notes administrator for the best method. If you check this box the fields below are enabled. **Server name** is a required field and it is the Domino server you wish to use for the restore. If USEXTPWD.DLL has been installed, you should enter a password in the **Password** field; otherwise Notes will prompt you for the password.

- **Notes database:** Enter the fully qualified file name of the Notes database for which you wish to apply the incrementals. If you did not check *Restore via Domino server* you can press the **Browse...** button next to the edit field to help you enter the file name. If your restore is via a Domino server, enter the name of the database relative to the Notes DATA directory (use backslashes even for UNIX servers). Only when the file name is valid and you have exited the edit field will the *Incremental directory* field be enabled.

- **Incremental directory:** Enter the directory name (not the file names) where you restored the incrementals to. You can press the **Browse...** button next to the edit field to help you enter the directory name. Only when you have specified a directory which contains incrementals which match the Notes database and exited the edit field will the remaining fields be enabled.

- **Incrementals to restore:** Press the **All** radio button to apply all the incrementals in the directory; press the **Selected...** radio button to select specific incrementals to apply.

  If you press the *Selected...* radio button you must highlight at least one incremental in the list box below. The selection list box is filled in automatically with incrementals from the selected directory of the specified database. Each line lists the incremental number and the date it was taken. This is a multiple-selection list box, where you select entries with the mouse and they are displayed highlighted.

- **Skip non-data notes:** Check this box if you included non-data notes in your incrementals or you otherwise with to skip non-data notes. The default is not checked.

- ☐ **Skip ACLs:** Check this box if you wish to skip Access Control Lists, which are used for security. The default is not checked.
- ☐ **Skip replication settings:** Check this box if you wish to skip replication settings. The default is not checked.
- ☐ **Create if it doesn't exist (whole backups):** If you used the /w option in LNINCR and you are using LNINCR to recreate the database (rather than UPSTREAM), check this box. All other users should leave it unchecked.
- ☐ **LNIncr tracing:** Check this box on request of UPSTREAM technical support.

When you have filled in the required fields, the **Begin** button will be enabled. When you press Begin, you will be asked if you wish to begin applying the incrementals. Press the **Ok** button to begin.

The incrementals are applied by successive calls to LNINCR. You will see both a status screen in LNREST showing you the current incremental being applied and the time of the run, and you will see a Console display which will flash up showing the status with each call to LNINCR.

If a call to LNINCR fails, the process will stop and a message box will be displayed which will ask you if you wish to run NOTEPAD to view the USLN.LOG file. When you exit the NOTEPAD display you will be returned to the LNREST dialog.

If the run is successful, a message box will display the number of databases applied and then you will be returned to the LNREST dialog.

When you press the **Begin** button, your settings are saved to the file LNREST.DFT. Most of your settings will be recovered (except for specified selections and the password) the next time you enter LNREST.

30.2 Lotus Notes R5/R6

FDR/UPSTREAM supports Notes R5/R6 databases using the Lotus Notes backup API for Windows NT, AIX, Solaris, Intel Linux and OS/390 UNIX. This means that UPSTREAM can perform on-line full backups of databases (even if in use) as well as incremental backups by backing up Notes transaction logs - essential if you are using transaction logging (which Lotus highly recommends). UPSTREAM can also perform incremental backups of databases where Notes indication of change or a DBIID change is detected and the database is backed up to assure recovery from transaction logs.

30.2.1 Transaction Logging

Notes R5/R6 introduces the concept of transaction logs. Notes uses them for 3 purposes:

- To avoid the use of the Fixup task. Transaction logs allow internal database recovery much quicker on system failure.
- Improves performance as database updates are deferred.
- Allows incremental backups, as you just backup the transaction logs.

Because of the way that transaction logging works, the Lotus Notes Backup API requires that Notes databases be processed quite differently than your normal file backups both for fulls and incrementals.

NOTE: All the *.nsf, *.ntf, and *.box databases files and the *.lfh and *.txn transaction log files in the \Lotus\Domino\Data directory and its subdirectories should be excluded from your normal backups and processed using the UPSTREAM Notes R5 backup agent.

The UPSTREAM Notes R5 backup agent uses the Notes backup API. Through its use, full backups are able to access all databases, even if in use and are guaranteed to have all transactions committed.

The Notes backup API requires that you perform your backups locally on the Domino server.

While you can exclude specific databases from transaction logging, once you enable transaction logging all databases will use it by default.

Incremental backups consist of backups of the transaction logs and changed databases.. There are only one set of transaction logs for a given Domino server; all databases use the single set of logs. Notes actually creates transaction logs in multiple 64MB files. Thus the smallest incremental is 64MB. A transaction log can not be archived until it has been filled and Notes has switched to a new transaction log. FDR/UPSTREAM performs both incrementals of archived transaction logs and transaction logs still in use.

To guarantee full recovery, UPSTREAM will automatically backup with all transaction log backups:

- Any transaction logs which require archiving.
- The active transaction log.
- The active notes.ini file.
- Any id files (cert.id, server.id, etc.) stored in the notes data directory.

30.2.2 Steps

The following are the steps to using the Notes R5/R6 database agent:

- ☐ Exclude the Notes databases and transaction logs from your normal production backups (see above).
- ☐ Verify that you have a large amount of free disk space in your UPSTREAM Work Path, equal to the largest Notes database.
- ☐ Run the Domino Administrator and set up archive transaction logging (below).
- ☐ Verify that your environment variables are correct:

Windows NT: make sure that the \Lotus\Domino directory is in your PATH and ahead of your \Lotus\Notes directory. Use the Environment tab of the System Applet in the Control Panel. Make sure that <drive>:\Lotus\Domino is in the System Variables PATH environment variable.

UNIX: There are a number of environment variables which must be set to use UPSTREAM Notes R5/R6 support. These environment variables must be in the actual environment; they can not be in the UPSTREAM environment file.

Thus for most users who will be running the daemon (except for USS users), we recommend that you add them to the fdrupstream.config file in the UPSTREAM /startup directory and rerun the install script in the UPSTREAM /startup directory. For user invocation of UPSTREAM, you should add these variables to the .profile for those users wishing to use the facility.

For USS users we recommend that you add these variables to the **usx** script if you are starting UPSTREAM from a batch job or /etc/init.options file (with the -e switch) if you are running UPSTREAM from /etc/rc.

The environment variables are:

- **LOTUS**. Used by the Notes API, it must point to the Domino main directory. For most AIX and Solaris users this is /opt/lotus, for most USS users this is /usr/lpp/lotus.
- ***(Solaris and Linux)*** **LD_LIBRARY_PATH** ***(AIX and USS)*** **LIBPATH**. Used by the system dynamic linker, it is used to find the Notes API shared libraries (in particular libnotes.so). It must point to the Domino executable directory. For SPARC Solaris, the directory is: /opt/lotus/notes/latest/sunspa.
- **NOTES_DATA_DIRECTORY**. Used by the Notes API, it must point to the Domino data files (*.nsf, *.ntf and *.box); the directory you start the Domino server in. For example, if you installed Domino in the /notes directory, you would specify /notes/notesdata.
- **Notes_ExecDirectory**. Specify the same path as you used for LD_LIBRARY_PATH.
- **PATH**. This is the standard environment variable for finding executables. You'll need to add all the paths specified above.

  For UNIX, Lotus also recommends adding your Domino resource directory. A resource file is a file provided by Domino that contains error messages and other strings used by Domino and C API programs at run time. Many C API programs require the resource file strings.res. All resource files are part of Domino and reside in the resource directory, **res**, which is in the Domino executable directory. Different resource directories may be provided to support different languages. The default resource directory is res/C in the Domino executable directory. For

example, for Domino for AIX, the default resource directory is **/opt/lotus/notes/latest/ibmpow/res/C**

For example, for Solaris you might add to fdrupstream.config or .profile the following:

```
LOTUS=/opt/lotus
export LOTUS
LD_LIBRARY_PATH=/opt/lotus/notes/notes/5030/sunspa
export LD_LIBRARY_PATH
NOTES_DATA_DIRECTORY=/notes/notesdata
export NOTES_DATA_DIRECTORY
Notes_ExecDirectory=/opt/lotus/notes/5030/sunspa
export Notes_ExecDirectory
PATH=$PATH:$LOTUS:$NOTES_DATA_DIRECTORY:$Notes_ExecDirectory:
       /opt/lotus/notes/5030/sunspa/res/C
export PATH
```

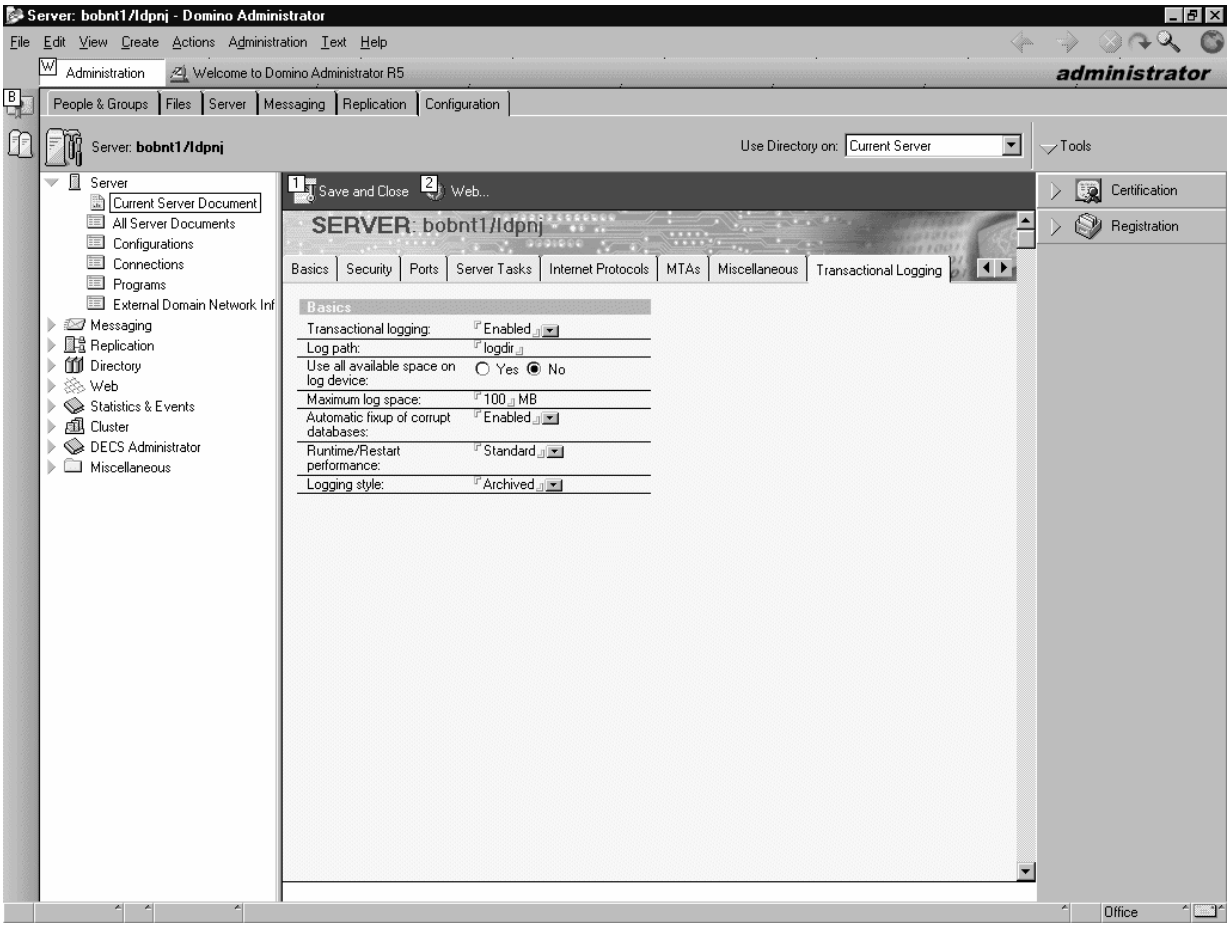
For example, for USS if you used the default directory for Domino executables and placed the Notes data path in /notesdata, you would add the following to the environment before starting UPSTREAM.

```
LOTUS=/usr/lpp/lotus
export LOTUS
LIBPATH=/usr/lpp/lotus/notes/latest/os390:$LIBPATH:.
export LIBPATH
NOTES_DATA_DIRECTORY=/notesdata
export NOTES_DATA_DIRECTORY
Notes_ExecDirectory=/usr/lpp/lotus/notes/latest/os390
export Notes_ExecDirectory
PATH=$NOTES_DATA_DIRECTORY:$Notes_ExecDirectory:$LOTUS:
       /usr/lpp/lotus/notes/latest/os390/res/C:.:$PATH:
export PATH
```

- ☐ Setup UPSTREAM parameter files (if PC initiating) or host jobs (if host initiating) using the correct file specs and plug in parameters (see below).

30.2.3 Domino Administrator Setup

The Lotus Domino Administrator program allows you to define and modify transaction logging parameters. In the Configuration tab, highlight the server document and select the Transactional Logging sub-tab. We recommend the following options:



- ☐ **Transactional logging:** It must be set to **Enabled**.
- ☐ **Log path:** We recommend that you use the default of **logdir**.
- ☐ **Use all available space on log device:** We recommend that you set this option to **No** as setting it to yes may lead to system instability.
- ☐ **Maximum log space:** There is a bug in Notes where the minimum transaction log size is actually 192MB; specifying a smaller value will result in 192MB being used (see Lotus TechNote #173422). Setting this to a larger value is recommended so long as you leave some free space on the disk.
- ☐ **Logging style:** Specify **Archived** to allow database recovery.

  The database instance ID (DBIID) allows association between databases and transactions in the transaction logs. When Notes assigns a new DBIID to a database, it can no longer recover transactions from its transaction logs. It does this in the following circumstances:

  - You enable transaction logging for the first time.
  - You run the Compact server task with any options.
  - You run the Fixup task on corrupt databases.

- You change the log path or maximum log size after initial setup and use.
- You move a Domino Release 5 database from one logged server to another logged server or from an unlogged server to a logged server.
- You restore a database.

If these conditions occur during your normal incremental cycle, we recommend that you specify the plugin parameter DBCHANGEDCHECK=I, so that UPSTREAM will preserve the DBIID for all databases and detect DBIID changes. If a DBIID changes on an incremental backup, UPSTREAM will perform a full backup of that database.

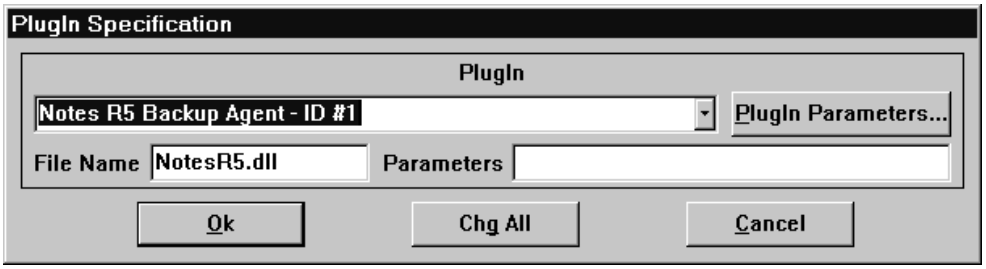
If you do not specify DBCHANGEDCHECK=I, we strongly recommend that you perform a full backup after any of these conditions occur. Thus after saving the parameters above, you should plan on a full backup.

30.2.4 UPSTREAM PlugIns

A PlugIn is a DLL or shared library which is loaded into UPSTREAM when needed and extends UPSTREAM's capabilities without the use of an external program. A single backup can include files which may or may not use PlugIns and PlugIn types can be mixed.

There are only two parameters when using an UPSTREAM PlugIn: **PLUGIN** which specifies the name of the PlugIn file (without the directory but with the extension), and **PLUGINPARAMETERS** which is a single string which may consist of any number of parameters to be used by the PlugIn. In Windows, PlugIns must be installed in the **\PlugIn** subdirectory immediately below the UPSTREAM directory. In AIX, Solaris and OS/390 UNIX, plugins are in the UPSTREAM directory and have the file name plugin<min. OS version><name>. For example, the Notes plugin for OS/390 Unix is plugin260notesr5. For Linux, the plugin is built into UPSTREAM - there is no separate file.

From the UPSTREAM user interface, there is a new button **PlugIn...** in the main backup specification dialog:

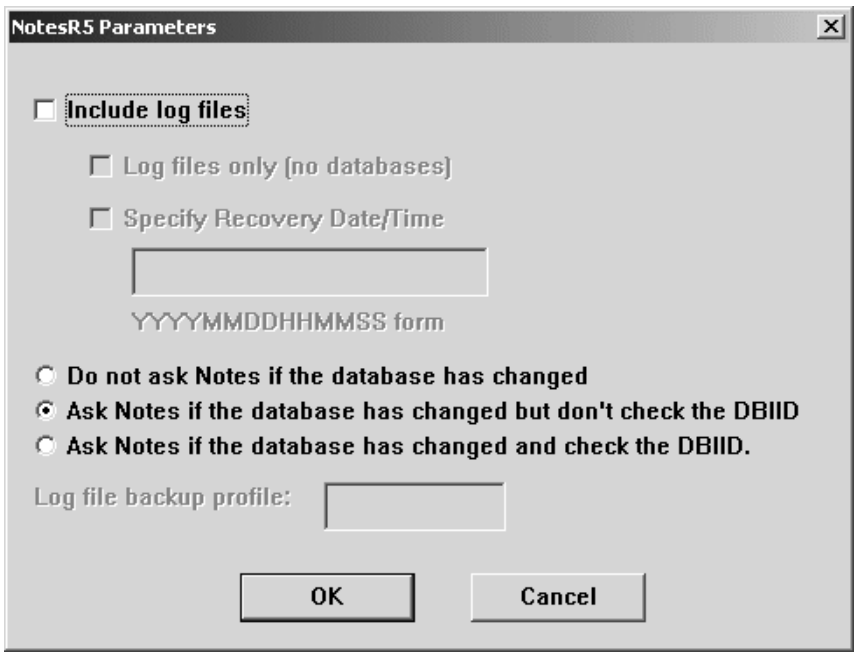


- ☐ **PlugIn:** This is a combo box, select **No PlugIn** if you do not wish to use PlugIns for this file specification. For the Notes R5 PlugIn select **Notes R5 Backup Agent - ID #1**.

- ☐ **File Name:** This is the file name of the PlugIn and should not generally be changed. For the Notes R5 PlugIn it is **NotesR5.DLL** for Windows NT and **notesr5** for UNIX.

- ☐ **Parameters:** You can manually enter or view the plug in parameters as modified by pressing the **PlugIn Parameters...** Button. The parameters are described below.

- ☐ **PlugIn Parameters...:** Many PlugIns provide a dialog which allow you to specify the parameters for the PlugIn. If there is not a dialog available, the button will be greyed and you must enter the parameters manually. For the Notes R5 PlugIn, the PlugIn dialog is only available for Windows NT. For Windows NT the dialog is below:



- **Include log files:** Check this box if you wish the backup or restore to also include log files. We recommend log files be included with all Notes R5 backups. The parameter for this is **LOGFILES=Y**.

- **Log files only (no databases):** Check this box if you wish the file spec to be ignored for this backup and only transaction logs included. This checkbox is grayed if this is a restore or if this is a backup until you press Include log files above. This is recommended for incrementals. The parameter is **LOGFILES=O** (letter 'o' not a zero).

- **Specify Recovery Date/Time:** Only valid for restores; described below.

- **Do not ask Notes if the database has changed:** Press this button if you wish to not use Notes functions to determine if the datatabase has changed. If this is an incremental, the archive bit (PC) or modification date (UNIX) will be used and the DBIID will not be saved. The parameter is **DBCHANGEDCHECK=N**.

- **Ask Notes if the database has changed but don't check the DB IID:** Press this button if you wish to use Notes to determine if the database has changed, but the DBIID will not be checked or saved. This is the default option, but it should only be used if you control DBIID changes. The parameter is **DBCHANGEDCHECK=Y**.

- **Ask Notes if the database has changed and check the DBIID:** Press this button if you wish to use Notes to determine if the database has changed, and if Notes says it has not, will also obtain and preserve the DBIID. This option is somewhat slower, but is safer. See the section *Incremental Detection of New Databases* below for more details. The parameter is **DBCHANGEDCHECK=I**.

- **Log file backup profile:** Used to specify restores if you are using multiple backup profiles. See the *Multiple Backups* section below.

If you are host initiating a you must specify, in the repeating section of the PC parameters (those that begin with SPECNUMBER) the following parameters. Note that if you are running FDR/UPSTREAM host version 3.1.1 or earlier you must set VERIFY=NO to allow unknown PC parameters to be accepted.

```
PLUGIN NOTESR5.DLL
PLUGINPARAMETERS <parameters>
```

The PLUGINPARAMETERS <parameters> values are:

Title	Default	Meaning
DBCHANGEDCHECK	Y	N: UPSTREAM will use the archive bit (PC) or modification date (UNIX) to determine if a database is new. Y: UPSTREAM will not use the archive bit (PC) or modification date (UNIX) to determine if a database is new; it will use the NotesAPI facilities. I: A DBIID file is created for all databases when they are backed up. If the NotesAPI facilities do not say the database is new, UPSTREAM will also check the DBIID against the prior one stored.
LOGBACKUPPROFILE	None	Specify the backup profile used for the transaction logs if you are using multiple backup profiles for your backups.
LOGFILES	Y	N: Log files are not included in the backup or restore. Y: Log files are included in the backup or restore. O: The file specification is ignored for this file spec and ONLY log files are included in this backup.
RECOVERYTIME (Restore only)	None	If specified, all committed transactions completed prior to that time are applied to the list of databases. The format is: YYYYMMDDHHMMSS.

You can specify a full-merge for full backups, but all the files will be transmitted as there is no inherent way to determine if a database has been changed (even by modification date or archive bit) as there may be transactions which are pending.

Restart is not supported for full or incremental Notes R5 backups.

Thus, for full-backups we'd recommend the following JCL (assuming that the Domino data directory is C:\Lotus\Domino\Data):

```
ACTION 1
BACKUPPROFILE <profile>
STORAGETYPE 3   * TAPE
MERGE 1         * FULL MERGE
LOGNONFATAL Y
*
SPECNUMBER 1
FILES C:\LOTUS\DOMINO\DATA\*.NTF
PLUGIN NOTESR5.DLL
PLUGINPARAMETERS LOGFILES=Y
*
SPECNUMBER 2
FILES C:\LOTUS\DOMINO\DATA\*.NSF
PLUGIN NOTESR5.DLL
PLUGINPARAMETERS LOGFILES=Y
*
SPECNUMBER 3
FILES C:\LOTUS\DOMINO\DATA\*.BOX
PLUGIN NOTESR5.DLL
PLUGINPARAMETERS LOGFILES=Y
```

For incremental backups, we recommend that you use the same parameters, except replace the MERGE parameter with:

```
MERGE 2
```

For UNIX systems you would replace NOTESR5.DLL with *notesr5* and use correct directory and case for your databases.

30.2.5 Incremental Detection of New Databases

When you check the option *Ask Notes if the database has changed but don't check the DB IID*or set the PLUGINPARAMETERS value **DBCHANGEDCHECK Y,** UPSTREAM will call Notes to determine if a given database is new and requires a full backup - it is more reliable than the archive bit or modification date.

This option is particularly useful for incrementals so that new databases are fully backed up and databases which do not need it are not. To best use it with incrementals, use the LOGFILES=Y option instead of LOGFILES=O and specify the databases you wish to include (with wildcards) in the same manner as you do for the full.

If a database is new it may report UPSTREAM error #10143 and Notes error #5114 and the database will be fully backed up. It is not terribly useful for full merge backups as UPSTREAM will still use the last modification date to indicate if the file has changed, will most likely consider this to be a mismatched file and back it up fully.

You only need to specify *Ask Notes if the database has changed and check the DBIID* or the PLUGINPARAMETERS value **DBCHANGECHECK I** if the DBIID may change between full backups. See page 30-14 for a description of when the DBIID might change. This option causes UPSTREAM to open the database during the directory build operation which may decrease overall performance, though it does guarantee that all databases will be recoverable from log files.

When you set this option, UPSTREAM will create a 16 byte file to hold the DBIID, in the same directory as the database, with the same name as the database with the added extension *.DBIID*. These files are updated whenever the database is backed up with this option. Thus we recommend if you are going to use this option for your incrementals, that you use it for your fulls as well to update this file.

30.2.6 Restores

If you restore a database from a full backup it is guaranteed to be complete, as of the date/time of the backup. To restore one or more databases from a full, merely select them in List and Restore, press the PlugIn button and specify the notesr5 PlugIn with no plug in parameters. You will need to be sure that Domino and Notes do not have them open. After closing a database which was open via Domino, you may have to wait a few minutes for Domino to actually close it. You can specify a new destination if you wish.

To restore databases as of the latest incremental, you must specify LOGFILES=Y for the plug-in parameters.

In the NotesR5 PlugIn dialog, the PlugIn parameter RECOVERYTIME allows the specification of a date and time such that all committed transactions completed prior to that time are applied to all databases restored. Do this if you do not wish a database recovered with the most recent transactions.

The option is only available for restores when you check **Include log files** (PLUGINPARAMETERS includes LOGFILES=Y). On the dialog you must also check **Specify Recovery Date/Time**. Enter the date/time you wish to use in YYYYMMDDHHMMSS form.

For example, if you wished to roll forward to 2PM on June 23, 2000, specify 20000623140000. If you were host initiating the PLUGINPARAMETERS line would look like:

LOGFILES=Y RECOVERYTIME=20000623140000

There are two steps that UPSTREAM performs in log file restores. First it restores the database(s). Then it calls Notes, providing it with the names of the databases and asks it to apply the logs. If the transaction logs are not currently on disk, it will ask UPSTREAM to perform the restore(s). When it completes, the databases should be properly recovered.

If a database has problems (for example, the DBIID has changed), Notes will stop the recovery without completing it. Thus we recommend breaking down your log file restores into multiple restore requests so that the failure in one will not require you to repeat the process multiple times.

30.2.7 Transaction Log Backups

When you request transaction log backups, the following additional files are automatically included so that a transaction log backup is suitable for disaster recovery. You use UPSTREAM as described in the *Disaster Recovery* section below to recover these files as needed. Note that all of these files must be renamed on recovery.

- All active transaction logs. They are saved on the host using the file name **c:\notesr5activelog:<file name>** for PC systems or **/notesr5activelog:<file name>** for UNIX systems when <file name> is the file name of the file.

  To assure that databases are completely recoverable, all active log files are included in log file backups along with the most recent one. You should expect your log file backups to be quite a bit bigger than just the current active transaction log, particularly if you have specified a large transaction log size (as specified in the Domino Administrator). To reduce the size of your daily backups, you may want to consider reducing the size of your transaction logs.

- The active notes.ini file. It is saved on the host using the file name **c:\notesr5ini:notes.ini** for PC systems or **/notesr5ini:notes.ini** for UNIX systems.

  There can be problems finding the notes.ini file programmatically; we have included the new environment variable **USNOTESINI** which can point to the notes.ini file. By default UPSTREAM will use the file name specified in this environment variable first, then the location defined in the Directory value in the Notes environment and then the directory above it.

- Any id files (cert.id, server.id, etc.) stored in the notes data directory, using the file name prefix **c:\notesr5id:** for PC systems and **/notesr5id:** for UNIX systems.

30.2.8 Multiple Backups

The NotesR5 agent supports multiple simultaneous backups. To do this you must:

- Logically separate the backups. You must create multiple, non-overlapping, UPSTREAM backups requests to separate backup profiles. If your data is stored on multiple drives or separate directories, this can be quite simple (one backup of the Notes data directory on the C: drive; another backup of the Notes data directory on the D: drive for example). Otherwise separate them by extension (*.NSF in one backup, *.NTF in another, *.BOX in yet another for example).

- Specify the log files in only one of these backups.

If you are performing a restore in which you wish to apply transaction logs there is no problem if the database is being restored from the backup profile used to store transaction logs. However, if you used a different backup profile for the transaction logs, you must specify the new PLUGINPARAMETERS value, **LOGBACKUPPROFILE** with the backup profile used for the transaction logs. Then if a transaction log is needed, it will be recovered correctly.

30.2.9 Disaster Recovery

In the event of the catastrophic loss of the active logger files, it will be possible to recover database backups to the last committed transaction in the archived transaction logs if the administrator has taken care to preserve the following, prior to any data loss:

- A set of recoverable database backup files.
- Performed UPSTREAM transaction log backups (with the v3.1.2b or later NotesR5 PlugIn). When you perform transaction log backups, the notes.ini file and the active transaction log is included along with any transaction logs which required archiving.

With the components listed above available, the disaster recovery procedures consist of the following. Note that you must be precise and the order is very important. Call tech support if you experience difficulty or have questions.

For UNIX, the steps below should be performed as the notes user. If you can't be the notes user, you should manually change the owner and group of all notes created files after each step to be the notes owner and group.

☐ 1. Restore the Domino server - Depending on the extent of the data loss it may be necessary, and advisable, to install a new Domino server. Be sure that the new installation is configured in the same manner as the damaged one (i.e. same directory structure/location and logdir path).

☐ 2. Restore the notes.ini file that was preserved prior to the data loss. **DO NOT LAUNCH THE NEW SERVER**.

UPSTREAM backs up the notes.ini file whenever a log file backup is performed, using the file name **c:\notesr5ini:notes.ini** for PC operating systems and **/notesr5ini:notes.ini** for UNIX operating systems.

To restore the notes.ini file, select this file in UPSTREAM using either the ISPF panels on the host or List and Restore on the workstation. You must specify a Destination. For example on most PC systems, you would specify a destination of **c:\lotus\domino\notes.ini**.

☐ 3. Prepare the data directory - Using UPSTREAM, restore database backup files of all required databases into the data directory (including the name and address book, unless a regular up-to-date copy is available from another server). Make sure that LOGFILES is not enabled.

☐ 4. Prepare the log directory - Make sure that the "logdir", as it is defined in the notes.ini file, exists and that no old files are present therein. If a transactional log control file (**nlogctrl.lfh**) or transaction logs (***.TXN**) remain from a previous installation they must be removed for the disaster recovery procedure to complete successfully.

☐ 5. Restore the latest active transaction logs.

UPSTREAM backs up the latest transaction log whenever a log file backup is performed, using the file name **c:\notesr5activelog:<name>** for PC operating systems and **/notesr5activelog:<name>** for UNIX operating systems. The <name> is the actual file name of the transaction log, for example: S0000011.TXN. There may be several stored; select ones from the most recent backup.

Select these files in UPSTREAM using either the ISPF panels on the host or List and Restore on the workstation. You must specify a Destination. For example on most PC systems, you would specify a destination of **c:\lotus\domino\data\logdir**

☐ 6. Manually edit notes.ini (using Notepad, vi, etc.). Set or add the parameter **TRANSLOG_Recreate_Logctrl=1** in the notes.ini file.

- ☐ 7. Perform Media Recovery - Using UPSTREAM, restore all database backup files that you desire to have rolled up to the latest state from the archived log, specifying the **LOGFILES=Y**, PLUGINPARAMETERS value. When the first database is restored, the log control file will be rebuilt and the notes.ini setting for TRANSLOG_Recreate_Logctrl will be set to 0 automatically.

- ☐ 8. Restore the id files. All existing id files which were stored in the notes data directory are backed up with the file name prefix **c:\notesr5id:** for PC systems and **/notesr5id:** for UNIX systems. You will need to fully qualify the destination file name for each file, specifying the notes data directory and the original file name.

- ☐ 9. Launch the Domino server - With the disaster recovery complete, it is now safe to start the Domino server and execute server tasks and functions.

- ☐ 10. Perform a new backup. With the successful completion of the disaster recovery process and launching of the new Domino server, new database backup files should be created and secured to avoid any future loss of data.

If you are recreating the server from scratch, you can shorten the procedure somewhat:

- ☐ 1. Reinstall Domino. Install it into the same directories as you had it originally.

- ☐ 2. Using UPSTREAM restore the following non-database files:
  - notes.ini to the original location (usually c:\lotus\domino\notes.ini for PC systems and the notesdata directory on UNIX systems) from c:\notesr5ini:notes.ini
  - The active transaction log. For example, on a PC system, if UPSTREAM shows the transaction log file as c:\notesr5activelog:S0000011.TXN, and you have Notes installed in the default directory, you would specify a destination of c:\lotus\domino\data\logdir\S0000011.TXN. Make sure that the log directory is empty or doesn't exist before you begin the restore.
  - The id files. For example, on a PC system, if UPSTREAM shows files c:\notesr5id:cert.id and c:\notesr5id:server.id, and you have Notes installed in the default directory, you would specify destinations of c:\lotus\domino\data\cert.id and c:\lotus\domino\data\server.id respectively.

- ☐ 3. When the restores have completed, manually edit notes.ini (using Notepad, vi, etc.). Set or add the parameter **TRANSLOG_Recreate_Logctrl=1** in the notes.ini file.

- ☐ 4. Perform Media Recovery - Using UPSTREAM, restore all database backup files that you desire to have rolled up to the latest state from the archived log, specifying the **LOGFILES=Y**, PLUGINPARAMETERS value. When the first database is restored, the log control file will be rebuilt and the notes.ini setting for TRANSLOG_Recreate_Logctrl will be set to 0 automatically.

- ☐ 5. Launch the Domino server - With the disaster recovery complete, it is now safe to start the Domino server and execute server tasks and functions.

- ☐ 6. Perform a new backup. With the successful completion of the disaster recovery process and launching of the new Domino server, new database backup files should be created and secured to avoid any future loss of data.

30.2.10 Errata

The following come from experiences with Notes:

- Do NOT backup all files in the Domino data directory using the UPSTREAM Notes R5 PlugIn as it may result in UPSTREAM crashing (in a Notes API call). You should only backup the Notes database files (*.nsf, *.ntf, and *.box).

- Any failure in UPSTREAM during a Notes backup or restore may hang UPSTREAM or Notes when they attempt to come up later. You must either reboot the machine, or stop all the Notes/Domino processes and manually terminate (using Task Manager) all other Notes processes especially nlogasio.exe.
- In Windows NT, the UPSTREAM restore status window during a log file restore is not associated with the UPSTREAM main window in the same way as it is during standard restores. This is due to the fact that the Notes log file restore facility calls UPSTREAM in a callback procedure from a different thread. This results in the status display not being centered or minimized correctly.
- Lotus has recently changed their documentation for transaction log backups. It is now permissible to back up transaction logs in process and they have documented disaster recovery procedures for these transaction logs. Thus, the FLUSHLOG PlugIn parameter, supported in earlier releases of the UPSTREAM Notes agent is no longer required and has been removed from the dialogs.
- **AIX:** When you upgrade Domino or the UPSTREAM PlugIn, you must purge memory of existing loaded shared libraries using the command **slibclean**. You must be root to run slibclean.
- If you delete or rename the Domino transaction log control file **nlogctrl.lfh**, or make a major transaction log configuration change, the counter file that UPSTREAM uses will be out of sync with the existing transaction logs and you will get UPSTREAM message 10180E (NotesR5) No transaction logs found. Delete the file "LASTARCH.US" in the Domino transaction log directory and perform a new full backup.

31 Microsoft Exchange

Microsoft Exchange is an E-mail management system which is hosted on a Windows NT Server system.

FDR/UPSTREAM includes an exchange agent which uses the Microsoft Exchange Client API for performing backups and restores. This is the method that Microsoft documents and expects backup vendors to use and is based on the idea that DS (directory database) and MDB (Information Store) will be backed up and restored in their entirety. Most users will use this facility; it is described on beginning on page 31-2

The objects stored in the Exchange databases are arranged in a hierarchical structure. The hierarchical structure in the DS database is referred to as the Directory Information Tree (DIT) while the hierarchical structure in the MDB database is a set of mailboxes each with a tree of mail folders.

FDR/UPSTREAM contains a database agent program named MSExchMB.exe which combines the hierarchical structures in the DS and MDB database into a single hierarchical structure and backs it up as though it were a file system. This new functionality allows the individual objects, mailboxes and folders to be backed up as a hierarchy of individual entities which can then be restored either individually or as a group. See page 31-17 for a description of the facility.

FDR/UPSTREAM also includes a backup agent compatible with the Microsoft Extensible Storage Engine (ESE98) which allows online full and transaction log backups of Microsoft Exchange 2000 databases. See page 31-35for a complete description of UPSTREAM for Exchange 2000.

31.1 Microsoft Exchange Backups

31.1.1 Overview

Microsoft Exchange is an E-mail management system which is hosted on a Windows NT Server system. FDR/UPSTREAM includes an exchange agent which uses the Microsoft Exchange Client API for performing backups and restores of each of the two Exchange databases (DS and MDB) in their entirety. This is the backup method recommended and supported by Microsoft.

31.2 Installation and Configuration

31.2.1 Prerequisites

The main component for using FDR/UPSTREAM to backup and restore the Microsoft Exchange databases is a program named **MSExch.EXE**. This is a Windows NT console application that can be executed from a Windows NT command line or from the *Start* or *Run* dialog box and provides all of the functionality required to perform backups and restores for the Microsoft Exchange databases.

MSExch.EXE is a front end program to FDR/UPSTREAM (US.EXE) that uses US.EXE and the Microsoft Exchange Client API to backup and restore the Exchange databases. Depending on how it is configured and the version of FDR/UPSTREAM (US.EXE) you are using, you can have the backups and restores performed using either disk files or named pipe connections

Since named pipes are much more efficient than disk when performing backups and restores, a named pipe is the suggested type of media to be used.

31.2.2 Planning

In Microsoft Exchange version 5.0 there are two databases that have to be backed up. These are the **Directory** database (named “Exchange DS Database” here) and the **Information Store** database (named “Exchange MDB Database” here). The backup plan that you create should deal with backing up both of these databases.

Full and incremental backups can be performed on both of the Microsoft Exchange databases while they are active (i.e. currently in use). This means that you do not have to plan any down time for the databases while they are being backed up.

A full backup of a databases can be performed at any time. An Incremental backup can be performed only if “Circular Logging” has been disabled for the database. Circular logging can be set on neither, one or both of the databases independently of the other. To enable or disable circular logging for either database, use the Microsoft Exchange Administrator program, select the Exchange server that owns the database(s) you want to enable or disable circular logging for, select the properties option for the Exchange server in question and select the **Advanced** tab on the **Properties** dialog. Following is the **Advanced** page of the **Properties** dialog for a server named “WINNT001”:

To allow incremental backups of the Directory database you should uncheck the **Directory** check box.

31.2.3 Microsoft Exchange Configuration

Other than setting the appropriate circular logging options for the two Exchange database, there are no other Microsoft Exchange configuration steps to perform.

31.2.4 FDR/UPSTREAM Configuration

There are a number of FDR/UPSTREAM related steps that need to be performed. These are as follows:

- 1. Determine the MVS storage requirements for the full and incremental database backups.
- 2. Create a FDR/UPSTREAM for MVS backup profile enabled for merge backups. There are no special requirements for the options used for this backup profile other than the enabling of the merge backup option.
- 3. A plan for vaulting the FDR/UPSTREAM for MVS backup datasets for the backup profile should be created to ensure that a failure of MVS storage media does not prevent restoration of one or both of the Microsoft Exchange databases.
- 4. Perform the MSExch.EXE configuration process to prepare MSExch.EXE to backup and restore both of the Exchange databases. This is done by supplying the values for a number of configuration parameters.

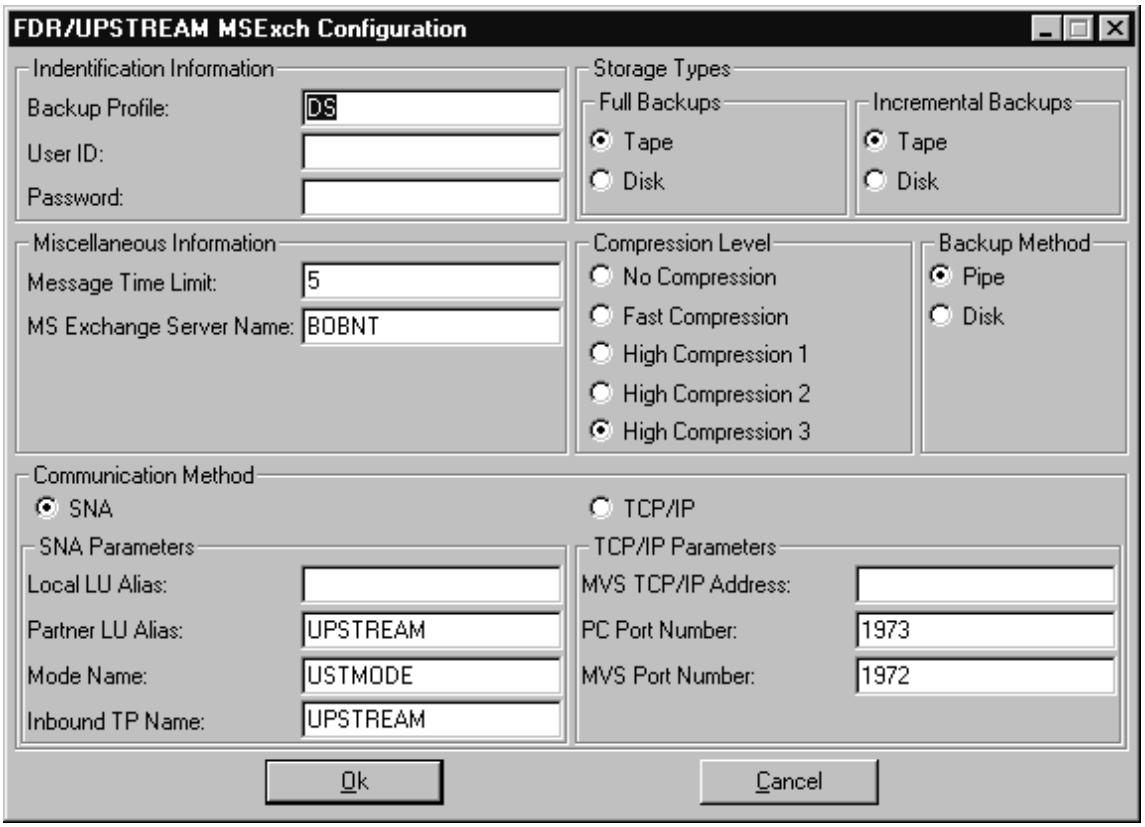
The first three steps listed above are no different from those for any of the servers you are already using FDR/UPSTREAM to back up. The last step is the special MSExch.EXE configuration. To configure a Microsoft Exchange database to be backed up using MSExch.EXE, execute the following two commands from a Windows NT command line:

```
MSExch CONFIGURE DS
MSExch CONFIGURE MDB
```

DS refers to the Directory database and MDB refers to the Information Store database.

The MSExch CONFIGURE command must be executed once for each of the two Exchange databases.

When executed, the MSExch CONFIGURE command will create a subdirectory structure under C:\UPSTREAM (assuming that this is the name of the directory in which MSExch.EXE was installed) for the specified database and then create a file named MSExch.CFG. The MSExch.CFG file contains a number of parameters that subsequent executions of MSExch.EXE will use to perform its functions. Default values will be supplied for most of these parameters, but other parameters need to have specific user- defined values supplied for them. Once invoked to perform the configuration process, MSExch.EXE will display the following configuration dialog:



Most fields are required, and you may need to modify some to best fit your environment:

- **Backup Profile:** The name of the backup profile defined in the FDR/UPSTREAM host configuration dataset. The directory database and the information store must use different backup profiles.
- **User ID:** Your host user ID. This is required only if you have security enable for FDR/UPSTREAM MVS.
- **Password:** Your host password. This is only required if you are required to enter a host user ID above.
- **Storage Types/Full Backups:** The MVS storage type to be used to back up the full database. This can be either disk or tape. The default is tape.

- **Storage Types/Incremental Backups:** The MVS storage type to be used to back up the transaction logs. This can be either disk or tape. The default is tape.

- **Message Time Limit:** The number of seconds that FDR/UPSTREAM will display a message before it times out. This can be either -1(for no message display) or a number in the range 1 - 20.

- **MS Exchange Server Name:** The name of the MS Exchange server that owns the database.

- **Compression Level:** The FDR/UPSTREAM compression level to which the database and log data will be compressed as it is backed up to the host. This can be either No Compression, Fast Compression, High Compression 1, High Compression 2, or High Compression 3. The default is High Compression 3.

- **Backup Method:** The method by which backups and restores to the database are performed. This can be either pipe or disk. The pipe method is the most efficient and is the default.

- **Communication Method:** The communication protocol that FDR/UPSTREAM should used to communicate with the FDR/UPSTREAM host. This can be either SNA or TCP/IP.

  You must enter the following if you are connecting with SNA:

- **Local LU Alias:** The SNA LU alias assigned to FDR/UPSTREAM. This LU alias must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSExch.EXE command from the FDR/UPSTREAM host.

- **Partner LU Alias:** The SNA LU alias assigned to the FDR/UPSTREAM host.

- **Mode Name:** The SNA mode name to be used by FDR/UPSTREAM to communicate with the FDR/UPTREAM host.

- **Inbound TP Name:** The SNA Transaction Program (TP) name for FDR/UPSTREAM.

  You must enter the following if you are connecting with TCP/IP:

- **MVS TCP/IP Address:** The TCP/IP address assigned to the FDR/UPSTREAM host.

- **PC Port Number:** The TCP/IP port number assigned to FDR/UPSTREAM. This port number must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSExch.EXE command from the FDR/UPSTREAM host.

- **MVS Port Number:** The TCP/IP port number assigned to the FDR/UPSTREAM host.

Once all of the required parameter values are supplied and verified, MSExch.EXE creates or modifies the MSExch configuration file (MSExch.CFG) and creates an FDR/UPSTREAM configuration file (UPSTREAM.CFG) and three FDR/UPSTREAM parameter files (DBBKUP.DAT, LOGBKUP,DAT and RESTORE.DAT).

The C:\UPSTREAM\MSExch directory is common to both of the Microsoft Exchange databases that you will use MSExch.EXE to backup and restore. This directory contains **MSExch.LOG** file which details all of the backup and restore activity performed by MSExch.EXE for all databases.

The C:\UPSTREAM\MSExch\DS directory contains the MSExch.EXE configuration file (MSExch.CFG) and the FDR/UPSTREAM configuration and parameter files (UPSTREAM.CFG, DBBKUP.DAT, LOGBKUP.DAT, RESTORE.DAT).

WARNING: If you choose to modify the FDR/UPSTREAM files outside of the MSExch CONFIGURE process note that your changes will be lost the next time a MSExch CONFIGURE process is performed and will have to be reapplied.

The C:\UPSTREAM\MSExch\DS\CtlFiles directory is used by MSExch.EXE to create work files. This directory name is also listed in the UPSTREAM.CFG file as the WORKPATH parameter which means that FDR/UPSTREAM itself will use it for its work files as well.

Finally the C:\UPSTREAM\MSExch\DS\BkpFiles directory is used for storing Microsoft Exchange backup files temporarily, only if disk files are used to perform the backups or restores.

If you wish to use UPSTREAM/SOS for your backups see page 31-13 for a description of additional configuration procedures.

NOTE: You will notice that the comment for the UPSTREAMLocalLUAlias parameter listed above states: *This LU Alias must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSExch.EXE command from the host.* The reason for a unique LU Alias has to do with the way in which MSExch BACKUP is run when it is initiated from the host via a USTBATCH job. The Host Initiation of MSExch.EXE section covers this topic in detail.

31.3 Usage

The MSExch.EXE file provides all of the functionality needed to use FDR/UPSTREAM to perform backups and restores for both Microsoft Exchange databases.

The proper syntax for MSExch.EXE is:

```
MSExch BACKUP DatabaseName FULL [NOTRUNCATE]
MSExch BACKUP DatabaseName INCREMENTAL [NOTRUNCATE]
MSExch RESTORE DatabaseName VersionNumber [NOSTOP] [NOSTART]
MSExch INQUIRE DatabaseName
MSExch CONFIGURE DatabaseName
```

Where:

- **DatabaseName** is the name of the database to be backed up or restored. This must be either "DS" or "MDB".
- **VersionNumber** is the UPSTREAM version number for the full or incremental backup to be restored. If the version number specified is an incremental backup, the previous full backup for the database will be identified and a restore will be performed for each of the versions from the full backup up to and including the incremental backup version specified.

The BACKUP optional modifier:

- **NOTRUNCATE** By default, UPSTREAM will truncate the transaction logs after a backup. By specifying this modifier, UPSTREAM will not truncate the transaction logs, effectively producing a differential backup. This option is not generally recommended.

The RESTORE optional modifiers:

- **NOSTOP** By default, MSExch will stop the appropriate service before beginning the restore. The service must be stopped before the restore will work. If you wish to verify that the restore is going to the correct server, you can specify this option and then manually stop the service before the restore.
- **NOSTART** By default, MSExch will restart the service after the restore. You must restart all of the services before restarting the machine. However, if you will be restoring both MDB and DS, you must not restart the services between restores (you must wait until the last restore has completed).

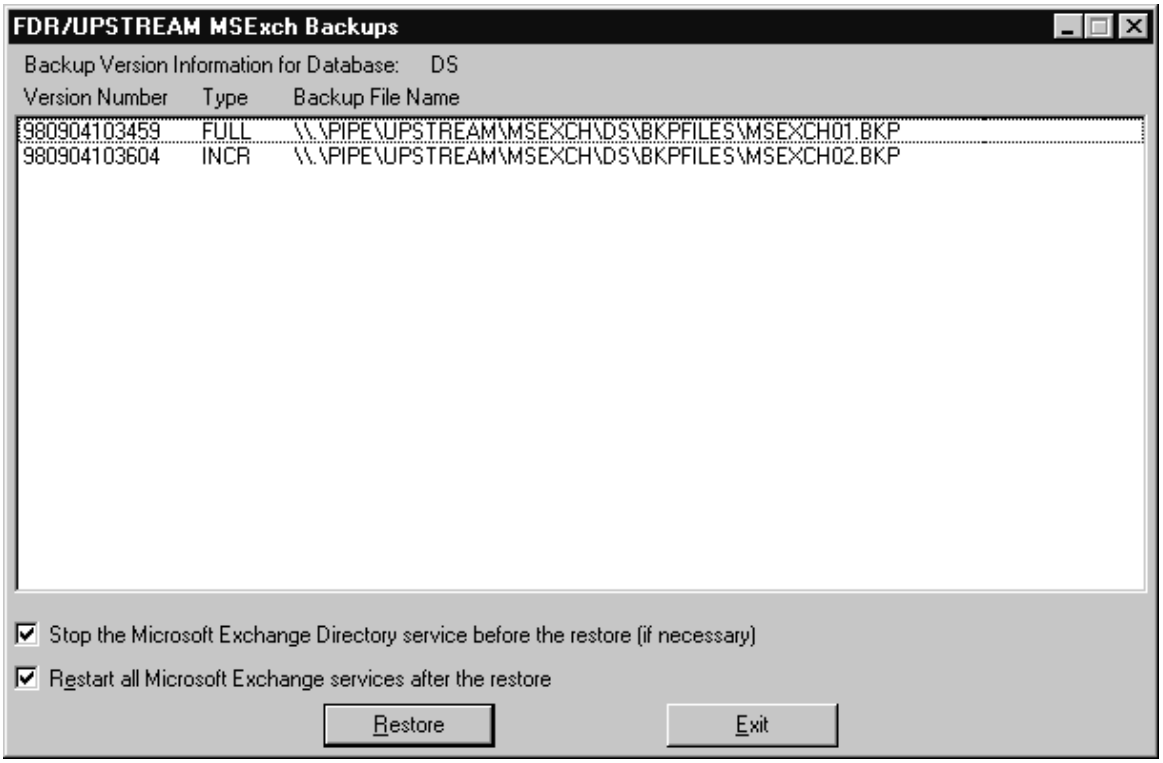
The database name supplied to MSExch.EXE must be either "DS" or "MDB". "DS" refers to the **Directory** database and "MDB" refers to the **Information Store** database. Before performing any backups or restores you need to check the state of the appropriate Exchange service as follows:

- Before executing "MSExch.EXE BACKUP DS" you must make sure that the "**Microsoft Exchange Directory**" service is running.
- Before executing "MSExch.EXE RESTORE DS" you must make sure that the "**Microsoft Exchange Directory**" service is stopped.
- Before executing "MSExch.EXE BACKUP MDB" you must make sure that the "**Microsoft Exchange Information Store**" service is running.
- Before executing "MSExch.EXE RESTORE MDB" you must make sure that the "**Microsoft Exchange Information Store**" service is stopped.

To perform a full database backup of a database, you would execute a 'MSExch BACKUP DatabaseName FULL' command. To perform an incremental backup of only a database's log files you would execute a 'MSExch BACKUP DatabaseName INCREMENTAL' command.

If you are going to restore both DS and MDB you must not restart the appropriate service before restoring both databases. However, when all restores are complete you must restart the appropriate service(s) before you restart the machine. Also, you must not perform a registry restore before you restart the appropriate service(s).

To perform a restore of a database with or without the restoration of any of its log files you would first use the 'MSExch INQUIRE DatabaseName' command to display a list of available FDR/UPSTREAM backups and their version numbers. The MSExch INQUIRE process will display the following dialog:



The two checkboxes are:

- **Stop the Microsoft Exchange Directory Service before the restore (if necessary):** Since the directory service must be stopped for the restore to be successful, this checkbox is checked by default.

- **Restart all Microsoft Exchange services after the restore:** Microsoft Exchange will report spurious errors if the services are not restarted after a restore, but are automatically started as the result of a reboot. Checking this box will keep these errors from occurring. You should not check this box if you are going to be restoring the other Exchange database before you restart the machine. This checkbox is checked by default.

To restore from a particular backup version, you first select the version to be restored and press the **Restore** button or just double-click on the version entry.

If you wish, you can command line execute the restore. For example, to restore the Directory service with UPSTREAM version date 980224110744, enter:

```
MSExch RESTORE DS 980224110744
```

Since the specified version number is from an incremental backup, MSExch will first restore from the previous full backup (version 980224110704) and then restore version 980224110744.

The method by which MSExch.EXE performs these backups and restores (either via a disk file or a named pipe), and the other parameters that control how MSExch.EXE and FDR/UPSTREAM (US.EXE) operate, are determined at the time that the database is configured for MSExch.EXE as explained in the **FDR/UPSTREAM Configuration** section (section 31.2.4, 33.2.4).

Each execution of a MSExch command causes MSExch.EXE to log its activity in a file named MSExch.LOG. This file is maintained in the C:\UPSTREAM\MSExch directory and has a format similar to a regular UPSTREAM.LOG file. In other words, each entry in the MSExch.LOG file starts with a time stamp. Over time, the MSExch.LOG file can become quite large. Therefore, to manage its size you can use the USLOGCLR.EXE program found in the C:\UPSTREAM directory to discard the activity older than a specified number of days. For example, the following command will cause the activity in the MSExch.LOG file older than 30 days to be discarded:

```
C:\UPSTREAM\USLOGCLR 30 C:\UPSTREAM\MSExch\MSExch.LOG
```

The return codes that MSExch.EXE can return are as follows:

- 0 - If the requested function was performed successfully.
- 4 - If a miscellaneous MSExch.EXE error occurred.
- 8 - If an FDR/UPSTREAM (US.EXE) error occurred.
- 12 - If one or more of the MSExch.EXE parameters were missing or invalid.

31.4 Operation

MSExch.EXE can be implemented in a production environment in a number of ways. Some of these are:

- Executing MSExch.EXE on the same server that Microsoft Exchange executes or on a different server within the same Windows NT domain.
- Executing MSExch.EXE in a logged on user environment or in a service process.
- Initiating a MSExch.EXE backup or restore from the host or initiating it from a Windows NT server either automatically or through some automated scheduler.

MSExch.EXE can be executed on any machine within the Windows NT domain in which Microsoft Exchange is deployed. The only requirement is that MSExch.EXE must be installed in and executed from the same directory as the FDR/UPSTREAM US.EXE program (typically C:\UPSTREAM). MSExch.EXE finds the Microsoft Exchange server via the MSExchServerName parameter in the MSExch.CFG file that is created during the MSExch CONFIGURE process.

If MSExch.EXE is executed on the server on which the MS Exchange services are running, MSExch.EXE must be run using the same Windows NT user account as the MS Exchange services.

Check the Startup/Log On As information for each of the MS Exchange services from the Control Panel/Services applet to determine under which Windows NT user account the MS Exchange services run, and then run the MSExch.EXE BACKUP and RESTORE commands under this same Windows NT account.

MSExch.EXE can be executed either in the context of a logged on user or as a Windows NT service. When run as a service it must be executed under a user-specified User Account and not the System Account; if run on the MS Exchange machine it must be run under the same user account as Exchange uses. This restriction is associated with the Microsoft Exchange security system. This user-specified User Account must be defined in Microsoft Exchange with permissions to the database in question. If the MSExch.EXE service is executed in the context of the System Account or the User Account has not been granted the appropriate permissions, MSExch.EXE will not be able to backup or restore the database.

The greatest flexibility of MSExch.EXE is the method used to initiate it. If MSExch.EXE is to be initiated from a Windows NT server, it can be executed manually, via the Windows NT scheduler or via any other automated mechanism.

Most FDR/UPSTREAM customers like to have the host control all FDR/UPSTREAM operations. Because of this, MSExch.EXE can be initiated from the host as well. To accomplish this, a second communication path between the Windows NT server and the host has to be established. In a SNA environment this means an additional LU and in a TCP/IP environment an additional TCP/IP port number. Host initiation is covered in the next section.

31.5 Host Initiation of MSExch.EXE

MSExch.EXE can be initiated from the host via a USTBATCH job. A sample set of USTBATCH parameters for invoking MSExch.EXE follow:

```
APPLPREF=UPSTR
USAPPL=UPSTREAM
LOGMODE=USTMODE
TARGLU=PCLU1
TPNAME=UPSTREAM
MAXRETRY=0
CONV=WAIT
ACTION=5
JOBOPTIONS=2
JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8
FILES=C:\UPSTREAM\MSEXCH.EXE BACKUP DS FULL
/*
```

Using this sample set of USTBATCH parameters, the backup process goes something like this:

- 1. The USTBATCH job is submitted for execution.
- 2. USTBATCH starts a conversation on LU UPSTR001 (APPLPREF=UPSTR) with the UPSTREAM started task on the host (USAPPL=UPSTREAM) and requests that a conversation with the Windows NT server (TPNAME=UPSTREAM) be started using the LU assigned to the Windows NT server (TARGLU=PCLU1).
- 3. The UPSTREAM TP on the Windows NT server is started, FDR/UPSTREAM for Windows is invoked and completes the connection.
- 4. The request to execute a job (ACTION=5) is passed down to FDR/UPSTREAM for Windows along with the program specification for the job (FILES=C:\UPSTREAM\MSEXCH.EXE BACKUP DS FULL).
- 5. FDR/UPSTREAM for Windows will invoke MSEXCH.EXE, wait for MSEXCH.EXE to finish execution and return a return code, and then terminate itself (JOBOPTIONS=2). Once MSEXCH.EXE is finished, FDR/UPSTREAM for Windows will map the MSEXCH.EXE return code into a return code that the USTBATCH job can interpret (JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8).
- 6. During the time that FDR/UPSTREAM for Windows is waiting for MSEXCH.EXE to finish, it will still have an active conversation with the host on the LU named PCLU1. When MSEXCH.EXE executes, it will build a FDR/UPSTREAM parameter file to execute via a second copy of US.EXE (FDR/UPSTREAM).

During the execution of the second copy of US.EXE (step #6 above), a second conversation with the host is initiated via the LU alias configured on the UPSTREAMLocalLUAlias parameter in the MSExch.EXE configuration file (MSExch.CFG). If you are using SNA and not using parallel sessions the UPSTREAM Local LU Alias parameter must have a LU alias for a LU name that is different from the one specified in the USTBATCH JCL (for example not PCLU1). The reason for this is that the first LU will be still be in use for the conversation that caused the MSExch.EXE job to be executed in the first place. The second LU is needed to start a conversation that will be used by the backup.

The scenario outlined here works the same way for TCP/IP except that TCP/IP does not have a concept similar to a TP (Transaction Program). This means that FDR/UPSTREAM for Windows must already be executing and waiting for the job request to be passed down from the host. Also since FDR/UPSTREAM should continue

to execute after MSExch.EXE has finished its execution, the JOBOPTIONS parameter should be JOBOPTIONS=3.

More information about remote host initiation, particularly TCP/IP conversations, can be found in the FDR/UPSTREAM for MVS manual.

31.6 MS Exchange and UPSTREAM/SOS

Before starting the reconfiguration of the MSExch DS and MDB backups, you must perform a number of steps as follows:

- 1. Perform the initial configuration for the DS and MDB by executing the MSEXCH CONFIGURE DS and MSEXCH CONFIGURE MDB commands (see section 31.2.4, 33.2.4).
- 2. Perform the appropriate configuration steps for the FDR/UPSTREAM/SOS local EMC disks as described in the UPSTREAM/SOS chapter.

Once the prerequisite steps have been performed, you are now ready to reconfigure the FDR/UPSTREAM template parameter files. When you execute the MSEXCH CONFIGURE DS and MSEXCH CONFIGURE MDB commands, the following FDR/UPSTREAM template parameter files are created:

```
C:\UPSTREAM\MSExch\DS\DBBKUP.DAT
C:\UPSTREAM\MSExch\DS\LOGBKUP.DAT
C:\UPSTREAM\MSExch\MDB\DBBKUP.DAT
C:\UPSTREAM\MSExch\MDB\LOGBKUP.DAT
```

Although not complete (unable to be used to perform real backups), these parameter files can be further modified with the main FDR/UPSTREAM program, US.EXE. To do this, start US.EXE and perform the following steps for each of the template parameter files:

☐ 1. Pull down the **File** menu from the main UPSTREAM screen and select **Open**. This displays the **File Open** dialog.

☐ 2. Double-click on the **[MSExch]** entry in the list box to go to down to the MSExch subdirectory.

☐ 3. Double-click on **[DS]** or **[MDB]** entry in the list box to go down to the DS or MDB subdirectories.

☐ 4. Double-click on the **DBBKUP.DAT** or **LOGBKUP.DAT** entry in the list box to open the parameter file. This displays either the Host Security Validation dialog or the Backup Parameters dialog. If the Host Security Validation dialog is displayed, reenter your password and press the Validate button to revalidate your security information. The Backup Parameters dialog will then be displayed.

☐ 5. Click on the **Local Bkp…** button. This displays the **Local Backup More…** dialog.

☐ 6. Press the **FDRSOS Physical Disk Local Backup** radio button. This causes the Select Disk… list box to be filled in with a list of physical disk IDs.

☐ 7. Select the disk ID of the EMC disk that was configured by the UPSTREAM/SOS setup step which was performed as one of the prerequisites.

☐ 8. Press the **Check Disk** button to verify that this is the correct disk.

☐ 9. Press the **Ok** button. The Backup Parameters dialog will be redisplayed.

☐ 10. Press the **Save or Begin…** button. This will display the Save Parameters/Backup dialog.

☐ 11. Press the **Save** button to save your parameters back to the original parameter file.

Once these steps have been performed for each of the template parameter files listed above, you are now ready to perform your MSExch backups as you normally would. Now when FDR/UPSTREAM backs up the data it will do so using the EMC local disks as a backup medium.

WARNING: If you ever need to execute the MSEXCH CONFIGURE DS or MSEXCH CONFIGURE MDB commands again, you will then also have to reconfigure the template parameter files as described above.

31.7 Additional Information

Microsoft has provided a number of documents that deal with the subject of Disaster Recovery for a MS Exchange server.

The most complete document dealing with MS Exchange Disaster Recovery is **Chapter 4 MS Exchange Server Disaster Recovery** found in the BackOffice Resource Kit:

BackOffice Resource Kit
Backoffice Resource Kit Part 2
Exchange Server Resource Guide, Supplement 1
Chapter 4 MS Exchange Server Disaster Recovery

A number of Knowledge Base articles are also available on this subject:

- Q148993 - Cannot Perform Forklift Upgrade Using UPDATE.EXE
- Q149950 - How to Search for Microsoft Exchange Articles by Topic
- Q154481 - README.TXT Microsoft Exchange 5.0 U.S. Service Pack 1
- Q154491 - DS/IS Fails to Re-create Mailboxes in Subcontainers
- Q154792 - Exchange and Schedule+ White Papers and Their Locations
- Q157562 - How To Merge Two .PST Files
- Q158699 - README.TXT Microsoft Exchange 4.0 U.S. Service Pack 4
- Q163589 - Restoring from an OST after Deleting the Mailbox
- Q164805 - Contents of This Public Folder Currently Unavailable
- Q168735 - README.TXT: Microsoft Exchange 5.0 U.S. Service Pack 2
- Q168892 - MTA Reports Failure on Ecbios.dll During Startup
- Q169859 - Event ID 1081 and Service Specific Error 0x00000057
- Q170473 - MTA Error 2194, Usually After Recovery
- Q170810 - Service Specific Error 4021 Starting Information Store
- Q174693 - Exchange Organization Name Is Case Sensitive
- Q174763 - Propagate These Properties… Option Does Not Appear
- Q175469 - Information Store Server Specific Error 2
- Q177635 - How to Set Up a Disaster Recovery Server for Dir.edb
- Q180403 - Error Message Trying to Install Exchange 5.5 Upgrade Only
- Q182979 - Function & Effects of the DS/IS Consistency Adjustment
- Q184186 - Recovering Exchange from a Corrupted Directory
- Q185005 - How To Restore a 4.0 Directory To a 5.0 Server
- Q185078 - Recommendations for Successful Disaster Recovery
- Q188645 - Deleted Directory Objects Remain Deleted

- Q190713 - Key Management Server Backup and Disaster Recovery

Two of these Knowledge Base articles reference a set of MS Exchange Disaster Recover documents:

- Q158699 - README.TXT Microsoft Exchange 4.0 U.S. Service Pack 4
- Q168735 - README.TXT Microsoft Exchange 5.0 U.S. Service Pack 2

The documents referenced by these two KB articles are:

- EDRV4P1.DOC - Microsoft Exchange Disaster Recovery Part 1
- EDRV4P2.DOC - Microsoft Exchange Disaster Recovery Part 2

31.8 Backup and Restore of Individual Microsoft Exchange Objects

31.8.1 Overview

Microsoft Exchange is an Email management system which is hosted on a Windows NT Server system. The information managed by MS Exchange is stored as objects in two databases, the Directory Services (DS) database and the Mailbox DataBase (MDB). The objects stored in these two databases are arranged in a hierarchical structure. The hierarchical structure in the DS database is referred to as the Directory Information Tree (DIT) while the hierarchical structure in the MDB database is a set of mailboxes each with a tree of mail folders.

FDR/UPSTREAM contains a database agent program named MSExchMB.exe which combines the hierarchical structures in the DS and MDB database into a single hierarchical structure and backs it up as though it were a file system. This new functionality allows the individual objects, mailboxes and folders to be backed up as a hierarchy of individual entities which can then be restored either individually or as a group.

This section describes the functionality of the FDR/UPSTREAM MSExchMB database agent program. It assumes that you are familiar with the basic operation of FDR/UPSTREAM and does not attempt to describe the FDR/UPSTREAM fundamentals. This section assumes that you have at least some familiarity with the functionality and structure of MS Exchange.

31.8.2 MSExchMB and FDR/UPSTREAM

MSExchMB.exe is a FDR/UPSTREAM database agent program. It is a Windows NT console application program that can be executed from a Windows NT command line or from the **Start | Run** dialog box. MSExchMB also provides a number of dialogs to assist you in specifying backups and restores.

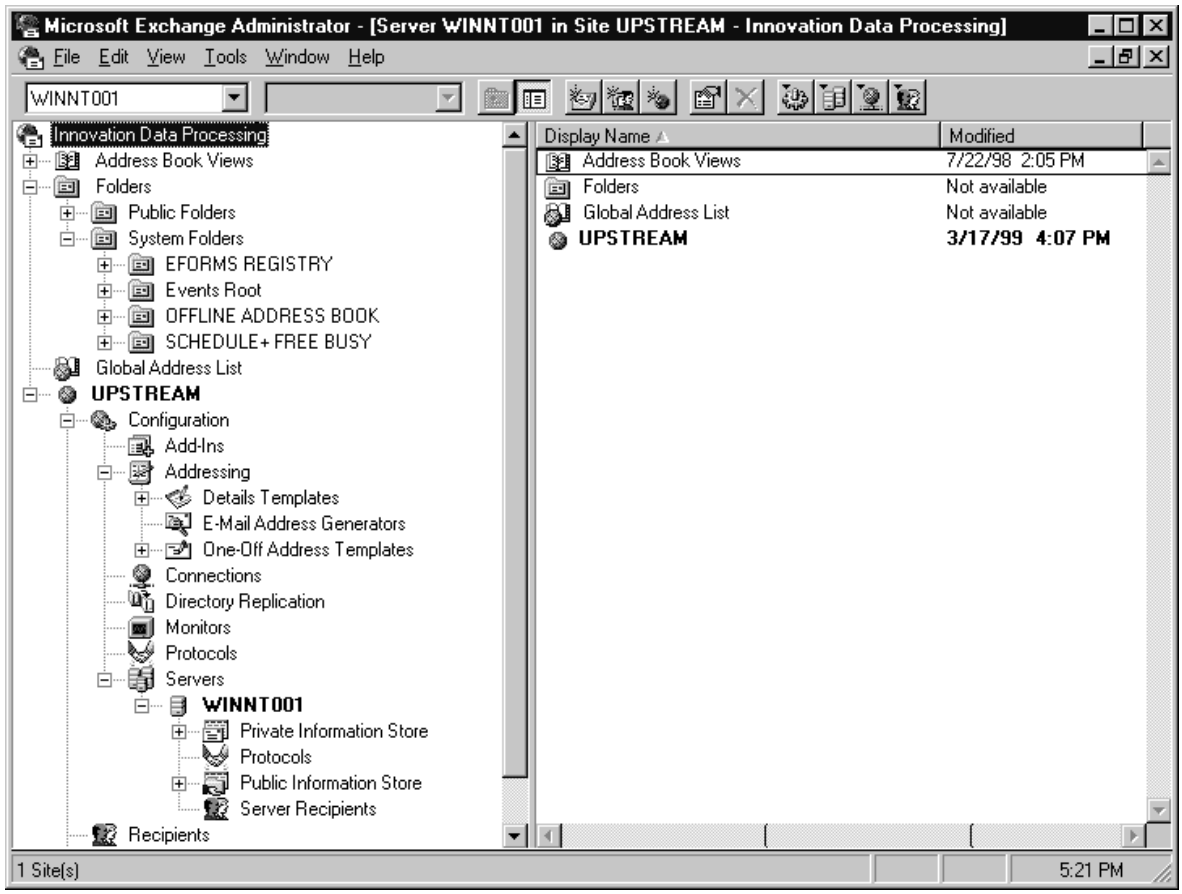
MSExchMB is a front end program to FDR/UPSTREAM (US.EXE) that uses FDR/UPSTREAM and two MS Exchange APIs (DAPI - Directory Access Program Interface and MAPI - Message Application Program Interface) to backup the DS and MDB databases as though they were a single file system.

MSExchMB is executed first to perform backups, restores and version inquiries. It then invokes FDR/UPTREAM as a subprogram to perform the actual backup, restore or inquiry functions. MSExchMB emulates the FDR/UPSTREAM ULTRA.EXE program and communicates with FDR/UPSTREAM via TCP/IP to make the combined DS and MDB hierarchy appear to FDR/UPSTREAM as though it were a normal disk based file system. As far as FDR/UPSTREAM is concerned, it is using ULTra to back up or restore a normal file system.

Because of this relationship no additional FDR/UPSTREAM configuration is required. The only requirement for FDR/UPSTREAM is that it must be version 3.1.0 or above. The configuration steps for MSExchMB and the FDR/UPSTREAM host are discussed in the *Configuration* section below.

31.8.3 The DS, MDB and MSExchMB Hierarchies

As explained in the *Overview* section, the Directory Services (DS) database and Mailbox DataBase (MDB) are the two databases in which MS Exchange stores its objects. Most of the objects stored in the DS can be viewed and maintained using the MS Exchange Administrator application. An example of a partial Directory Information Tree as shown by the MS Exchange Administrator program follows:

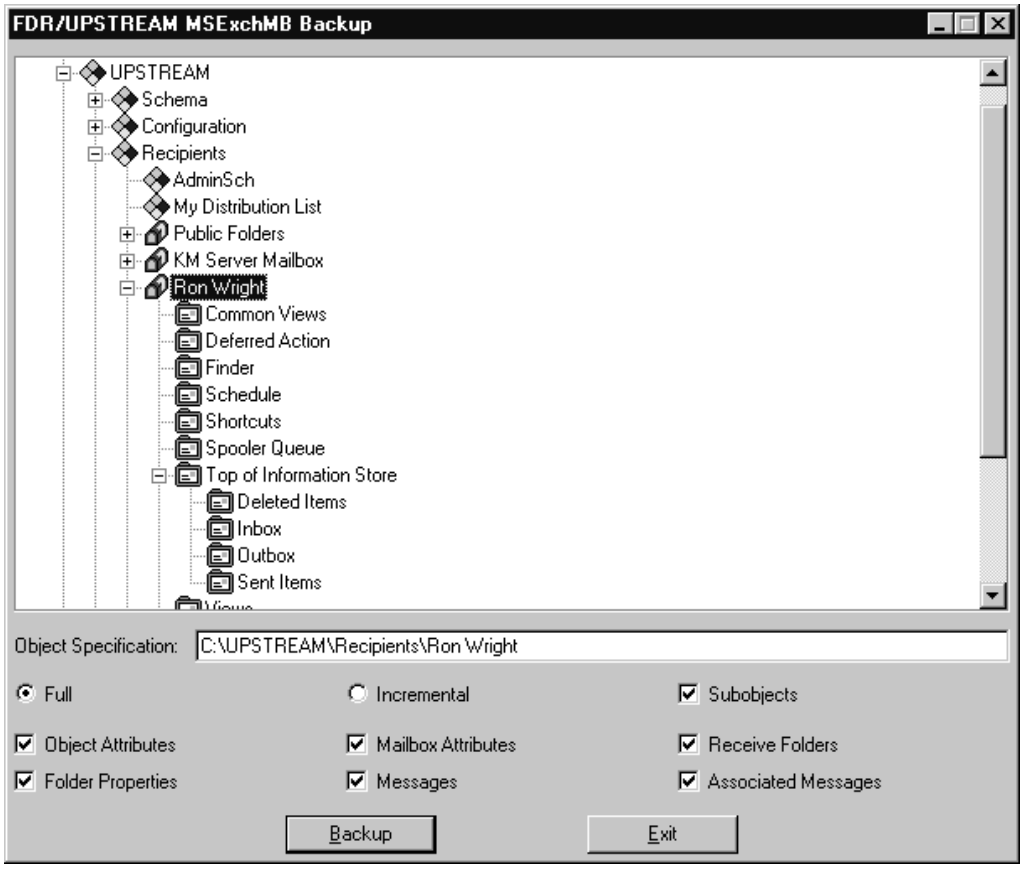


There are some objects in the DS that are not shown by the MS Exchange Administrator program, such as the Schema object (and its subobjects) which is a subobject of the site object (for example, Innovation Data Processing\UPSTREAM\Schema).

MS Exchange maintains a separate MDB database for each MS Exchange server. The information stored in a MDB database is maintained as a hierarchy of mailbox, folder and message objects belonging to individual recipients (users). To view and maintain the objects in a single recipient's mailbox, a MS Exchange client program such as Outlook 97 can be used.

These two databases are related by individual mailbox entries. At the bottom of the DIT are one or more recipient container objects which contain one or more recipient objects. The default recipient container object in the DIT is named "Recipients". Each of the individual recipient objects in the recipient container objects has its own hierarchy of folder and message objects in the MDB.

The UPSTREAM program MSExchMB uses this relationship between recipient objects and their mailbox objects to build a single hierarchy containing the entire DIT (Directory Information Tree) with the individual mailbox object hierarchies grafted onto the individual recipient objects. An example of this combined object hierarchy can be seen in the following MSExchMB Backup dialog display:



In this display the relationship between the DS and MDB can be seen starting at the **Innovation Data Processing\UPSTREAM\Recipients\Ron Wright** mailbox object. Throughout the rest of this document, the term recipient and mailbox will be used interchangeably. Under the Ron Wright mailbox object is a hierarchy of folder objects. If you were to view this folder object hierarchy in Outlook 97, you would not see the entire hierarchy shown here. This is because Outlook 97 hides all of the folder objects which are not part of the **Top of Information Store** folder object tree. In Outlook 97, the **Top of Information Store** folder object is shown as the root folder for the mailbox.

You may notice that the hierarchy presented by MSExchMB does not exactly match the hierarchy presented by the MS Exchange Administrator program. Specifically, the **Innovation Data Processing\Folders** object presented by the MS Exchange Administrator program is presented by MSExchMB as the **Innovation Data Processing\UPSTREAM\Recipients\Public Folders** object. This is due to the fact that the MS Exchange Administrator program takes some liberties in how it displays the objects in the DIT which is not exactly how the information is stored in the DS database.

The MSExchMB object hierarchy is described in further detail in the following **MSExchMB Object Hierarchy and Files** section.

The DIT has an object for each of the individual MS Exchange servers. Because all of the MS Exchange servers within a single MS Exchange site are part of the same DIT, MSExchMB has the capability to backup all of the MS Exchange servers within an individual MS Exchange site as a single backup.

31.8.4 MSExchMB Object Hierarchy and Files

As described in the **MSExchMB and FDR/UPSTREAM** section, MSExchMB makes the MS Exchange object hierarchy appear as a file system to FDR/UPSTREAM. To do this, each object in the hierarchy is represented as a file system directory. For example, the **Organization\Site\Recipients** object is represented as the **C:\Site\Recipients** directory and the **Organization\Site\Recipients\User\Top of Information Store\Inbox** folder object is represented as the **C:\Site\Recipients\User\Top of Information Store\Inbox** directory.

The actual data for any given object is represented as one or more files under the directory associated with the object. The names of the files used to backup the object's data is dependent on the type of object. MSExchMB has three different classifications of objects:

- **Object:** For all "generic" objects that are not mailbox or folder objects.
- **Mailbox:** For individual mailbox (recipient) objects.
- **Folder:** For individual mail folder objects belonging to a mailbox.

The data for an "Object" object is backed up by MSExchMB and stored on the host in a file named **Object Attributes.bin**. The data for a "Mailbox" object is backed up in two files named **Mailbox Attributes.bin** and **Receive Folders.bin**. And the data for a "Folder" object is backed up in three files named **Folder Properties.bin**, **Messages.bin** and **Associated Messages.bin**.

MSExchMB does not back up individual mail messages or associated messages (associated messages are used internally by MS Exchange) as unique objects, but instead groups all of the messages and associated messages within the same mail folder into the **Messages.bin** and **Associated Messages.bin** files respectively. The reason for this grouping of messages is to keep the number of file information records in the FDR/UPSTREAM host FILEINFO cluster to a minimum.

Using this representation the following sample subset of files might be backed up from a MS Exchange site:

```
C:\Site\Recipients\Object Attributes.bin
C:\Site\Recipients\User\Mailbox Attributes.bin
C:\Site\Recipients\User\Receive Folders.bin
C:\Site\Recipients\User\Folder Properties.bin
C:\Site\Recipients\User\Messages.bin
C:\Site\Recipients\User\Associated Messages.bin
C:\Site\Recipients\User\Top of Information Store\Folder Properties.bin
C:\Site\Recipients\UserTop of Information Store\Messages.bin
C:\Site\Recipients\User\Top of Information Store\Associated Messages.bin
C:\Site\Recipients\User\Top of Information Store\Inbox\Folder Properties.bin
C:\Site\Recipients\User\Top of Information Store\Inbox\Messages.bin
C:\Site\Recipients\User\Top of Information Store\Inbox\Associated Messages.bin
```

In the preceding example you will notice that the C:\Site\Recipients\User directory has five files:

```
Mailbox Attributes.bin
Receive Folders.bin
Folder Properties.bin
Messages.bin
Associated Attributes.bin
```

This is because the C:\Site\Recipients\User directory is not only the directory for the mailbox object, but also the directory for the root folder object within the mailbox. The **Mailbox Attributes.bin** file contains the information for the mailbox object itself. The **Receive folders.bin** file contains information about the receive folder settings for the mailbox. The **Folder Properties.bin** file contains the information for the root folder object of the mailbox. The **Messages.bin** file is a grouping of the individual message objects in the root folder. And the **Associated Messages.bin** file is a grouping of the individual associated message objects in the root folder.

Of the six different types of object data files (Object Attributes.bin, Mailbox Attributes.bin, Receive Folders.bin, Folder Properties.bin, Messages.bin and Associated Messages.bin), the four non-message files (Object Attributes.bin, Mailbox Attributes.bin, Receive Folders.bin and Folder Properties.bin) do not contain any information such as a last modification time stamp. Because of this lack of a last modification time stamp, MSExchMB cannot determine if the data has changed since the last backup and therefore, these files will always be backed up regardless of whether the backup is a full or incremental backup.

The Messages.bin and Associated Messages.bin files will also always be backed up regardless of whether the backup is a full or incremental backup, but the messages and associated messages that they contain will either be the full set or a subset of the messages depending on the last modification time stamps for the messages themselves. Therefore, for a full backup, the **Messages.bin** file will contain all of the messages currently in the associated folder, but on an incremental backup, the **Messages.bin** file will contain only those messages that have been modified since the last time a backup was performed. The same rule applies to the associated messages in the **Associated Messages.bin** file.

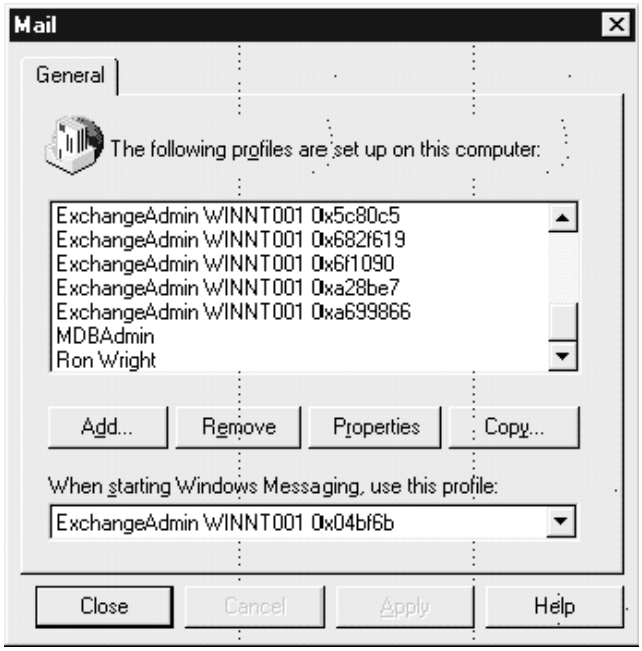
When it comes time to restore any of the MS Exchange objects, MSExchMB enforces a number of rules as follows:

- Generic object (i.e. non-mailbox and non-folder objects) data (Object Attributes.bin) may only be restored back to the same generic object that it was backed up from. This is due to the fact that although MSExchMB treats generic objects the same, they are really very diverse types of objects in MS Exchange and to restore one type of object information to another type of object makes no sense.
- Mailbox object data (Mailbox Attributes.bin and Receive Folders.bin) may only be restored back to the same mailbox object that it was backed up from.
- Folder object data (Folder Properties.bin, Messages.bin and Associated Messages.bin) may be restored from any folder to any other folder within the same mailbox except for the “Public Folders” mailbox.
- Folder object data for a folder within the “Public Folders” mailbox may only be restored back to the same folder from which it was backed up. The reason for this is that although the “Public Folders” mailbox may contain any number of user-defined folders to be used for user-defined purposes, there are a number of system-defined folders which contain specific system-defined information which should not be intermixed. An example of a system-defined folder is **Organization\Site\Public Folders\NON_IPM_SUBTREE\Events Root**.
- When the messages in a Messages.bin file are restored, they are added to the specified folder as new messages and will not overlay any messages that are already in the folder even if they are duplicates. The same rule applies to the associated messages in an Associated Messages.bin file.

31.9 Configuration

There are a number of configuration steps that need to be performed before you can use MSExchMB to perform your first backup. These are as follows:

☐ 1. Create a MS Exchange profile. Most users can use the **Mail** applet in the Windows NT Control Panel An example of the dialog for maintaining MS Exchange profiles follows:



If you do not have a Mail applet, you can create a profile by using Microsoft Outlook:

- Start Outlook (not Outlook Express), pull down the **Tools** menu and select the **Options...** submenu. Press the **Mail Services** tab, and in the Startup settings frame, press the **Prompt for a profile to be used** radio button. Press the **Ok** button and exit Outlook.
- Restart Outlook. This will display the Choose Profile dialog. Press the New... button to start the Microsoft Outlook Setup Wizard. Press the **Use the following service(s) radio button** only check the **Microsoft Exchange Server** checkbox and press the **Next>** button.
- Enter the name of a profile you wish to create and press the **Next>** button.
- Enter the name of the Exchange server and the name of the Exchange mailbox to use for this profile. Press the Next> button.
- Press the **No** radio button in response to **Do you travel with this computer** and press the **Next>** button.
- Press the **Finish** button to complete the creation of the profile.

☐ 2. Determine the MVS storage requirements for the full and incremental backups.

☐ 3. Create a FDR/UPSTREAM host backup profile enabled for merge backups. There are no special requirements for the options used for this backup profile other than the enabling of the merge backup option.

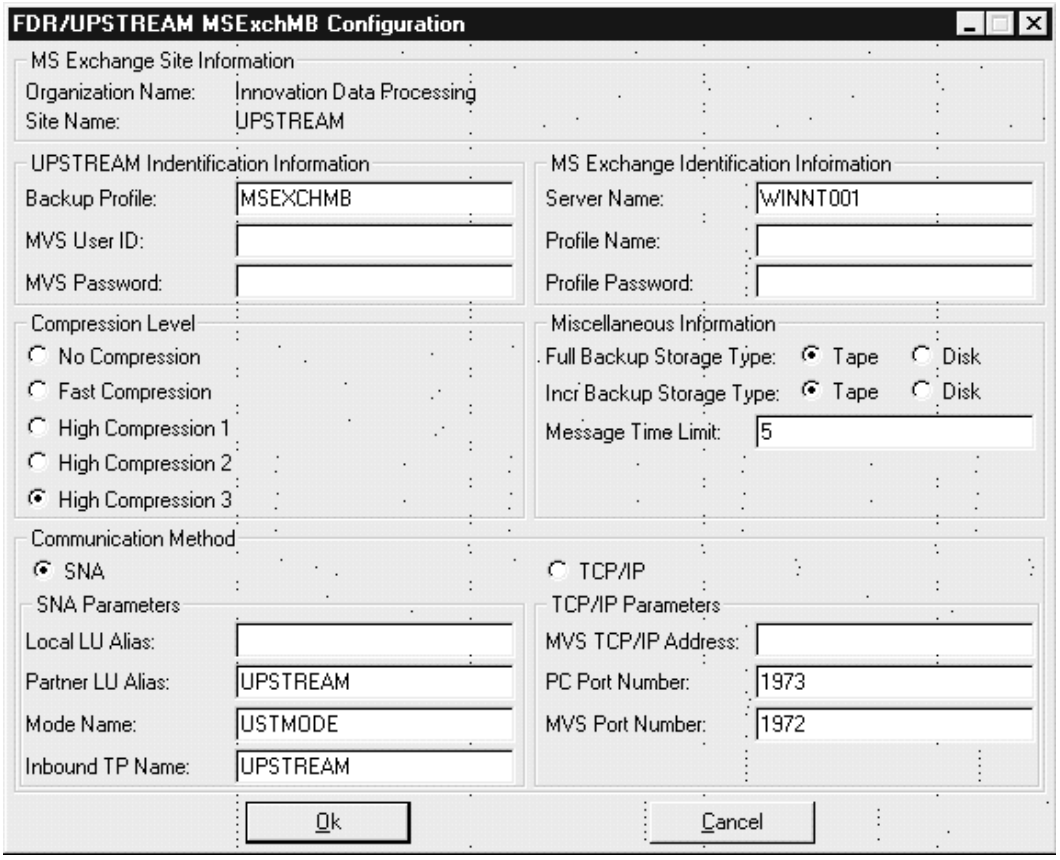
- ☐ 4. A plan for vaulting the FDR/UPSTREAM host backup datasets for the backup profile should be created to ensure that a failure of MVS storage media does not prevent restoration your MS Exchange objects.

- ☐ 5. Perform the MSExchMB configuration process to prepare MSExchMB to backup and restore your MS Exchange objects. This is done by supplying the values for a number of configuration parameters.

Steps 2 through 4 listed above are no different from those for any of the servers you are already using FDR/UPSTREAM to back up. The last step is the special MSExchMB configuration. To get ready to perform your first MSExchMB backup, execute the following command from a Windows NT command line:

```
C:\UPSTREAM> MSExchMB CONFIGURE
```

When executed, the MSExchMB CONFIGURE command will create a subdirectory under C:\UPSTREAM (assuming that this is the name of the directory in which MSExchMB.exe was installed) named MSExchMB and then create a file named MSExchMB.cfg. The MSExchMB.cfg file contains a number of parameters that subsequent executions of MSExchMB will use to perform its functions. Default values will be supplied for most of these parameters, but other parameters need to have specific user-defined values supplied for them. Once invoked to perform the configuration process, MSExchMB will display the following configuration dialog:



You will need to fill in the fields that are blank and may have to change some of the other fields if the defaults are not to your liking. The fields on this dialog are detailed below:

- ☐ **Backup Profile:** The name of the backup profile defined in the FDR/UPSTREAM host configuration dataset.

- ☐ **MVS User ID:** The user ID associated with the Backup Profile defined in the FDR/UPSTREAM host configuration.

- ☐ **MVS Password:** The password for the user ID associated with the Backup Profile defined in the FDR/UPTREAM host configuration.

- ☐ **Server Name:** The name of the MS Exchange server from which MSExchMB will get the DIT.

- ☐ **Profile Name:** The name of the MS Exchange profile (created in step 1 of the Configuration above) to be used to access the individual MS Exchange MDB databases.

- ☐ **Profile Password:** The password (if any) associated with the profile name.

- ☐ **Compression Level:** The level to which the individual object data files will be compressed as they are backed up to the host. This can be No Compression, Fast Compression, High Compression 1, High Compression 2, or High Compression 3. The default is High Compression 3.

- ☐ **Full Backup Storage Type:** The MVS storage type to be used to back up the full MS Exchange tree. This can be either disk or tape. The default is tape.

- ☐ **Incr Backup Storage Type:** The MVS storage type to be used to back up the MS Exchange tree incrementally. This can be either disk or tape. The default is tape.

- ☐ **Message Time Limit:** The number of seconds that FDR/UPSTREAM will display a message before it times out. This can be -1 (for no message display) or a number in the range 1 - 20. The default is 5.

- ☐ **Communication Method:** The communication protocol that FDR/UPSTREAM should use to communicate with the FDR/UPSTREAM host. This can be either SNA or TCP/IP.

  If you specified SNA, you'll have to enter the following:

- ☐ **Local LU Alias:** The APPC LU alias assigned to FDR/UPSTREAM in your communications configuration. This LU alias must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating MSExchMB commands from the FDR/UPSTREAM.

- ☐ **Partner LU Alias:** The APPC LU alias assigned to the FDR/UPSTREAM host in your communications configuration.

- ☐ **Mode Name:** The APPC mode name to be used by FDRUPSTREAM to communicate with the FDR/UPTREAM host.

- ☐ **Inbound TP Name:** The SNA Transaction Program (TP) name for FDR/UPSTREAM.

  If you specified TCP/IP, you'll have to enter the following:

- ☐ **MVS TCP/IP Address:** The TCP/IP address assigned to the FDR/UPSTREAM host.

- ☐ **PC Port Number:** The TCP/IP port number assigned to FDR/UPSTREAM. This port number must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating MSExchMB commands from the FDR/UPSTREAM host. Most user will use the default of 1973.

- ☐ **MVS Port Number:** The TCP/IP port number assigned to the FDR/UPSTREAM host. Most users will use the default of 1972.

Once all of the required parameter values are supplied and verified, MSExchMB creates or modifies the MSExchMB configuration file (MSExchMB.cfg) and creates a FDR/UPSTREAM configuration file (upstream.cfg) and three FDR/UPSTREAM parameter files (FULLBKUP.dat, INCRBKUP.dat and RESTORE.dat). The directories and files created by the MSExchMB CONFIGURE process are:

```
C:\UPSTREAM\MSExchMB (directory)
C:\UPSTREAM\MSExchMB\FULLBKUP.dat (file)
C:\UPSTREAM\MSExchMB\INCRBKUP.dat (file)
C:\UPSTREAM\MSExchMB\MSExchMB.cfg (file)
C:\UPSTREAM\MSExchMB\RESTORE.dat (file)
C:\UPSTREAM\MSExchMB\UPSTREAM.CFG (file)
```

A sample MSExchMB.cfg file follows:

```
;-----------------------------------------------------------;
; MSExchMB Configuration                                    ;
;-----------------------------------------------------------;
UPSTREAMBACKUPPROFILE=MSEXCHMB
UPSTREAMUSERID=
UPSTREAMPASSWORD=
UPSTREAMFULLSTORAGETYPE=TAPE
UPSTREAMINCRSTORAGETYPE=TAPE
UPSTREAMCOMPRESSIONLEVEL=4
UPSTREAMMESSAGETIMELIMIT=1
UPSTREAMCOMMUNICATIONMETHOD=TCPIP
UPSTREAMLOCALLUALIAS=
UPSTREAMPARTNERLUALIAS=
UPSTREAMMODENAME=
UPSTREAMINBOUNDTPNAME=
UPSTREAMTCPIPADDRESS=192.168.75.253
UPSTREAMTCPIPPCPORTNUMBER=1973
UPSTREAMTCPIPMVSPORTNUMBER=1972
MSEXCHSERVERNAME=WINNT001
MSEXCHPROFILENAME=Ron Wright
MSEXCHPROFILEPASSWORD=
```

A file named MSExchMB.log will be written to the C:\UPSTREAM\MSExchMB directory. Detailed MSExchMB process information is logged in this file for each invocation of MSExchMB.

The C:\UPSTREAM\MSExchMB directory contains the MSExchMB configuration file (MSExchMB.cfg) and the FDR/UPSTREAM configuration and parameter files (UPSTREAM.CFG, FULLBKUP.dat, INCRBKUP.dat, RESTORE.dat).

WARNING: If you choose to modify the FDR/UPSTREAM files outside of the MSExchMB CONFIGURE process you should be careful and have full knowledge of the impact of the modifications you are making. Also, each time a MSExchMB CONFIGURE process is performed, the manual changes made to the FDR/UPSTREAM files will be lost because the MSExchMB CONFIGURE process will overwrite them.

The C:\UPSTREAM\MSExchMB directory is also used as the directory in which to create work files. This directory name is also listed in the UPSTREAM.CFG file as the WORKPATH parameter which means that FDR/UPSTREAM itself will use it for its work files as well.

31.10 Usage

The MSExchMB program provides all of the functionality needed to use FDR/UPSTREAM to perform backups and restores for your MS Exchange object hierarchy.

If you need to restore a complete mailbox and that mailbox does not yet exist, you must first create the mailbox using the Microsoft Exchange Administrator program before issuing the MSExchMB Restore command. This is required to create the proper Windows account association for the mailbox since the Windows account association is not included in the backup.

The proper syntax for MSExchMB is:

```
MSExchMB

MSExchMB BACKUP [SrcSpec FULL|INCR [NOSUB] [OA] [MA] [RF] [FP] [ME] [AM]]

MSExchMB RESTORE [VersNum SrcSpec [NOSUB] [BACKTOFULL] [TgtSpec] [OA] [MA] [RF] [FP]
[ME] [AM]]

MSExchMB INQUIRE

MSExchMB CONFIGURE

MSExchMB HELP|/H|-H|/?|-?
```

Where:

- **SrcSpec:** The MS Exchange object specification of where the backup is to start or where in the specified backup version the restore is to start. SrcSpec is a required backup or restore parameter, there is no default. For example:
  - **C:*.*** The root of the MS Exchange Directory Information Tree (DIT).
  - **"C:\ Address Book Views*.*"** The "Address Book Views" object only (quotes required because there are spaces in the name)
  - **C:\ExchangeSite#1*.*** The ExchangeSite#1 object only.
- **FULL|INCR**: Use either FULL or INCR in indicate if the backup should be a full backup or an incremental backup. Only the Messages (ME) and Associated Messages (AM) objects will be backed up on an incremental basis. If INCR is specified along with OA, MA, RF or FP, these objects will always be backed up in full. FULL or INCR is a required backup parameter, there is no default.
- **VersNum:** The FDR/UPSTREAM version number for the full or incremental backup to be restored. If the version number specified is an incremental backup and BACKTOFULL is also specified, the previous full backup will be identified and a restore will be performed for each of the versions from the full backup up to and including the incremental backup version specified. VersNum is a required restore parameter, there is no default.
- **NOSUB:** Use NOSUB if the subobjects of the specified source object (SrcSpec) are not to be backed up or restored. If NOSUB is not specified the default is to backup or restore the subobjects.
- **BACKTOFULL:** Use BACKTOFULL to restore from all of the backup versions from the last full backup up to and including the specified backup version. If BACKTOFULL is not specified, the default is to restore from the specified backup version only.

- **TgtSpec:** The MS Exchange object specification of where in the DIT the specified source object (SrcSpec) should be restored. For example:
  - **C:*.*** the root of the MS Exchange Directory Information Tree (DIT).
  - **"C:\ Address Book Views*.*"** The " Address Book Views" object only. Quotes are required because there are spaces in the name.
  - **C:\ExchangeSite#1*.*** The ExchangeSite#1 object only.

  If TgtSpec is not specified, the default will be the source object specification (SrcSpec). If TgtSpec and SrcSpec are both specified and do not match, both of the specs must reference subfolders within the same mailbox. Also, public folders may only be restored back to the same public folder. For example:
  - SrcSpec "C:\Site\Recipients\Joe*.*"
    TgtSpec "C:\Site\Recipients\Joe\New Folder*.*"

  Where "C:\Site\Recipients\Joe" is a mailbox object.
- **OA:** Use OA to backup or restore only the Object Attributes for the objects specified by SrcSpec.
- **MA:** Use MA to backup or restore only the Mailbox Attributes for the mailboxes specified by SrcSpec.
- **RF**: Use RF to backup or restore only the Receive Folders for the mailboxes specified by SrcSpec.
- **FP:** Use FP to backup or restore only the Folder Properties for the folders specified by SrcSpec.
- **ME:** Use ME to backup or restore only the Messages in the folders specified by SrcSpec.
- **AM:** Use AM to backup or restore only the Associated Messages in the folders specified by SrcSpec.

Some additional notes:

- If OA, MA, RF, FP, ME and AM are all not specified, the default will be to backup or restore all of the object types.
- The SrcSpec and TgtSpec (if specified) must start with "C:\". The last object name in the specs may or may not be followed with a "\", "*" or "*.*". The following examples can be used to reference the same object:

  ```
  "C:\Site\Recipients\User Mailbox Name"
  "C:\Site\Recipients\User Mailbox Name\"
  "C:\Site\Recipients\User Mailbox Name\*"
  "C:\Site\Recipients\User Mailbox Name\*.*"
  ```
- Use "MSExchMB" with no parameters to display a dialog from which you may choose an action. Use "MSExchMB BACKUP ..." to perform a backup. Use "MSExchMB RESTORE ..." to perform a restore. Use "MSExchMB BACKUP" or "MSExchMB RESTORE" with no additional parameters to display a dialog on which you may specify the backup or restore parameters. Use "MSExchMB INQUIRE" to display a dialog showing all of the backup versions from which you may start a restore. Use "MSExchMB CONFIGURE" to modify the MSExchMB configuration. Use "MSExchMB HELP" to display this help text.

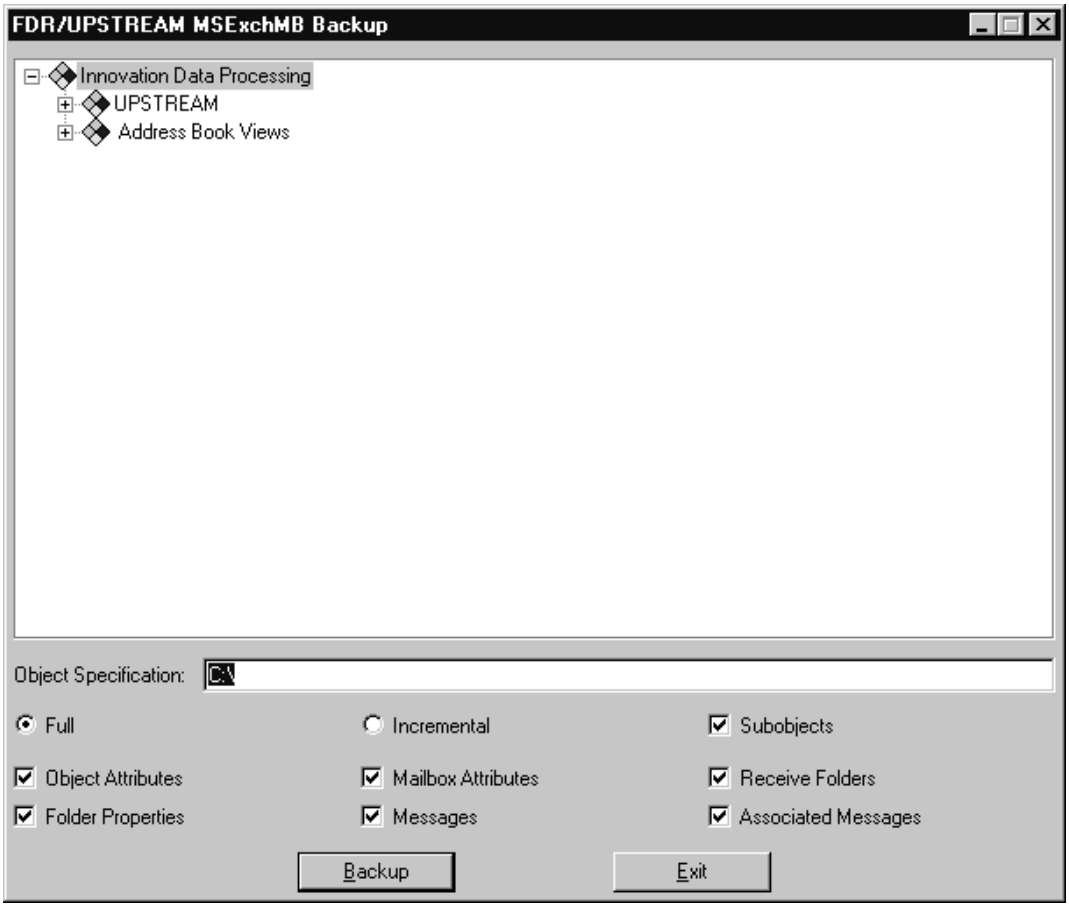
To perform a full backup of the MS Exchange hierarchy, you would execute:

```
MSExchMB BACKUP C:\*.* FULL
```

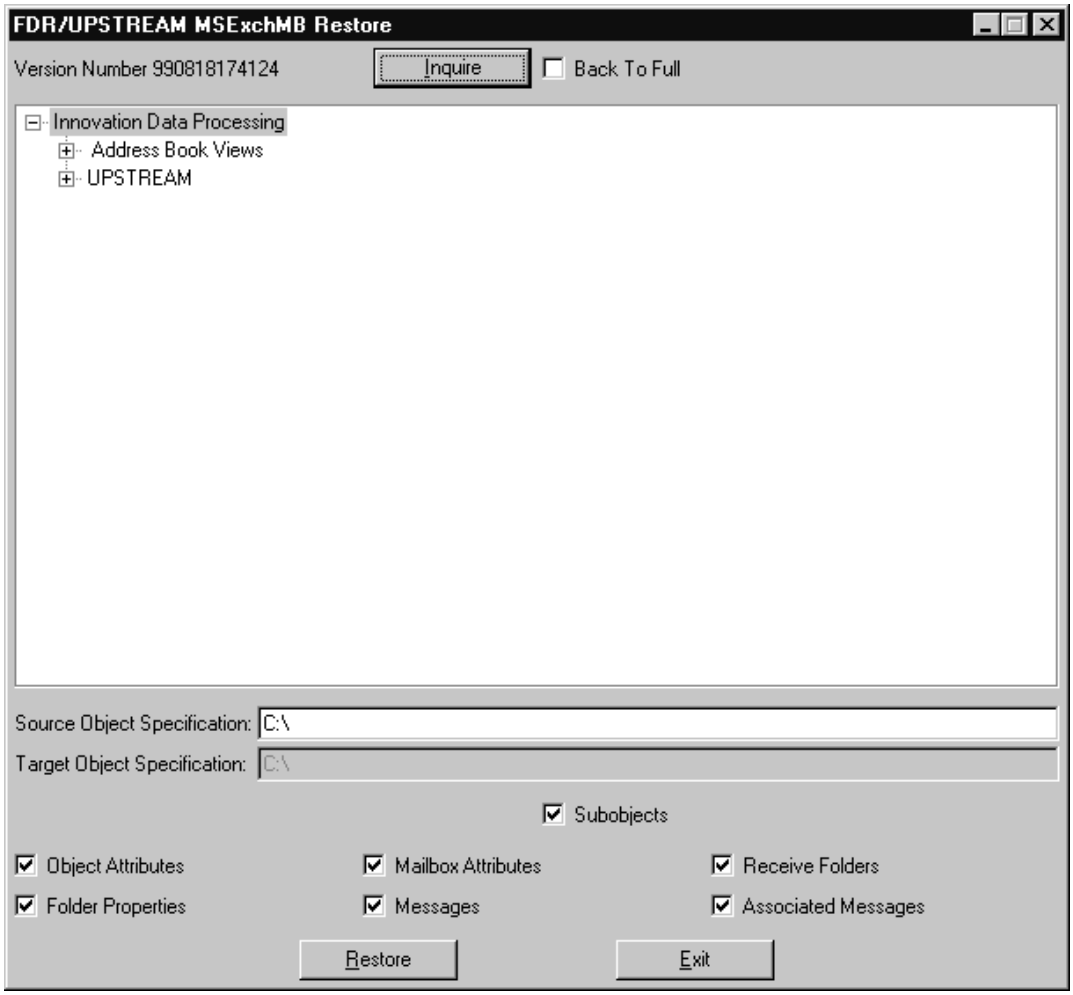
To perform an incremental backup of the MS Exchange hierarchy, you would execute:

```
MSExchMB BACKUP C:\*.* INCR"
```

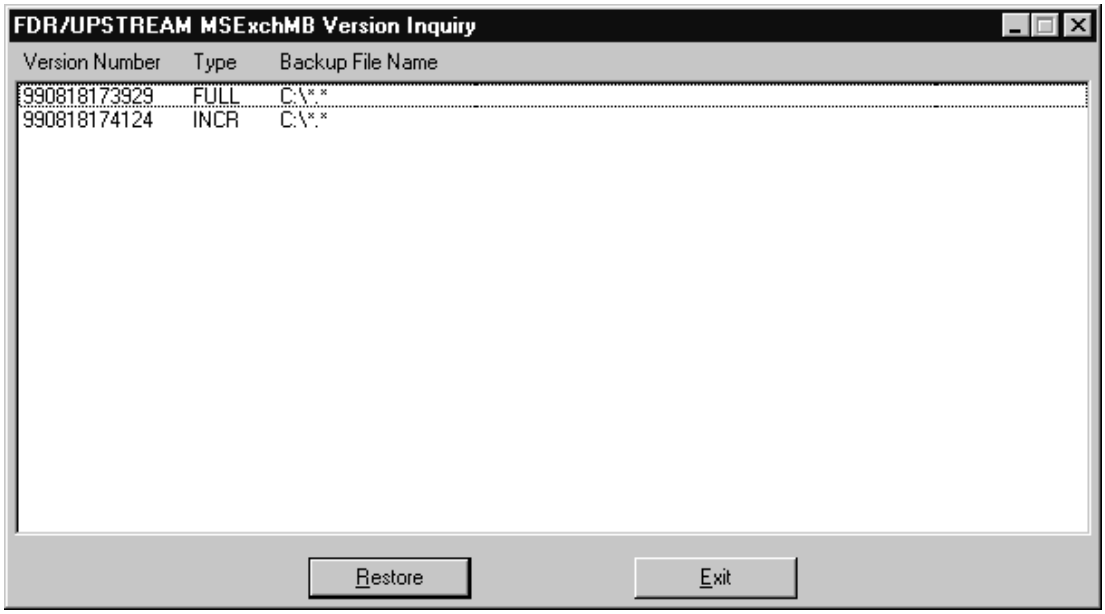
If you execute "MSExchMB BACKUP" with no additional parameters, the following dialog will be displayed for you to enter the required backup parameters:



If you execute “MSExchMB RESTORE” with no additional parameters, the following dialog will be displayed for you to enter the required restore parameters:



If you click the **Inquire** button on the **FDR/UPSTREAM MSExchMB Restore** dialog or execute the "MSExchMB INQUIRE" command, the following dialog will be displayed for you to choose a backup version to restore from as follows:

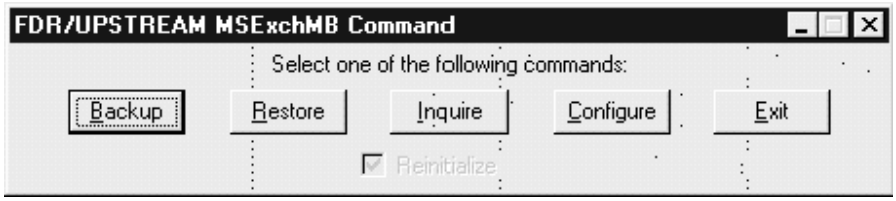


To restore from a particular backup version, you first select the version to be restored and click the **Restore** button or just double-click on the version number entry. If you already know the version number that you want to restore from you can invoke the MSEXCHMB RESTORE VersNum SrcSpec command directly. For example:

```
MSEXCHMB RESTORE 990818174124 C:\*.* BACKTOFULL
```

Since the specified version number is from an incremental backup and BACKTOFULL was specified, MSEXCHMB will first restore from the previous full backup version (version number 990818173929) and then restore from the incremental version (version number 990818174124).

If you execute MSExchMB from a command line with no parameters, the following dialog will be displayed:



From the preceding dialog you can choose the command you want to perform. The **Reinitialize** check box can be checked to cause MSExchMB to reinitialize its in-memory object hierarchy. This may be needed if the actual object hierarchy in the two MS Exchange databases changes between any two restores performed from a single running instance of MSExchMB.

Each execution of a MSEXCHMB command causes MSEXCHMB to log its activity in a file named MSExchMB.log. This file is maintained in the C:\UPSTREAM\MSEXCHMB directory and has a format similar to a regular upstream.log file. In other words, each entry in the MSExchMB.log file starts with a time stamp. Over time, the MSExchMB.log file will become quite large. Therefore, to manage its size you can use the USLOGCLR.exe program found in the C:\UPSTREAM directory to discard the activity older than a specified number of days. For example, the following command will cause the activity in the MSExchMB.log file older than 30 days to be discarded:

```
C:\UPSTREAM\USLOGCLR.exe 30 C:\UPSTREAM\MSEXCHMB\MSExchMB.log
```

The return codes that MSEXCHMB can return are as follows:

- 0 - If the requested function was performed successfully.
- 4 - If a miscellaneous MSEXCHMB error occurred.
- 8 - If a FDR/UPSTREAM error occurred.
- 12 - If one or more of the MSEXCHMB parameters were missing or invalid.

31.11 Operation

MSEXCHMB can be implemented in a production environment in a number of ways. Some of these are:

- Executing MSEXCHMB on any MS Exchange server machine.
- Executing MSEXCHMB in a logged on user environment or in a service process.
- Initiating a MSEXCHMB backup or restore from the host or initiating it from a Windows NT server either automatically or through some automated scheduler.

MSEXCHMB can be executed on any MS Exchange server machine within a MS Exchange site (domain). The only requirement is that MSExchMB.exe must be installed in, and executed from, the same directory as US.EXE (typically C:\UPSTREAM). MSEXCHMB finds the MS Exchange server via the MSExchServerName parameter in the MSExchMB.cfg file that is created during the MSEXCHMB CONFIGURE process MSEXCHMB accesses the DS database of this MS Exchange server to get the DIT.

MSEXCHMB can be executed either in the context of a logged on user or as a Windows NT service. The only requirement for executing MSEXCHMB in the context of a service is that it must be executed under a user-specified User Account and not the System Account. This restriction is associated with the MS Exchange security system. This user-specified User Account must be defined in MS Exchange with permissions to the database in question. If the service that executes MSEXCHMB is started in the context of the “System Account” or the specific “User Account” has not been granted the appropriate permissions, MSEXCHMB will not be able to backup or restore the MS Exchange object hierarchy.

The greatest flexibility of MSEXCHMB is the method used to initiate it. If MSEXCHMB is to be initiated from a Windows NT server, it can be executed manually, via the Windows NT scheduler or via any other automated mechanism.

Most FDR/UPSTREAM customers like to have the host control all FDR/UPSTREAM operations. Because of this, MSEXCHMB can be initiated from the host as well. To accomplish this, a second communication path between the Windows NT server and the host has to be established. In a SNA environment this means an additional LU and in a TCP/IP environment an additional TCP/IP port number. Host initiation is covered in the next section.

31.12 Host Initiation of MSEXCHMB

MSEXCHMB can be initiated from the host via a USTBATCH job. A sample set of USTBATCH parameters for invoking MSEXCHMB follow:

```
APPLPREF=UPSTR
USAPPL=UPSTREAM
LOGMODE=USTMODE
TARGLU=PCLU1
TPNAME=UPSTREAM
MAXRETRY=0
CONV=WAIT
ACTION=5
JOBOPTIONS=2
JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8
FILES=C:\UPSTREAM\MSEXCHMB.EXE BACKUP C:\*.* FULL
/*
```

Using this sample set of USTBATCH parameters, the backup process goes something like this:

- 1. The USTBATCH job is submitted for execution.
- 2. USTBATCH starts a conversation on LU UPSTR001 (APPLPREF=UPSTR) with the FDR/UPSTREAM host started task on the host (USAPPL=UPSTREAM) and requests that a conversation with the Windows NT server (TPNAME=UPSTREAM) be started using the LU assigned to the Windows NT server (TARGLU=PCLU1).
- 3. The UPSTREAM TP on the Windows NT server is started, FDR/UPSTREAM is invoked and completes the connection.
- 4. The request to execute a job (ACTION=5) is passed down to FDR/UPSTREAM along with the program specification for the job (FILES=C:\UPSTREAM\MSEXCHMB.EXE BACKUP C:*.* FULL).
- 5. FDR/UPSTREAM will invoke MSEXCHMB, wait for MSEXCHMB to finish execution and return a return code, and then terminate itself (JOBOPTIONS=2). Once MSEXCHMB is finished, FDR/UPSTREAM will map the MSEXCHMB return code into a return code that the USTBATCH job can interpret (JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8).
- 6. During the time that FDR/UPSTREAM is waiting for MSEXCHMB to finish, it will still have an active conversation with the host on the LU named PCLU1. When MSEXCHMB executes, it will build a FDR/UPSTREAM parameter file to execute via a second copy of FDR/UPSTREAM.

During the execution of the second copy of FDR/UPSTREAM (step #6 above), a second conversation with the host is initiated via the LU alias configured on the UPSTREAMLocalLUAlias parameter in the MSEXCHMB configuration file (MSExchMB.cfg). It is crucial that the UPSTREAMLocalLUAlias parameter have an LU alias for an LU name that is different from the one specified in the USTBATCH JCL (for example not PCLU1). The reason for this is that the first LU will be still be in use for the conversation that caused the MSEXCHMB job to be executed in the first place. The second LU is needed to start a conversation that will be used by the backup.

The scenario outlined here works the same way for TCP/IP except that TCP/IP does not have a concept similar to a TP (Transaction Program). This means that FDR/UPSTREAM must already be executing and waiting for the job request to be passed down from the host. Also since FDR/UPSTREAM should continue to execute after MSEXCHMB has finished its execution, the JOBOPTIONS parameter should be JOBOPTIONS=3.

More information about remote host initiation, particularly TCP/IP conversations, can be found in the FDR/UPSTREAM host manual.

31.13 Microsoft Exchange 2000

FDR/UPSTREAM also includes a backup agent compatible with the Microsoft Extensible Storage Engine (ESE98) which allows online full and transaction log backups of Microsoft Exchange 2000 databases.

31.13.1 MSESE PlugIn Backups

The UPSTREAM ESE98 PlugIn, MSESE.DLL must be installed in the UPSTREAM \PlugIn directory. The MSESE PlugIn can be used with UPSTREAM on any Windows NT/2000 system on which the files ESEBCLI2.dll and ESEBKMSG.dll exist. UPSTREAM running on this machine can use the MSESE PlugIn to backup any number of Microsoft ESE application database groups that reside on both local and remote server machines.

The **PATH** environment variable must include the directory where the ESE libraries exist. To add it to your environment use the **Control Panel**, select the **System** applet, press the **Advanced** tab, press the **Environment Variables** button, highlight **PATH** in System variables, press the **Edit** button, and add to the end of the Variable Value the path name to these variables (most users will enter **c:\exchsrvr\bin** with a semicolon to separate it from the preceding variables). You will need to stop and restart UPSTREAM.

The ESE98 backup API (ESEBCLI2.dll), on which the MSESE PlugIn depends, provides a generic backup API for ESE98 (Extensible Storage Engine, also referred to as JET) applications. ESE98 applications (also referred to as registrations or annotations in the ESE98 specification) reside on one or more servers and maintain one or more individual databases which are grouped into one or more database groups (also referred to as storage groups or instances in the ESE98 specification). The MSESE PlugIn provides support for backing up and restoring individual database groups, not individual databases. This is due to the fact that although ESE98 manages an application's database files independently of one another, the application's transaction log files are managed on a database group level and not segregated by individual database. Since the transaction log files are not unique to any single database, the backup of these transaction log files must be dealt with on the database group level only.

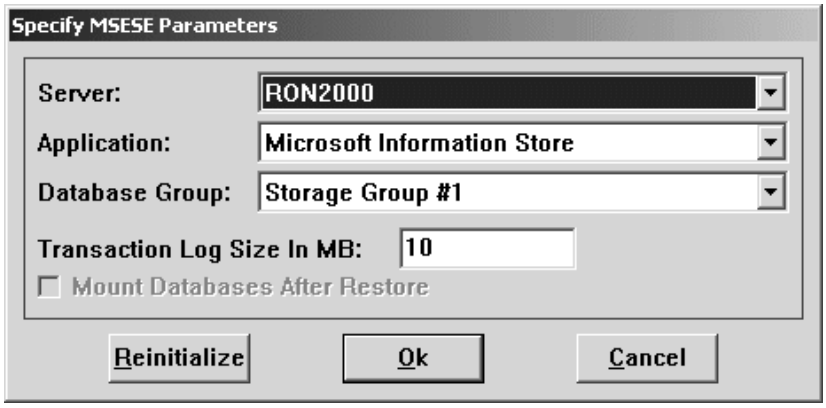
Three unique identifiers identify a database group:

- The name of the server on which the application resides
- The name of the application
- The name of the individual database group

To specify the use of the MSESE PlugIn to back up, you must use one of the merge backup types (non-merge backups are not supported with MSESE).

To backup a single ESE98 application database group, use the **Backup Parameters** dialog to add a new file specification (or select a file specification that you want to alter), press the **PlugIn…** button to display the *PlugIn For File Specification* dialog.

The MSESE PlugIn has a unique PlugIn ID number of 5 and a descriptive name of **Microsoft ESE - ID #5**. The PlugIn ID number is used internally by UPSTREAM to uniquely identify PlugIn modules. The descriptive name is used to help you select this PlugIn for use with a particular file spec. To specify parameters specific to this PlugIn, press the **PlugIn Parameters** button:



- **Server:** Select the server you wish to backup from the list of all server machines on which ESE98 applications are registered.

- **Application:** Select the application from the list of applications registered for the server selected above. For Exchange 2000, the Application is **Microsoft Information Store**.

- **Database Group:** Select the database group from the list of database groups registered for the application selected above. For Exchange 2000, the Database Group is **Storage Group #1**.

- **Transaction Log Size in MB:** Enter an estimate of the transaction log size. This estimate is used by UPSTREAM in space allocation for backups to host disk or backups using the UPSTREAM/SOS local backup disk. The default for this is 0 which causes MSESE to estimate the size:

  - If the backup is a full merge backup, the size of the log files will be defaulted to 10% of the total size of the database files for the database group.
  - If the backup is an incremental merge backup, the size of the log files will be defaulted to 20MB.

  We recommend that you perform backups over the course of a number of days with the value set to 0 and then examine the upstream.log to determine the maximum number of transaction log files that were truncated on any one backup. The LOGSIZEINMB value can then be determined using the following calculation:

```
LOGSIZEINMB = ((Maximum-truncated-log-files + 1) * Log-file-size) / 1048576
```

- **Reinitialize:** Press this button to cause the drop down lists to be repopulated with up-to-the-minute ESE98 information.

In the above example, **RON2000** is the name of a server that has at least one ESE98 application registered for it, **Microsoft Information Store** is the name of an ESE98 application on the RON2000 server and **Storage Group #1** is the name of a database group for the Microsoft Information Store application.

Once you have set the MSESE PlugIn parameters to your liking, press the **Ok** button to return to the *PlugIn for File Specification ...* dialog. You will now see the *Parameters* field filled in with a set of parameters in the format (all on one line):

```
SERVER=servername APPLICATION=applicationname DATABASEGROUP=databasegroupname
LOGSIZEINMB=0 MOUNTDATABASES=yn.
```

For example:

```
SERVER=RON2000 APPLICATION=”Microsoft Information Store” DATABASEGROUP=”Storage Group
#1” LOGSIZEINMB=10 MOUNTDATABASES=N
```

Note the double quotes (“) around the application and database group names. The need for the double quotes is because these parameters contain spaces or commas.

MSESE uses the ESE backup API to get the names of the individual database and transaction log files for the selected server, application and database group to be backed up and then packages these files together in a single virtual file which is stored on the host, named with the format:

```
\\servername\MSESE\applicationname\databasegroupname.bin
```

Using the example above, the file name stored on the host would be:

```
\\RON2000\MSESE\Microsoft Information Store\Storage Group #1.bin
```

MSESE makes this virtual file appear as a real file to UPSTREAM, which then backs it up in the normal manner.

When an MSESE backup is performed, all of the individual databases for the targeted database groups must be mounted (online) by the ESE98 application that owns them. The individual database and transaction log files that make up any ESE98 application database group that is mounted should be excluded from your normal backups since they are locked by the ESE98 application and cannot be backed up in the normal way. The location of these files is determined by the ESE98 application that owns them. Check the configuration of the ESE98 application to determine where its database and transaction log files are located.

MSESE requires a specific set of file specification parameters, which it sets automatically. As a result, the Backup Parameters dialog does not allow you to modify the Backup Specification field or press the Spec Detail… button to alter the rest of the file specification parameters.

The MSESE PlugIn may be used for multiple file specifications as long as the server, application and database group names are unique for each file specification. The MSESE PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

31.13.2 MSESE PlugIn Restores

A backup of a database group may be restored to any already existing database group as long as the backup and restore database groups have the same underlying database file structure (the number and names of the database files must match). This is not a restriction of the MSESE PlugIn, but is the nature of ESE98 backup API in general. MSESE does not enforce this restriction, but if it is not followed the likely result will be a restore that is unsuccessful.

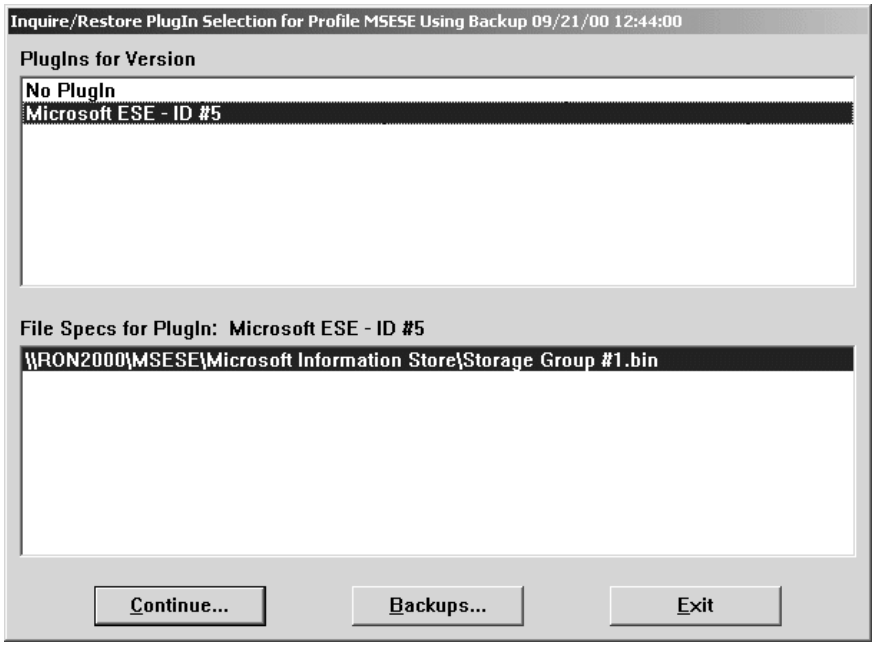
When an MSESE backup is performed, all of the individual databases for the targeted database groups must be mounted (online) by the ESE98 application that owns them.

Before starting a restore for an ESE98 application database group, make sure that the individual databases in the database group to be restored to is dismounted (offline) by the ESE98 application.

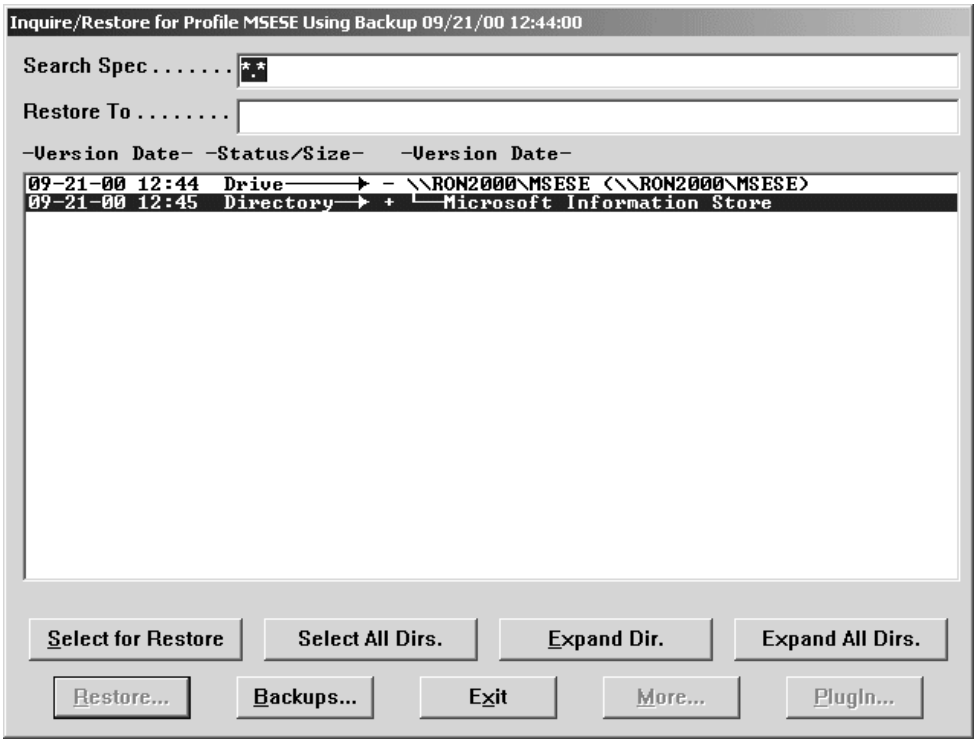
For Exchange 2000, you dismount the databases in the Exchange **System Manager**. In the Exchange server tree, expand the Servers tree, the tree of the server you wish to restore to, and then the tree of the Storage Group you wish to restore. Highlight each of the databases in the Storage Group tree in turn, press the **Action** button (on the top left of the Microsoft Management Console) and select **Dismount Store**

NOTE: You must have the Storage Group defined and all the databases off-line before beginning your UPSTREAM restore.

To setup the restore in UPSTREAM, select the **List and Restore** submenu item of the **Action** menu. If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the MSESE PlugIn, the Inquire/Restore PlugIn Selection for Profile … dialog will be displayed.



From this dialog, select the **Microsoft ESE** item and press the **Continue…** button. When the Continue… button is pressed or if the backup version contains file specifications that all use the MSESE PlugIn, the *Inquire/Restore for Profile* ... dialog is displayed.



On this dialog you will see all of the top level file specifications included in this backup version. If you attempt to expand a file specification that does not use the MSESE PlugIn, the list of files for that file specification will not be displayed. Only the files for the file specifications that use the MSESE PlugIn will be displayed. When you expand the file specification for the application (**Microsoft Information Store** in the above example), you will get a list of database group files for that application. For example: **Storage Group #1.bin**.

Find the file specification for the ESE98 application database group to be restored and select the *databasegroupname.bin* file (**Storage Group #1.bin** in the above example) for that file specification. Then press the **Select for Restore** button to include the storage group and have the *PlugIn*... button enabled. The *More*... button will not be enabled since the MSESE PlugIn requires complete control of the file specification parameters. Press the **PlugIn...** button to display the *PlugIn for File Specification* ... dialog, which is the same dialog as you used when specifying the backup (above).

The *Parameters* field will be blank and will be filled in for you when you press the **PlugIn Parameters…** button to display the *Specify MSESE Parameters* dialog.

The same dialog is used for restore as is used for backup, and the fields have similar meanings (you must specify an existing Server, Application and Database Group). However, the Transaction Log Size in MB field is grayed and there is an Ungreyed field:

- **Mount Databases After Restore:** Since your databases must all be offline for the restore to complete successfully, this checkbox will have UPSTREAM automatically mount and bring the databases on line after a successful restore.

Once you have set the MSESE PlugIn parameters to your liking, press the **Ok** button to return to the *PlugIn for File Specification* ... dialog. You will now see the *Parameters* field filled in with a set of parameters in the format (all on one line):

```
SERVER=servername APPLICATION=applicationname DATABASEGROUP=databasegroupname
LOGSIZEINMB=0 MOUNTDATABASES=yn.
```

For example:

```
SERVER=RON2000 APPLICATION="Microsoft Information Store" DATABASEGROUP="Storage Group
#1" LOGSIZEINMB=0 MOUNTDATABASES=Y
```

Note the double quotes (") around the application and database group names. The need for the double quotes is because these parameters contain spaces or commas.

31.13.3 Host Initiating MSESE Backups and Restores

Like all other UPSTREAM backups and restores, those that use the MSESE PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e. after the SPECNUMBER parameter).

- ☐ **FILES.** Specify the file spec in the form below. The correct format for the FILES parameter is not crucial since the MSESE PlugIn will override it anyway and force it to be \\servername\MSESE\applicationname\databasegroupname.bin. It does this by getting the real server, application and database group names from the PLUGINPARAMETERS value.

```
FILES \\Servername\MSESE\applicationname\databasegroupname.bin
```

- ☐ **PLUGIN.** You must specify MSESE.DLL:

```
PLUGIN MSESE.DLL
```

- ☐ **PLUGINPARAMETERS**. You must specify the parameters specific to the MSESE PlugIn. Note that the PLUGINPARAMETERS value must be specified on one line; use the FDR/UPSTREAM host continuation to allow it to operate that way. The generic form for PLUGINPARAMETERS is:

```
PLUGINPARAMETERS SERVER=servername APPLICATION=applicationname
DATABASEGROUP=databasegroupname LOGSIZEINMB=num MOUNTDATABASES=yn
```

The sub-parameters in PLUGINPARAMETERS are:

Name	Default	Required	Description
SERVER	None	Yes	The name of the server on which the ESE98 application resides.
APPLICATION	None	Yes	The name of the ESE98 application. For Exchange this is usually **Microsoft Information Store**.
DATABASEGROUP	None	Yes	The name of the database group for the ESE98 application. Exchange 2000 automatically creates the database group **First Storage Group**.

Name	Default	Required	Description
LOGINSIZEINMB (Backup only)	0	No	A backup only parameter, the estimated size of the transaction log files in megabytes. See above for suggestions in setting this value.
MOUNTDATABASES (Restore only)	N	No	A restore only parameter, whether databases will be mounted after the restore completes. Specify **Y** to have the databases automatically mounted.

For example, to specify a full backup of the BOBNT1 server, your JCL might look like this:

```
ACTION 1                    * BACKUP
BACKUPPROFILE BOBESE
MERGE 1                     * FULL-MERGE
STORAGETYPE 2               * SEQ. DISK
COMPRESSLEVEL 4             * HIGH COMPRESSION 3
LOGNONFATAL Y
*
SPECNUMBER 1
FILES \\BOBNT1\MSESE\MICROSOFT INFORMATION STORE\*.*
PLUGIN MSESE.DLL
PLUGINPARAMETERS SERVER=BOBNT1 APPLICATION=”MICROSOFT INFORMATION STOREX
“ DATABASEGROUP=”FIRST STORAGE GROUP”
```

Note the continuation character (X) at the end of the first PLUGINPARAMETERS line so that the line can be entered in its entirety and the double quote (”) at the beginning of the continuation line which matches the double quote in the line above.

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32 Microsoft SQL Server

32.1 Overview

The Microsoft SQL Server is a fully-functioning Relational Database Management System (RDBMS) which is hosted on a Windows NT Server system. It provides a number of backup and restore options that provide Database Administrators the flexibility they need to plan their database recovery strategy.

This section describes how FDR/UPSTREAM can be used to provide a dependable backup solution for Microsoft SQL Server.

There are two methods for backing up a Microsoft SQL Server:

- **MSSQL.EXE.** This is the legacy method. Each database must be backed up independently to a given backup profile. It should be used for legacy applications and when you have Microsoft SQL Server v6 or below.

NOTE: Backups performed with MSSQL.EXE are not compatible with those using the UPSTREAM SQL Server PlugIn. You must perform a full backup if you are converting from the MSSQL.EXE program.

- **MSSQL.DLL.** An UPSTREAM PlugIn, this method has the following advantages over MSSQL.EXE:
  - Configuration, logging, error handling and interaction with the main US.EXE program is seamless as opposed to being almost totally separate for MSSQL.EXE.
  - The MSSQL.EXE configuration process creates a somewhat unwieldy directory structure under the main UPSTREAM directory (C:\UPSTREAM by default). MSSQL.DLL does not use anything other than a normal UPSTREAM parameter file to store its configuration.
  - MSSQL.EXE allows the backup or restore of only a single Microsoft SQL Server database at one time and these backups must be independent of all other backups (i.e. they need their own unique Backup Profile). MSSQL.DLL allows you to intermix the backups of multiple Microsoft SQL Servers databases together with the backups of other file system and non-file system backups. By using MSSQL.DLL, the file system and databases for a single server can be backed up in one backup operation using a single Backup Profile.
  - Since MSSQL.EXE is a program, backups and restores of a Microsoft SQL Server database must be performed, not as Backup and Restore operations, but as Run Job operations. MSSQL.DLL works directly with US.EXE to allow backups and restores to be performed as true Backup and Restore operations.
  - MSSQL.EXE provides only partial support for Microsoft SQL Server version 7.0 and Microsoft SQL Server 2000 while MSSQL.DLL provides full support.

- MSSQL.DLL interacts directly with Microsoft SQL Server using the DB-Library API (using NTWDBLIB.DLL installed with SQL Server) rather than direct isql commands.

Although MSSQL.EXE allows backups and restores to be performed using an optional disk interface, the MSSQL PlugIn does not support this interface and instead requires all backups and restores to be performed using the named pipe interface exclusively.

Configuration of your Microsoft SQL Server environment is the same for both applications. You should begin in the following section (page 32-3). If you wish to use MSSQL.EXE see page 32-11, for MSSQL.DLL see page 32-20.

32.2 Configuring SQL Server

32.2.1 Planning

Chapter 12, **Backing Up and Restoring**, of the **Administrator's Companion 6.0** document for Microsoft SQL Server version 6.5 documents all of the relative concerns that need to be addressed when planning a backup and restore strategy for a Microsoft SQL Server database. This section will rehash a few of the points covered in the **Backing Up and Restoring** chapter.

The backup plan that you create should cover the following databases:

- The *master* database. This is the most important database maintained by Microsoft SQL Server since it contains the configuration information for all other databases.
- The *msdb* database. This database contains all of the information about scheduled events that are maintained by the Microsoft SQL Server Scheduler.
- The *distribution* database. This database holds information about database replication if the server is configured as a replication distributor.
- All user defined databases.

To ensure that these databases are consistent (i.e. are operating properly), you should plan on monitoring them periodically. The following Transact-SQL script commands can be used to check the consistency of a database:

- DBCC CHECKDB
- DBCC CHECKALLOC or NEWALLOC
- DBCC CHECKCATALOG

A backup of a Microsoft SQL Server database can be performed while the database is active. This means that you do not have to plan any down time for a database while it is being backed up.

The Microsoft SQL Server will maintain transaction logs for a database as long as the database was configured with a separate device to house them. When a database is created it is allocated to either a single database device or a database device and a log device. By creating a database on a single database device you limit the type of backups you can perform for the database to full database backups only. By creating a database on a database device and a separate log device you then have the ability to perform either full database backups or incremental transaction log backups.

Most of the databases created by Microsoft SQL Server for its own use are created using a separate log device to hold the database transaction logs. The exceptions to this rule are the *master and msdb* databases. The *master* database does not have a separate log device so that all backups that you perform for the *master* database must be full database backups. Microsoft intentionally disables transaction logging by default after reboots for the *msdb* database so its backups are also always fulls.

You should plan how often you want to perform full database backups and incremental transaction log backups. A typical database backup schedule involves performing full database backups once a week and incremental transaction log backups daily. In addition to the backups you perform according to this schedule, there are times when it is important to perform nonscheduled full database backup as follows:

- After initially creating the database.
- After performing a nonlogged operation.
- After creating an index.

Also, a full database backup for the *master* database should be performed after any of the following actions are performed:

- ALTER DATABASE
- CREATE DATABASE
- DISK INIT
- DISKsp_dropserver
- sp_dropremotelogi MIRROR
- DISK UNMIRROR
- DISK REMIRROR
- DISK RESIZE
- various DBCC options such as SHRINKDB
- sp_addlogin
- sp_addremotelogin
- sp_addsegment
- sp_addumpdevice
- sp_configure
- sp_dropdevice
- sp_droplogin
- sp_dropsegment
- sp_dropserver
- Sp_dropremotelogin
- Sp_extendsegment
- sp_logdevice

If ever you should need to restore a database, you must ensure that the database is not in use before proceeding. This can be accomplished by using the following Transact-SQL script commands:

- sp_dboption
- sp_who
- KILL

To restore a database, you must first restore from the latest full database backup and then restore from each subsequent incremental transaction log backup in the order they were backed up.

If the database you need to restore happens to be the *master* database or the *msdb* database, you should first read the **Backing Up and Restoring** chapter to be aware of the special considerations for these databases. The special considerations for the *master* and *msdb* databases are also covered in the **Restoring the Master Database** and **Restoring the Msdb Database** sections of this chapter respectively.

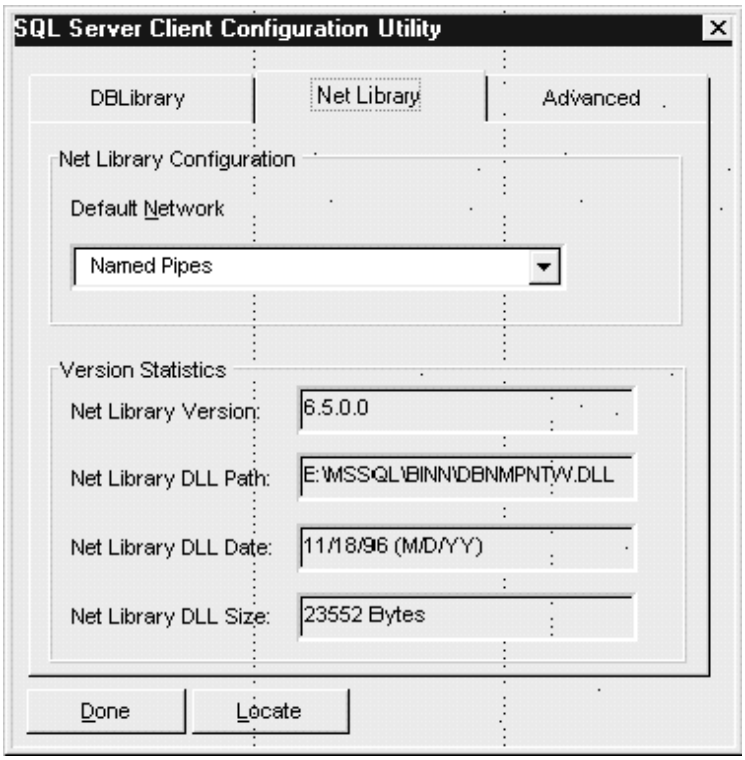
NOTE: If you are using MS SQL 7.0 Full-Text Catalogs and Indexes, these will need to be backed up on a file-by-file basis - not with the agents discussed in this chapter. See KnowlegeBase Article Q240867 for more information.

32.2.2 The Microsoft SQL Client Network Library Configuration

Before using the ISQL.exe utility which is invoked by MSSQL.exe or the NTWDBLIB.dll which is loaded by the MSSQL PlugIn, you must first ensure that you have an appropriate Net Library configured for client access. Each version of Microsoft SQL Server has its own unique application for performing the Net Library Configuration. The various Microsoft SQL Server versions are:

- Microsoft SQL Server version 6.5

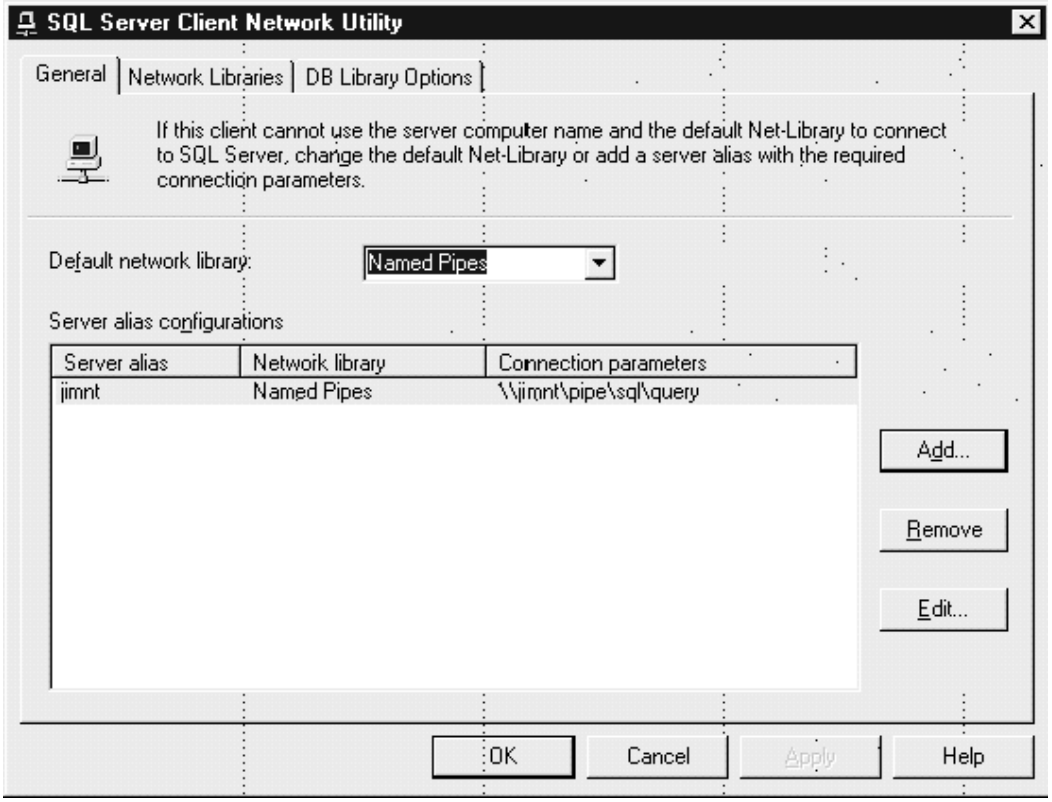
  Run the SQL Client Configuration Utility application. This will display the following dialog:



  Set the Default Network setting to the default protocol used by the MS SQL Server to be accessed. If you are using MSSQL.DLL this must not be Multiprotocol.

- Microsoft SQL Server version 7.0

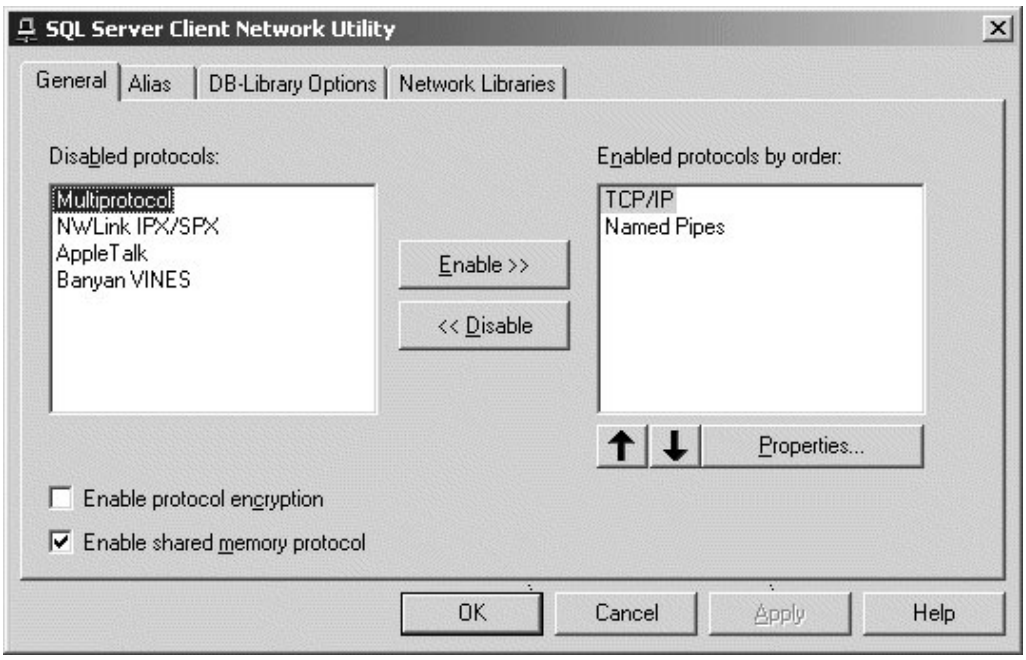
  Run the **Microsoft SQL Server 7.0 Profiler** application to configure the Net Library. When the Profiler application is started, select the **SQL Server Client Configuration Utility** sub-menu item from the **Tools** menu. This will display the following dialog:



Set the default network library setting to the default protocol used by the MS SQL Server to be accessed. If you are using MSSQL.DLL this must not be Multiprotocol.

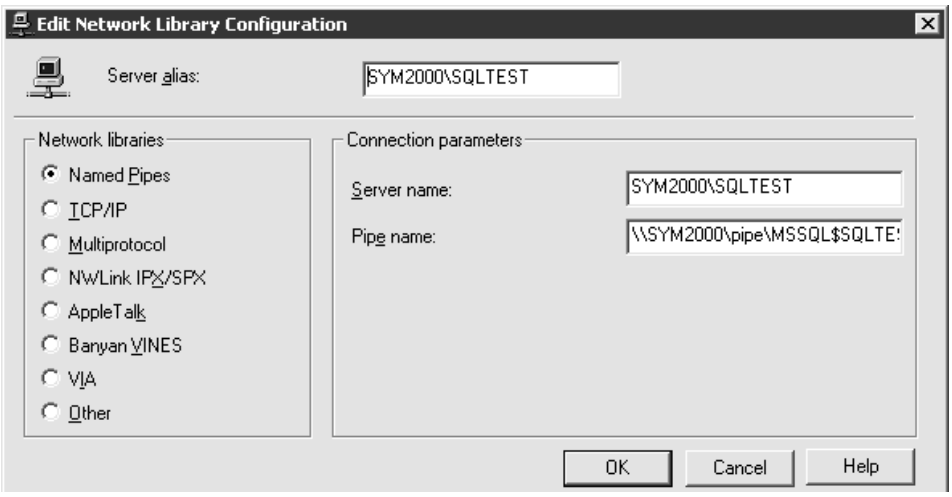
- Microsoft SQL Server 2000 (version 8.0)

  Run the Client Network Utility. This will display the following dialog:



Enable all of the protocols that you require. Make sure that the first enabled protocol is the default protocol used by the primary MS SQL Server to be accessed. For MSSQL.DLL this must not be Multiprotocol. You can add additional alias configurations for MS SQL servers that use a protocol other than the first one enabled.

If you are running multiple SQL Server instances, you will need to define an alias for each. In this dialog press the Alias tab.



The server alias must be in the form of machine_name\alias. The remaining parameters can generally be left at their defaults.

32.2.3 The Microsoft SQL Server Connection

In addition to the special considerations outlined in the *Planning* section, you must determine which type of connection you want to use between the MSSQL.exe or MSSQL.dll and the main SQL Server service. The two types of connections that can be used are:

- An explicit SQL Login connection using a specific SQL Server Login ID and password. If you use MSSQL.exe, the specific SQL Server Login ID that is used is the SA (System Administrator) Login ID and cannot be configured otherwise. If you use MSSQL.dll, the Login ID that is used is configurable by you. This is not the recommended method since it requires that the Login ID and password be stored in an ASCII text file.
- A trusted connection using the SQL Server's integrated security mode to authenticate the Windows NT account under which MSSQL.EXE or MSSQL.dll (US.EXE) will run. This is the recommended method.

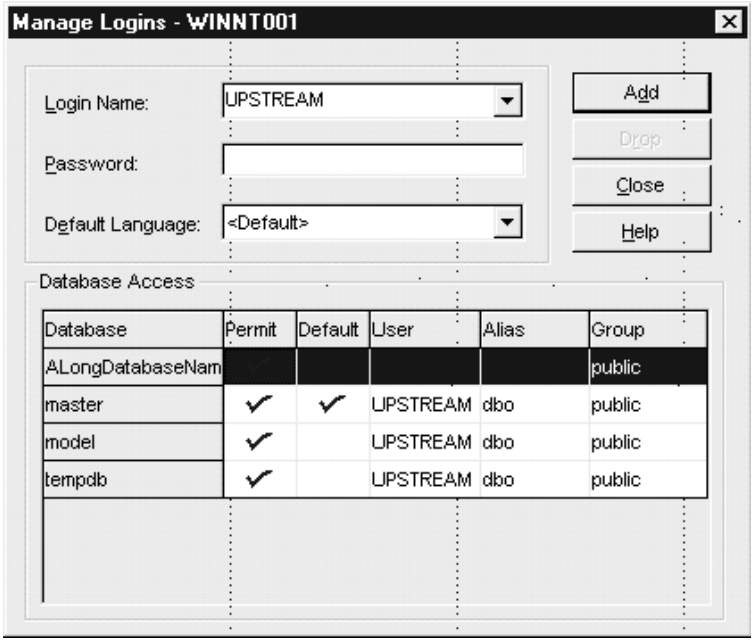
To use an explicit SQL Login connection, you must know and supply the password for the SA Login ID to the MSSQL.EXE configuration process or supply any Login ID and password on the MSSQL.dll parameter screen. The Login password is stored in the MSSQL.CFG file when using MSSQL.exe or an UPSTREAM parameter file when using MSSQL.dll, and these files are ASCII text files. Because storing passwords in ASCII text files poses a security risk, the use of an explicit SQL Login connection is not recommended.

If you plan on using the recommended type of connection, which is a trusted connection, you must create a Login ID in the Microsoft SQL Server configuration that matches the Windows NT/2000 account under which MSSQL.exe or the MSSQL PlugIn will run. You must then create a database alias of 'dbo' (the owner of the database) in each database for this Login ID. The **Managing SQL Server Logins** section of Chapter 9, **Managing Security,** of the **Administrator's Companion 6.0** document for Microsoft SQL Server version 6.5 explains how to add and modify a Login ID.

For example, assume that the Windows NT user account under which MSSQL.exe or the MSSQL PlugIn will run is named **UPSTREAM**. A Login ID of **UPSTREAM** must be created with the default database set to the **master** database. And then for each database that the UPSTREAM Login ID is to backup or restore, an alias for that database must be assigned to be **dbo**. The procedure to be used to create Login IDs and to establish database aliases is different for each Microsoft SQL Server version. The various Microsoft SQL Server versions are:

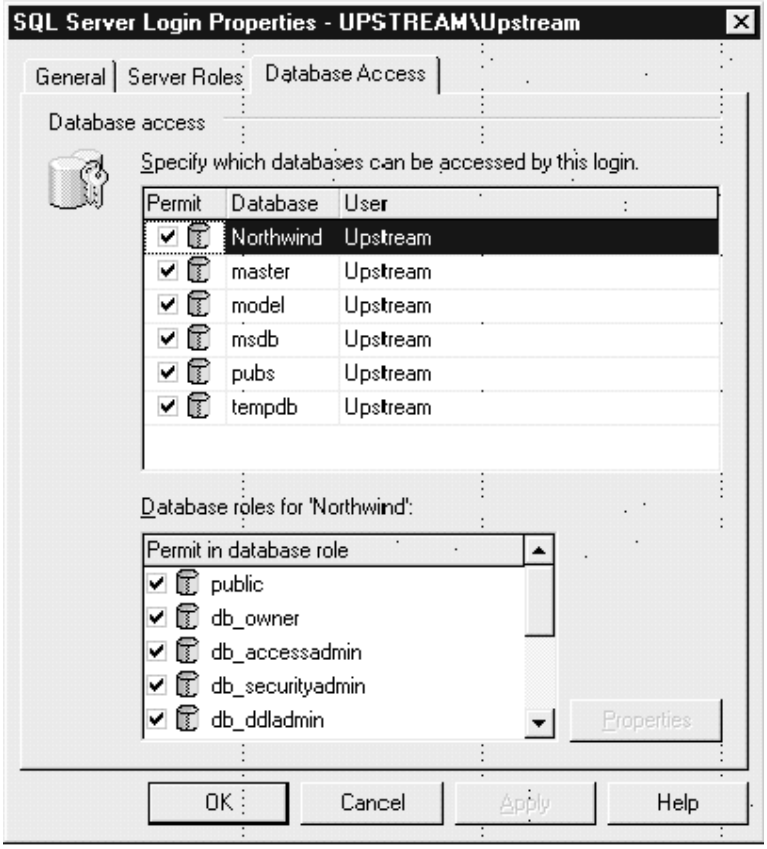
☐ Microsoft SQL Server version 6.5

Run the **SQL Enterprise Manager** application. Expand the tree for the server in question, right-click on the **Logins** item and then left-click on the **New Login…** item. This displays the following dialog:



- Microsoft SQL Server version 7.0 and Microsoft SQL Server 2000 (version 8.0)

  Run the **Enterprise Manager** application. Expand the tree for the server group and server in question, expand the **Security** item, right-click on the **Logins** item and then left-click on the **New Login…** item. This displays the following dialog:



Use the **General** tab to define the **Login ID** and **password** and then use the **Database Access** tab to permit access to the appropriate databases and configure the database roles. Make sure that the db_owner role is configured for all of the databases that MSSQL.exe or the MSSQL PlugIn are to backup or restore.

By configuring a special Login ID for the UPSTREAM user account, MSSQL.exe or the MSSQL PlugIn can establish a 'trusted connection' with the server to perform backups, restores and queries. The Login ID does not necessarily have to be 'UPSTREAM'. It can be any other Login ID that matches any Windows NT user account name that you choose to run UPSTREAM under. You may in fact create two or more Login IDs and may even create a separate unique Login ID for each database you want to backup and restore.

This completes the SQL Server configuration requirements. Proceed to page 32-11 for MSSQL.EXE and page 32-20 for MSSQL.DLL PlugIn installation, configuration and use.

32.3 MSSQL.EXE

32.3.1 Prerequisites

The main component for using FDR/UPSTREAM to backup and restore a Microsoft SQL Server database is the program **MSSQL.EXE**. This program can be executed from a Windows NT command line or an UPSTREAM job and provides all of the functionality required to perform backups and restores for a Microsoft SQL Server database.

The Microsoft API allows backups to both files and pipes. Backups to a file is basically a staging process where the backup is stages to a flat file on disk requiring significant additional disk space and some degradation in performance. Back to a pipe is a memory to memory transfer, is quite fast and requires no additional disk space. We recommend pipe backups whenever possible however it requires SQL Server 6.0 or later.

MSSQL.EXE is used to coordinate the execution of a Transact-SQL script (via ISQL.EXE) and FDR/UPSTREAM to handle backups and restores. Depending on how it is configured and the version of FDR/UPSTREAM you are using you can have the backups and restores performed using either DISK or PIPE dump devices.

Note that we recommend that most new customers use the MSSQL.DLL PlugIn described on page 32-20.

32.3.2 FDR/UPSTREAM Configuration

There are a number of FDR/UPSTREAM related steps that need to be performed. These are as follows:

- 1. Determine the MVS storage requirements for the full and incremental database backups.
- 2. Create a FDR/UPSTREAM for MVS backup profile enabled for merge backups. There are no special requirements for the options used for this backup profile other than the enabling of the merge backup option.
- 3. A plan for vaulting the FDR/UPSTREAM for MVS backup datasets for the backup profile should be created to ensure that a failure of MVS storage media does not prevent restoration of the Microsoft SQL Server database.
- 4. Perform the MSSQL.EXE configuration process to prepare MSSQL.EXE to backup and restore the database. This is done by supplying the values for a number of configuration parameters.

The first three steps listed above are no different from those for any of the servers you are already using FDR/UPSTREAM to back up. The last step is the special MSSQL.EXE configuration. To configure a Microsoft SQL Server database to be backed up using MSSQL.EXE, execute the following command from a Windows NT command line:

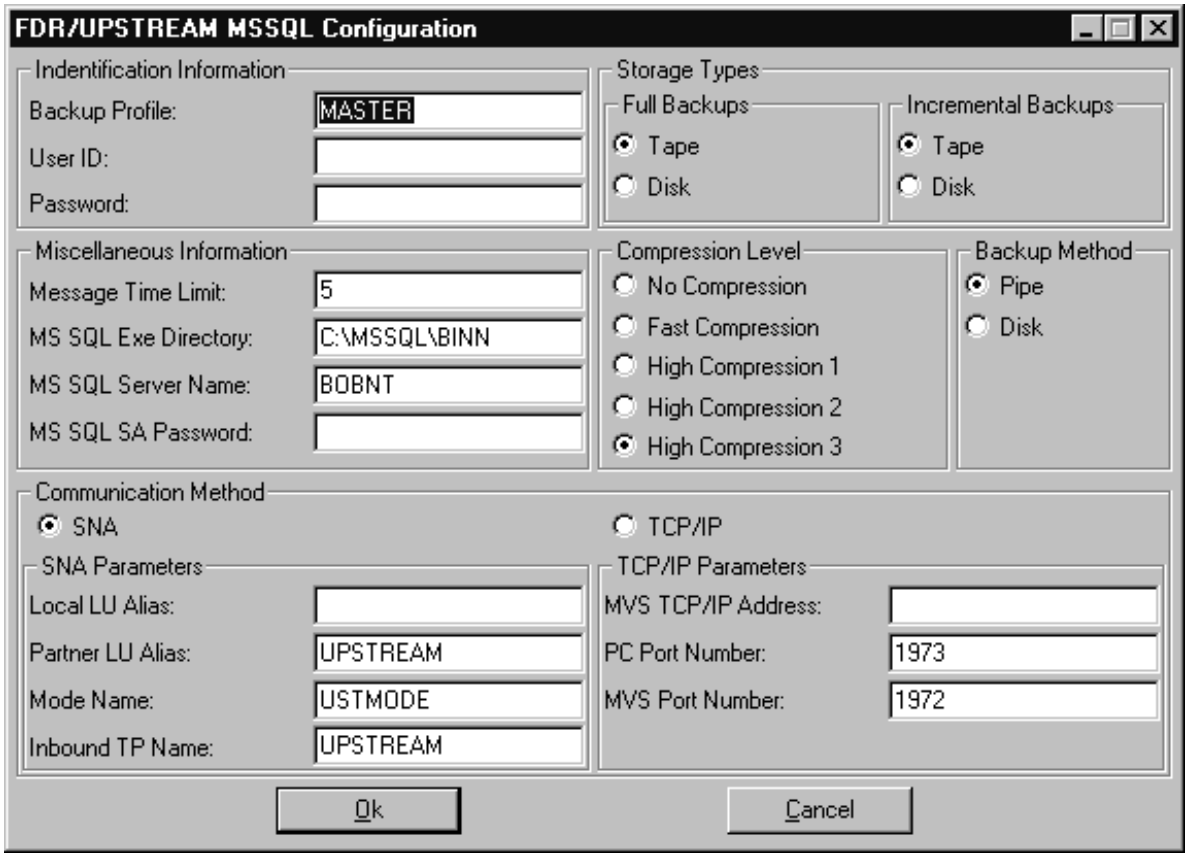
```
MSSQL CONFIGURE DatabaseName
```

Where *DatabaseName* is the name of the database to be configured for backups and restores using MSSQL.EXE.

The MSSQL CONFIGURE command must be executed at least once for each database you want to backup and restore using MSSQL.EXE. Two databases in particular, the *master* database and the *msdb* database, require special treatment and **SHOULD ALWAYS** be configured to be backed up and restored using MSSQL.EXE

When executed, the MSSQL CONFIGURE command will create a subdirectory structure under C:\UPSTREAM (assuming that this is the name of the directory in which MSSQL.EXE was installed) for the specified database and then create a file named MSSQL.CFG. The MSSQL.CFG file contains a number of

parameters that subsequent executions of MSSQL.EXE will use to perform its functions. Default values will be supplied for most of these parameters, but other parameters need to have specific user- defined values supplied for them. Once invoked to perform the configuration process, MSSQL.EXE will display the following dialog:



Most of the fields are required. You may have to change some of the other fields if the defaults are not to your liking. The fields on this dialog are detailed below:

- **Backup Profile:** The name of the backup profile defined in the FDR/UPSTREAM host configuration dataset.
- **User ID:** You host user ID if required.
- **Password:** Your host password for the user ID specified above.
- **Storage Types/Full Backups:** The MVS storage type to be used to back up the full database. This can be either disk or tape. The default is tape.
- **Storage Types/Incremental Backups:** The MVS storage type to be used to back up the transaction logs. This can be either disk or tape. The default is tape.
- **Message Time Limit:** The number of seconds that FDR/UPSTREAM will display a message before it times out. This can be either -1(for no display) or a number in the range 1 - 20.

- ☐ **MS SQL Exe Directory:** The fully qualified name of the directory that contains the MS SQL ISQL.EXE program. This directory name may also be specified in standard UNC format.

- ☐ **MS SQL Server Name:** The name of the MS SQL server that owns the database.

- ☐ **MS SQL SA Password:** The password for the MS SQL Server System Administrator (SA) Login ID. Leave this field blank if you want to use a trusted connection for ISQL.EXE functions (this is the recommended method).

- ☐ **Compression Level:** The level to which the database and log data will be compressed as it is backed up to the host. This can be either No Compression, Fast Compression, High Compression 1, High Compression 2, or High Compression 3. The default is High Compression 3.

- ☐ **Backup Method:** The method by which backups and restores to the database are performed. This can be either pipe or disk. The pipe method is the most efficient.

- ☐ **Communication Method:** The communication protocol that FDR/UPSTREAM should use to communicate with the FDR/UPSTREAM host. This can be either SNA or TCP/IP.

If you specify the SNA Communications Method you will have to enter the following fields:

- ☐ **Local LU Alias:** The SNA LU alias assigned to FDR/UPSTREAM. This LU alias must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSExch.EXE command from the FDR/UPSTREAM host.

- ☐ **Partner LU Alias:** The SNA LU alias assigned to the FDR/UPSTREAM host.

- ☐ **Mode Name:** The SNA mode name to be used by FDR/UPSTREAM to communicate with the FDR/UPTREAM host.

- ☐ **Inbound TP Name:** The SNA Transaction Program (TP) name for FDR/UPSTREAM.

If you specify the TCP/IP Communications Method you will have to enter the following fields:

- ☐ **MVS TCP/IP Address:** The TCP/IP address assigned to the FDR/UPSTREAM.

- ☐ **PC Port Number:** The TCP/IP port number assigned to FDR/UPSTREAM. This port number must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSExch.EXE command from the FDR/UPSTREAM host.

- ☐ **MVS Port Number:** The TCP/IP port number assigned to the FDR/UPSTREAM host.

Once all of the required parameter values are supplied and verified, MSSQL.EXE creates a FDR/UPSTREAM configuration file and three FDR/UPSTREAM parameter files. The directories and files created by the MSSQL CONFIGURE process are:

- C:\UPSTREAM\MSSQL(directory)
- C:\UPSTREAM\MSSQL\ALongDatabaseName (directory)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\BkpFiles (directory)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\CtlFiles (directory)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\DBBKUP.DAT (file)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\LOGBKUP.DAT (file)

- C:\UPSTREAM\MSSQL\ALongDatabaseName\MSSQL.CFG (file)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\RESTORE.DAT (file)
- C:\UPSTREAM\MSSQL\ALongDatabaseName\UPSTREAM.CFG (file)

The C:\UPSTREAM\MSSQL directory is common to all of the Microsoft SQL Server databases that you will use MSSQL.EXE to backup and restore. This directory contains a MSSQL.LOG file which details all of the backup and restore activity performed by MSSQL.EXE for all databases.

The C:\UPSTREAM\MSSQL\ALongDatabaseName directory contains the MSSQL.EXE configuration file (MSSQL.CFG) and the FDR/UPSTREAM configuration and parameter files (UPSTREAM.CFG, DBBKUP.DAT, LOGBKUP.DAT, RESTORE.DAT).

WARNING: If you choose to modify the FDR/UPSTREAM files outside of the MSSQL CONFIGURE process you should be careful and have full knowledge of the impact of the modifications you are making. Also each time a MSSQL CONFIGURE process is performed, the manual changes made to the FDR/UPSTREAM files will be lost because the MSSQL CONFIGURE process will overwrite them.

The C:\UPSTREAM\MSSQL\ALongDatabaseName\CtlFiles directory is used by MSSQL.EXE to create work files. This directory name is also listed in the UPSTREAM.CFG file as the WORKPATH parameter which means that FDR/UPSTREAM itself will use it for its work files as well.

Finally the C:\UPSTREAM\MSSQL\ALongDatabaseName\BkpFiles directory is used for storing Microsoft SQL Server backup files temporarily, only if disk files are used to perform the backups (DUMP) or restores (LOAD).

Special Note: You will notice that the comment for the UPSTREAMLocalLUAlias parameter listed above states: "This LU Alias must be different than the one used in your normal FDR/UPSTREAM configuration if you will be initiating the MSSQL.EXE command from the host." The reason for a unique LU Alias has to do with the way in which MSSQL BACKUP is run when it is initiated from the host via a USTBATCH job. The **Host Initiation of MSSQL.EXE** section covers this topic in detail.

If you wish to use UPSTREAM/SOS for your backups see page 32-18 for a description of additional configuration procedures.

32.3.3 Usage

The MSSQL.EXE file provides all of the functionality needed to use FDR/UPSTREAM to perform backups and restores for a Microsoft SQL Server database. The proper syntax for MSSQL.EXE is:

```
MSSQL BACKUP [DatabaseName | DatabaseListFileName] DATABASE
MSSQL BACKUP [DatabaseName | DatabaseListFileName] LOG
MSSQL RESTORE DatabaseName VersionNumber [REPLACE]
MSSQL INQUIRE DatabaseName
MSSQL CONFIGURE DatabaseName
```

Where:

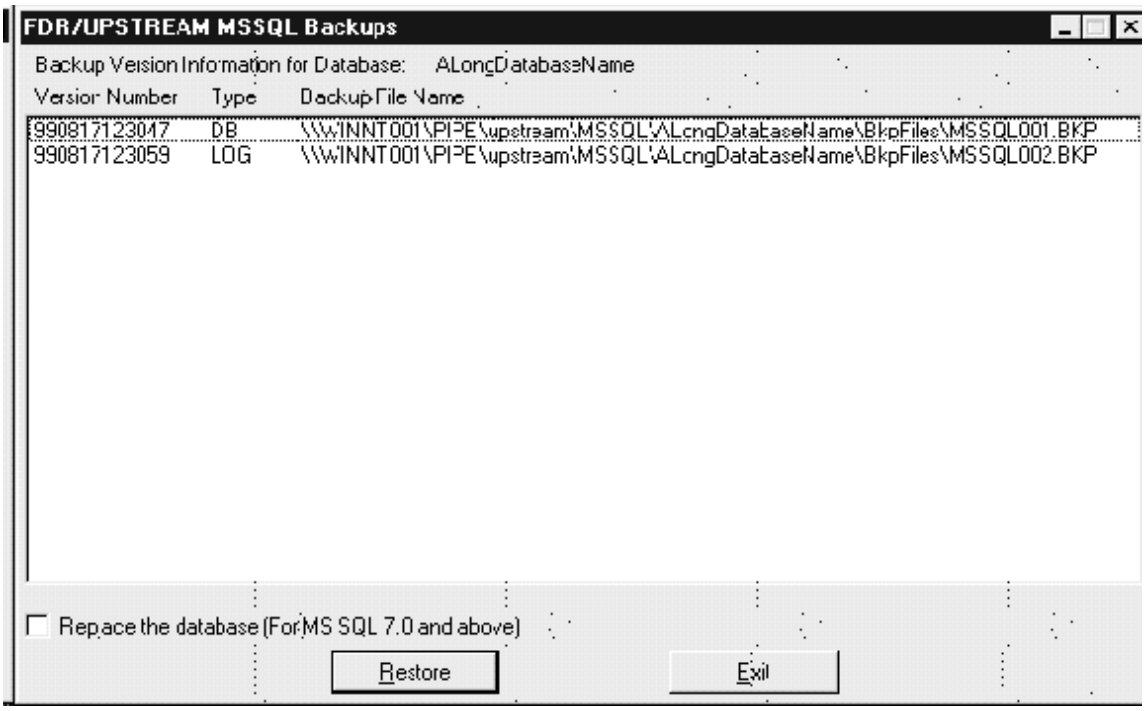
- DatabaseName is the name of the database to be backed up or restored.
- DatabaseListFileName is the name of a file containing the names of databases to be backed up.

- VersionNumber is the UPSTREAM version number for the database or log backup to be restored. If the version number specified is a log backup, the previous database backup for the database will be identified and a restore will be performed for each of the versions from the database backup up to and including the log backup version specified.
- REPLACE is an optional keyword for restore which will cause the database to be replaced during the restore. This keyword may need to be used for MS SQL 7.0 databases only. The restore will fail if this keyword is specified for a database prior to MS SQL 7.0.

To perform a full database backup of a database, you would execute a 'MSSQL BACKUP DatabaseName DATABASE' command. To perform an incremental backup of a database's transaction logs you would execute a 'MSSQL BACKUP DatabaseName LOG' command.

If you wish to backup a number of databases, place the names of these databases in a text file. This file must be a plain text file (no word processing formatting information) and be viewable with the TYPE command. Specify the name of this text file in place of the DatabaseName on the MSSQL BACKUP command for either the DATABASE or LOG. MSSQL will automatically create a **MSSQL.LST** file which can be used as a Database List File Name; whenever you perform a MSSQL CONFIGURE command, it will add the specified database to the MSSQL.LST file.

To perform a restore of a database with or without the restoration of any of its transaction log files you would first use the 'MSSQL INQUIRE DatabaseName' command to display a list of available FDR/UPSTREAM backups and their version numbers. The MSSQL INQUIRE process will display the following dialog:



To restore from a particular backup version, you first select the version to be restored and click the **Restore** button or just double-click the version entry. If you already know the version number that you want to restore from you can invoke the MSSQL RESTORE DatabaseName VersionNumber command directly. An example of this follows:

```
MSSQL RESTORE ALongDatabaseName 980224145305 REPLACE
```

Since the specified version number is from a log (incremental) backup, MSSQL will first restore from the previous database (full) backup (version 980224145239) and then restore version 980224145305.

The method by which MSSQL.EXE performs these backups and restores (either though a DISK or PIPE dump device), and the other parameters that control how Microsoft SQL Server and FDR/UPSTREAM (US.EXE) operate, are determined at the time that the database is configured for MSSQL.EXE as explained in the **FDR/UPSTREAM Configuration** section.

Each execution of a MSSQL command causes MSSQL.EXE to log its activity in a file named MSSQL.LOG. This file is maintained in the C:\UPSTREAM\MSSQL directory and has a format similar to a regular UPSTREAM.LOG file. In other words, each entry in the MSSQL.LOG file starts with a time stamp. Over time, the MSSQL.LOG file can become quite large. Therefore, to manage its size you can use the USLOGCLR.EXE program found in the C:\UPSTREAM directory to discard the activity older than a specified number of days. For example, the following command will cause the activity in the MSSQL.LOG file older than 30 days to be discarded:

```
C:\UPSTREAM\USLOGCLR 30 C:\UPSTREAM\MSSQL\MSSQL.LOG
```

The return codes that MSSQL.EXE can return are as follows:

- 0 - If the requested function was performed successfully.
- 4 - If the execution of a Transact-SQL script via ISQL.EXE encountered an error.
- 8 - If FDR/UPSTREAM encountered an error.
- 12 - If one or more of the MSSQL.EXE parameters were missing or invalid.

32.3.4 Operation

MSSQL.EXE can be implemented in a production environment in a number of ways. Some of these are:

- Executing MSSQL.EXE on the same server that Microsoft SQL Server executes or on a different server within the same Windows NT domain.
- Executing MSSQL.EXE in a logged on user environment or in a service process.
- Initiating a MSSQL.EXE backup or restore from the host or initiating it from a Windows NT server either automatically or through some automated scheduler.

The Microsoft SQL Server supplied ISQL.EXE program can be executed on any machine within the Windows NT domain in which the Microsoft SQL Server itself is deployed. The only requirement is that MSSQL.EXE must be installed in and executed from the same directory as the FDR/UPSTREAM US.EXE program (typically C:\UPSTREAM). MSSQL.EXE finds the Microsoft SQL Server via the MSSQLServerName parameter in the MSSQL.CFG file that is created during the MSSQL CONFIGURE process.

MSSQL.EXE can be executed either in the context of a logged on user or as a Windows NT service. The only requirement for executing MSSQL.EXE in the context of a service is that it must be executed under a user-specified User Account and not the System Account. This restriction is associated with the Microsoft SQL Server security system. This user-specified User Account must be defined in Microsoft SQL Server as a Login ID which has an alias defined to ‘dbo’ (the database owner) of each database that MSSQL.EXE will be used to backup and restore. If the MSSQL.EXE service is executed in the context of the System Account or the User Account has not been defined as a Login ID to Microsoft SQL Server, MSSQL.EXE will not be able to execute the required Transact-SQL scripts needed to perform its functions.

The greatest flexibility of MSSQL.EXE is the method used to initiate it. If MSSQL.EXE is to be initiated from a Windows NT server, it can be executed manually, via the Windows NT scheduler, via the Microsoft SQL Server scheduler or via any other automated mechanism. Information about how to schedule tasks from

Microsoft SQL Server can be found in Chapter 16, **Scheduling Tasks**, of the **Administrator's Companion 6.0** document for Microsoft SQL Server version 6.5.

Most FDR/UPSTREAM customers like to have the host control all FDR/UPSTREAM operations. Because of this, MSSQL.EXE can be initiated from the host as well. To accomplish this, a second communication path between the Windows NT server and the host has to be established. In a SNA environment this means an additional LU and in a TCP/IP environment an additional TCP/IP port number. Host initiation is covered in the next section.

32.3.5 Host Initiation of MSSQL.EXE

MSSQL.EXE can be initiated from the host via a USTBATCH job. A sample set of USTBATCH parameters for invoking MSSQL.EXE follow:

```
APPLPREF=UPSTR
USAPPL=UPSTREAM
LOGMODE=USTMODE
TARGLU=PCLU1
TPNAME=UPSTREAM
MAXRETRY=0
CONV=WAIT
ACTION=5
JOBOPTIONS=2
JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8
FILES=C:\UPSTREAM\MSSQL.EXE BACKUP ALongDatabaseName DATABASE
/*
```

Using this sample set of USTBATCH parameters, the backup process goes something like this:

- 1. The USTBATCH job is submitted for execution.
- 2. USTBATCH starts a conversation on LU UPSTR001 (APPLPREF=UPSTR) with the UPSTREAM started task on the host (USAPPL=UPSTREAM) and requests that a conversation with the Windows NT server (TPNAME=UPSTREAM) be started using the LU assigned to the Windows NT server (TARGLU=PCLU1).
- 3. The UPSTREAM TP on the Windows NT server is started, FDR/UPSTREAM for Windows is invoked and completes the connection.
- 4. The request to execute a job (ACTION=5) is passed down to FDR/UPSTREAM for Windows along with the program specification for the job (FILES=C:\UPSTREAM\MSSQL.EXE BACKUP ALongDatabaseName DATABASE).
- 5. FDR/UPSTREAM for Windows will invoke MSSQL.EXE, wait for MSSQL.EXE to finish execution and return a return code, and then terminate itself (JOBOPTIONS=2). Once MSSQL.EXE is finished, FDR/UPSTREAM for Windows will map the MSSQL.EXE return code into a return code that the USTBATCH job can interpret (JOBRETURNCODEMAP=0:0 4:8 12:12 ?:8).
- 6. During the time that FDR/UPSTREAM for Windows is waiting for MSSQL.EXE to finish, it will still have an active conversation with the host on the LU named PCLU1. When MSSQL.EXE executes, it will build a Transact-SQL script file to execute via ISQL.EXE and build a FDR/UPSTREAM parameter file to execute via a second copy of US.EXE (FDR/UPSTREAM for Windows).

During the execution of the second copy of US.EXE (step #6 above), a second conversation with the host is initiated via the LU alias configured on the UPSTREAMLocalLUAlias parameter in the MSSQL.EXE configuration file (MSSQL.CFG). It is **crucial** that the UPSTREAMLocalLUAlias parameter have a LU alias for a LU

name that is different from the one specified in the USTBATCH JCL (for example not PCLU1). The reason for this is that the first LU will be still be in use for the conversation that caused the MSSQL.EXE job to be executed in the first place. The second LU is needed to start a conversation that will be used by the backup.

The scenario outlined here works the same way for TCP/IP except that TCP/IP does not have a concept similar to a TP (Transaction Program). This means that FDR/UPSTREAM for Windows must already be executing and waiting for the job request to be passed down from the host or you must use the FDR/UPSTREAM TCP/IP Attach Manager (see the Running More Than One Copy chapter for more information about the . Also since FDR/UPSTREAM should continue to execute after MSSQL.EXE has finished its execution, the JOBOPTIONS parameter should be JOBOPTIONS=3.

More information about remote host initiation, particularly TCP/IP conversations, can be found in the FDR/UPSTREAM for MVS manual.

32.3.6 MS SQL Server and UPSTREAM/SOS

Before starting the reconfiguration of the UPSTREAM SQL server parameter files, perform the following prerequisites:

- 1. Perform the initial configuration for the server by executing the MSSQL CONFIGURE <database name> commands (see section 32.3.2, 34.3.2).
- 2. Perform the appropriate configuration steps for the FDR/UPSTREAM/SOS local EMC disks as described in the UPSTREAM/SOS chapter.

Once the prerequisite steps have been performed, you are now ready to reconfigure the FDR/UPSTREAM template parameter files. When you execute the MSSQL CONFIGURE <database name> command, the following FDR/UPSTREAM template parameter files are created:

```
C:\UPSTREAM\MSSQL\DatabaseName\DBBKUP.DAT (file)
C:\UPSTREAM\MSSQL\DatabaseName\LOGBKUP.DAT (file)
```

Although not complete (unable to be used to perform real backups), these parameter files can be further modified with the main FDR/UPSTREAM program, US.EXE. To do this, start US.EXE and perform the following steps for each of the template parameter files:

☐ 1. Pull down the **File** menu from the main UPSTREAM screen and select **Open**. This displays the **File Open** dialog.

☐ 2. Double-click on the **[MSSQL]** entry in the list box to go to down to the MSExch subdirectory.

☐ 3. Double-click on **[Database Name]** entry in the list box to go down to the subdirectory for your database.

☐ 4. Double-click on the **DBBKUP.DAT** or **LOGBKUP.DAT** entry in the list box to open the parameter file. This displays either the Host Security Validation dialog or the Backup Parameters dialog. If the Host Security Validation dialog is displayed, reenter your password and press the Validate button to revalidate your security information. The Backup Parameters dialog will then be displayed.

☐ 5. Click on the **Local Bkp…** button. This displays the **Local Backup More…** dialog.

☐ 6. Press the **FDRSOS Physical Disk Local Backup** radio button. This causes the Select Disk… list box to be filled in with a list of physical disk IDs.

☐ 7. Select the disk ID of the EMC disk that was configured by the UPSTREAM/SOS setup step which was performed as one of the prerequisites.

- ☐ 8. Press the **Check Disk** button to verify that this is the correct disk.
- ☐ 9. Press the **Ok** button. The Backup Parameters dialog will be redisplayed.
- ☐ 10. Press the **Save or Begin…** button. This will display the Save Parameters/Backup dialog.
- ☐ 11. Press the **Save** button to save your parameters back to the original parameter file.

Once these steps have been performed for each of the template parameter files listed above, you are now ready to perform your MSSQL backups as you normally would. Now when FDR/UPSTREAM backs up the data it will do so using the EMC local disks as a backup medium.

WARNING: If you ever need to execute the MSSQL CONFIGURE command again, you will then also have to reconfigure the template parameter files as described above.

For special considerations regarding SQL Server Restores see page 32-30.

32.4 SQL Server PlugIn (MSSQL.DLL)

Enhancing the existing support for Microsoft SQL Server databases, a more powerful and easier to use backup agent for SQL Server is now available. Taking advantage of a number of SQL Server v7 features it operates as an UPSTREAM PlugIn, a feature of UPSTREAM which integrates database agents directly into the UPSTREAM product.

The benefits of using the UPSTREAM SQL Server PlugIn (MSSQL.DLL) rather than MSSQL.EXE are:

- Configuration, logging, error handling and interaction with the main US.EXE program is seamless as opposed to being almost totally separate for MSSQL.EXE.
- The MSSQL.EXE configuration process creates a somewhat unwieldy directory structure under the main UPSTREAM directory (C:\UPSTREAM by default). MSSQL.DLL does not use anything other than a normal FDR/UPSTREAM parameter file to store its configuration.
- MSSQL.EXE allows the backup or restore of only a single Microsoft SQL Server database at one time and these backups must be independent of all other backups (i.e. they need their own unique Backup Profile). MSSQL.DLL allows you to intermix the backups of multiple Microsoft SQL Servers databases together with the backups of other file system and non-file system backups. By using MSSQL.DLL, the file system and databases for a single server can be backed up in one backup operation using a single Backup Profile.
- Since MSSQL.EXE is a program, backups and restores of a Microsoft SQL Server database must be performed, not as Backup and Restore operations, but as Run Job operations. MSSQL.DLL works directly with US.EXE to allow backups and restores to be performed as true Backup and Restore operations.
- MSSQL.EXE provides only partial support for Microsoft SQL Server version 7.0 while MSSQL.DLL provides full support.
- MSSQL.DLL can backup multiple instances on a server.
- MSSQL.DLL can be used on a database installed on a cluster server.

MSSQL.DLL is a PlugIn module, also referred to as the MSSQL PlugIn. As with the MSSQL.EXE program, the MSSQL PlugIn makes use of Transact-SQL scripts to also perform the backup and restore operations. The difference with the MSSQL PlugIn is that the scripts are submitted to the Microsoft SQL Server via the **DB-Library** API. During the installation of Microsoft SQL Server, the NTWDBLIB.DLL is added to the %SystemRoot%\system32 directory of your Windows NT system. It is NTWDBLIB.DLL that provides the DB-Library API that MSSQL.DLL uses.

Although MSSQL.EXE allows backups and restores to be performed using an optional disk interface, the MSSQL PlugIn does not support this interface and instead requires all backups and restores to be performed using the named pipe interface exclusively.

NOTE: Backups performed with MSSQL.EXE are not compatible with those using the UPSTREAM SQL Server PlugIn. You must perform a full backup if you are converting from the MSSQL.EXE program.

32.4.1 Installation and Configuration

The UPSTREAM MSSQL.DLL PlugIn is included in the UPSTREAM distribution. Note that when upgrading either the PlugIn or the main executable, that both must be upgraded at the same time (they are both properly upgraded when performing a full install or upgrade).

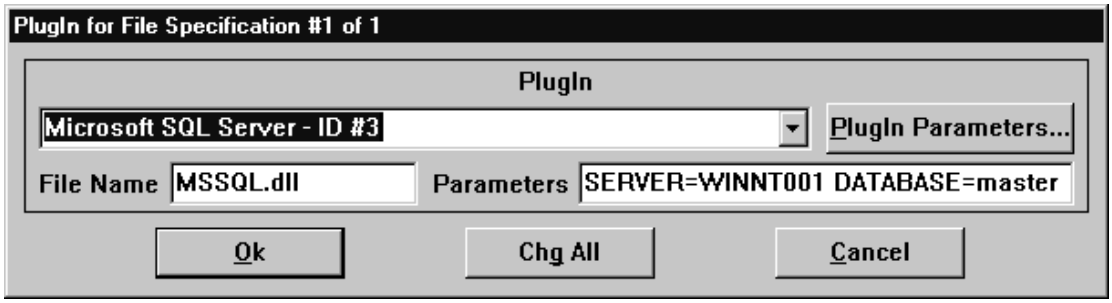
Configuration of SQL Server for the PlugIn is the same as for MSSQL.EXE; see page 32-3 for details.

32.4.2 MSSQL PlugIn Backups

The MSSQL PlugIn can be used with US.EXE on any Windows NT operating system machine on which the NTWDBLIB.DLL file exists. US.EXE running on this machine can use the MSSQL PlugIn to backup any number of Microsoft SQL Server servers and databases.

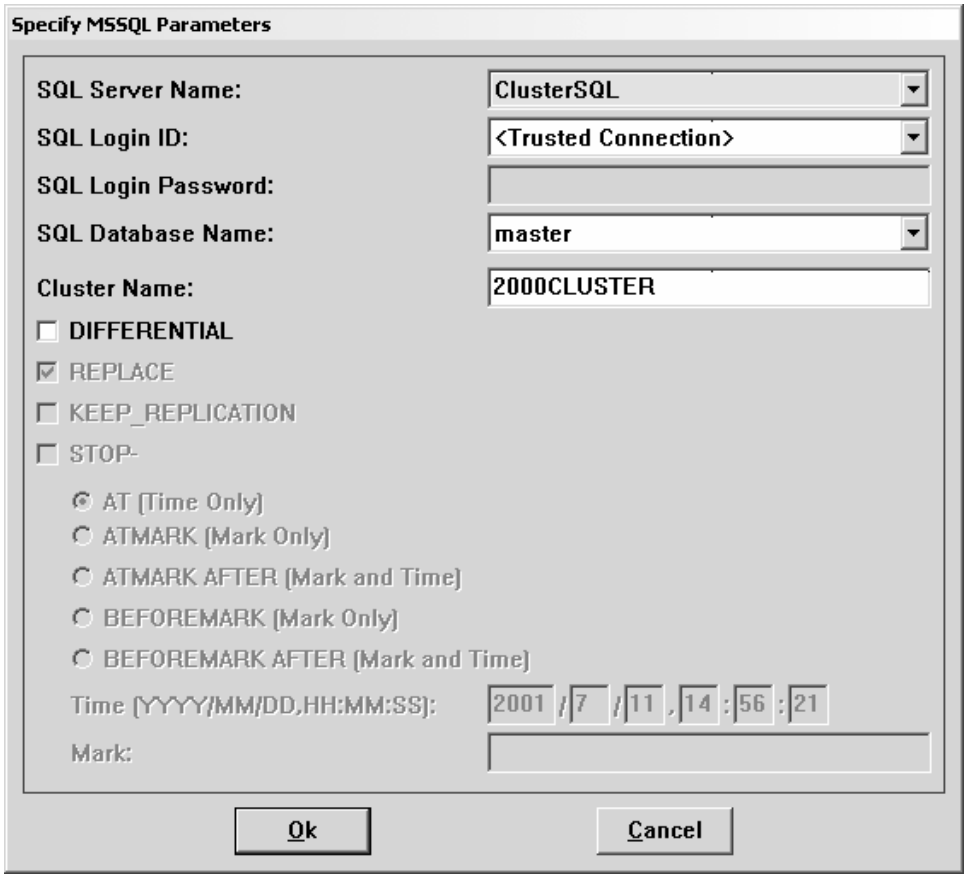
The backup type for all MSSQL PlugIn backups must be either First-time full, Full merge or Incremental merge. A merge type of first-time full (MERGE 3) or full merge (MERGE 1) will create a full database backup of the specified databases; a merge type of incremental merge (MERGE 2) will create a transaction log backup of the specified databases.

To specify the use of the MSSQL PlugIn to back up a single Microsoft SQL Server database, use the Backup Parameters dialog to add a new file specification (or select a file specification that you want to alter) and then press the **PlugIn…** button.



When the **PlugIn…** button is pressed, the **PlugIn for File Specification …** dialog is displayed. MSSQL has a unique PlugIn ID number of **3** and a descriptive name of **Microsoft SQL Server**. The PlugIn ID number is used internally by US.EXE to uniquely identify PlugIn modules. The descriptive name is used on the PlugIn for File Specification … dialog to select this PlugIn for use with a particular file spec.

To aid in the specification of parameters specific to this PlugIn, the MSSQL PlugIn has a PlugIn specific dialog that is displayed when the **PlugIn Parameters…** button is pressed.



- **SQL Server Name:** When it is displayed, the Microsoft SQL Server Name drop down list will be populated with the names of all of the Microsoft SQL Servers and Microsoft SQL Server Aliases that the DB-Library (NTWDBLIB.DLL) API can locate as well as any aliases defined locally. In the above example, **ClusterSQL** is the name of a Microsoft SQL Server Alias.

- **SQL Login ID:** The Login IDs drop down list is populated with the Login IDs configured on the selected Microsoft SQL Server. The first item in this list will always be **<Trusted Connection>**. The <Trusted Connection> item is the default and should be selected to establish a trusted connection with the Microsoft SQL Server. If any other Login ID is selected the connection with the Microsoft SQL Server will be an explicit connection.

- **SQL Login Password:** Disabled for Trusted Connections, enter the password associated with the Login ID above.

- **SQL Database Name:** Whenever the Microsoft SQL Server Name selection is changed the SQL Database Name drop down list will be populated with the names of the databases on the selected server.

- **Cluster Name:** The name of the cluster that the selected Microsoft SQL Server resides on. This should be left blank if the Microsoft SQL Server is not installed on a cluster.

- **DIFFERENTIAL:** This check box is enabled only for Incremental merge backups and when the selected Microsoft SQL Server Name is a version 7.0 server. DIFFERENTIAL is a special option on the BACKUP command that is issued to the Microsoft SQL Server when performing a backup. Refer to the Microsoft SQL Server documentation for the BACKUP command for more information about this option.

WARNING: If you plan on performing an incremental backup of a database that has had non-logged operations performed on it (such as bcp operations), you must use the DIFFERENTIAL option for the backup

If the DIFFERENTIAL option is not used for such a database, the incremental backup will not include transaction log entries for the non-logged operations.

- ☐ **REPLACE:** This check box is enabled only for restores and when the selected Microsoft SQL Server Name is a version 7.0 server. REPLACE is a special option on the RESTORE command that is issued to the Microsoft SQL Server when performing a restore. Refer to the Microsoft SQL Server documentation for the RESTORE command for more information about this option.

- ☐ **KEEP_REPLICATION:** This check box is enabled only for restores and when the selected Microsoft SQL Server Name is a version 8.0 server. KEEP_REPLICATION is a special option on the RESTORE command that is issued to the Microsoft SQL Server when performing a restore. Refer to the Microsoft SQL Server documentation for the RESTORE command for more information about this option.

- ☐ **STOP-** This check box is enabled only for restores and when the selected Microsoft SQL Server Name is a version 7.0 or 8.0 server. This check box enables the specification of the STOPAT, STOPATMARK, STOPATMARKAFTER, STOPBEFOREMARK and STOPBEFOREMARKAFTER parameters that are special options of the RESTORE command that is issued to the Microsoft SQL Server when performing a restore. Refer to the Microsoft SQL Server documentation for the RESTORE command for more information about this option.

MSSQL uses the parameters specified on the **Specify MSSQL Parameters** dialog to construct the PLUGINPARAMETERS and FILES parameters that can be saved in an UPSTREAM parameter file. The FILES parameter (the file specification) is formatted for SQL Server:

```
\\real server name\PIPE\MSSQL\databasename.bin
```

Or

```
\\real server name\PIPE\MSSQL(instance name)\databasename.bin
```

If the name selected from the SQL Server Name drop down list is a Microsoft SQL Server Alias name, the MSSQL PlugIn will resolve the alias name into its real server name and instance name if it has one. For the default instance, the instance name is blank.

The MSSQL PlugIn requires a specific set of file specification parameters that it sets automatically. As a result, the Backup Parameters dialog does not allow you to modify the Backup Specification field or press the Spec Detail… button to alter the rest of the file specification parameters.

The MSSQL PlugIn may be used for multiple file specifications as long as the server and database name combinations are unique for each file specification. The MSSQL PlugIn may also be used in conjunction with other file specifications that do not use PlugIns or use other PlugIns as long as the other PlugIns also allow this combination.

32.4.3 Server Login

When the Specify MSSQL Parameters dialog is first displayed and whenever a different SQL Server Name is selected, MSSQL attempts to login to the specified server using the connection information in the PLUGINPARAMETERS. The purpose of this login is to query the server for the following information:

- Its version.
- Its list of Login IDs.

- Its list of databases.

If MSSQL cannot login to the specified server using the connection information in the PLUGINPARAMETERS, it then attempts to login using a trusted connection with the Windows NT/2000 account you are currently logged on with. If MSSQL still cannot login to the specified server, it displays the following login dialog:

Enter a valid MSSQL Login ID and Password in this dialog to continue configuring for MSSQL backups.

32.4.4 MSSQL PlugIn Restores

To start a restore of one or more databases that were backed up with the MSSQL PlugIn, select the **List and Restore** option in the **Action** menu. If the latest backup version of the current backup profile had multiple file specifications and one or more of these file specifications did not use the MSSQL PlugIn, the *Inquire/Restore PlugIn Selection for Profile…* dialog will be displayed.

Select the **Microsoft SQL Server** item and press the **Continue…** button. When the Continue… button is pressed or if the backup version contains file specifications that all use the MSSQL PlugIn, the Inquire/Restore for Profile… dialog is displayed.

On this dialog you will see all of the top level file specifications included in this backup version. If you attempt to expand a file specification that does not use the MSSQL PlugIn, the list of files for that file specification will not be displayed. Only the files for the file specifications that use the MSSQL PlugIn will be displayed. Find the file specification for the Microsoft SQL Server database restored and select the ***databasename.*****bin** file for that file specification. Then press the **Select for Restore** button to have the **PlugIn…** button enabled.

The More… button will not be enabled since the MSSQL PlugIn requires complete control of the file specification parameters. Once the PlugIn… button is enabled, press it to display the PlugIn for File Specification … dialog (the same dialog as for the backup).

The Parameters field will be blank and will be filled in for you when you press the **PlugIn Parameters…** button to display the Specify MSSQL Parameters dialog. This is the same dialog that was displayed when you configured the backup.

Once you have set the MSSQL PlugIn parameters to your liking, press the Ok button to return to the PlugIn for File Specification … dialog. You will now see the Parameters field filled in with a set of parameters in the format SERVER=server or alias name DATABASE=databasename… For example:

```
SERVER=ClusterSQL DATABASE=master
```

Once the PLUGINPARAMETERS have been specified for each database to be restored and the restore is started, the MSSQL PlugIn processes the restore as follows:

- 1. The list of versions for the backup profile is scanned to find the previous full backup for the database. This may be the version that was selected for the restore.
- 2. All of the versions from the previous full up to and including the version selected are examined to find the last differential backup if one exists.
- 3. Only the full backup version, the last differential backup version (if one exists) and the incremental backup version since the last differential backup or full version are selected for the restore process. Any incremental backup versions before the last differential backup version is skipped.
- 4. An individual restore operation is performed for each of the selected backup versions.

For example, suppose the ABC database has the following backup versions:

```
000601210000            Full
000602210000            Incremental
000603210000            Differential
000604210000            Incremental
000605210000            Differential
000606210000            Incremental
000607210000            Incremental
000608210000            Incremental
```

and version 000607210000 (second from the last) is selected for a restore. A restore operation will be performed for versions 000601210000, 000605210000, 000606210000 and 000607210000. Versions 000602210000, 0006032100 and 000604210000 are skipped since they are before the last differential backup version and 000608210000 is skipped since it is after the selected restore version.

32.4.5 PlugIn Parameters

Each PlugIn module has a specific set of PlugIn specific parameters. These are space separated pairs, TITLE=VALUE all within the PLUGINPARAMETERS parameter for each file spec. The format for the PlugIn parameters for MSSQL is:

```
SERVER=["]severname["]
DATABASE=["]databasename["]
[CLUSTER=clustername]
[DIFFERENTIAL]
[REPLACE]
[KEEP_REPLICATION]
[STOPAT=yyyy/mm/dd,hh:mm:ss|
 STOPATMARK=["]mark["],yyyy/mm/dd,hh:mm:ss |
 STOPATMARKAFTER=["]mark["],yyyy/mm/dd,hh:mm:ss |
 STOPBEFOREMARK=["]mark["],yyyy/mm/dd,hh:mm:ss |
 STOPBEFOREMARKAFTER=["]mark["],yyyy/mm/dd,hh:mm:ss]
[LOGINID=["]loginid["]
 LOGINPASSWORD=[["]loginpassword["]]]
```

Where:

- **SERVER=[“]servername[“]** The name of the server or alias which owns the database to be backed up or restored. This parameter is required.

- **DATABASE=[“]databasename[“]** The name of the database to be backed up or restored. This parameter is required.

- **CLUSTER=clustername** An optional parameter that specifies the name of the cluster that the server is installed on.

- **[DIFFERENTIAL]** An optional parameter for the backup of a Microsoft SQL Server version 7.0 database.

- **[REPLACE]** An optional parameter for the restore of a Microsoft SQL Server version 7.0 database.

- **[KEEP_REPLICATION]** An optional parameter for the restore of a Microsoft SQL Server version 8.0 database.

- **[STOPAT=yyyy/mm/dd,hh:mm:ss]** An optional parameter for the restore of a Microsoft SQL Server version 7.0 database. This parameter is mutually exclusive with the STOPATMARK, STOPATMARKAFTER, STOPBEFOREMARK and STOPBEFOREMARKAFTER parameters.

- **[STOPATMARK=[“]mark[“],yyyy/mm/dd,hh:mm:ss]** An optional parameter for the restore of a Microsoft SQL Server version 8.0 database. This parameter is mutually exclusive with the STOPAT, STOPATMARKAFTER, STOPBEFOREMARK and STOPBEFOREMARKAFTER parameters.

- **[STOPATMARKAFTER=[“]mark[“],yyyy/mm/dd,hh:mm:ss]** An optional parameter for the restore of a Microsoft SQL Server version 8.0 database. This parameter is mutually exclusive with the STOPAT, STOPATMARK, STOPBEFOREMARK and STOPBEFOREMARKAFTER parameters.

- **[STOPBEFOREMARK=[“]mark[“],yyyy/mm/dd,hh:mm:ss]** An optional parameter for the restore of a Microsoft SQL Server version 8.0 database. This parameter is mutually exclusive with the STOPAT, STOPATMARK, STOPATMARKAFTER and STOPBEFOREMARKAFTER parameters.

- **[STOPBEFOREMARKAFTER=[“]mark[“],yyyy/mm/dd,hh:mm:ss]** An optional parameter for the restore of a Microsoft SQL Server version 8.0 database. This parameter is mutually exclusive with the STOPAT, STOPATMARK, STOPATMARKAFTER, STOPBEFOREMARKAFTER parameters.

- **[LOGINID=[“]loginid[“]]** An optional parameter to be used to specify the Login ID to be used for an explicit connection.

- **[LOGINPASSWORD=[[“]loginpassword[“]]]** An optional parameter to be used to specify the Login Password to be used for an explicit connection. This parameter must not be specified without the LOGINID parameter.

Double quotes may be used to delimit some of the parameter values that may contain spaces or commas.

32.4.6 Host Initiating MSSQL PlugIn Backups and Restores

Like all other UPSTREAM backups and restores, those that use the MSSQL PlugIn may also be initiated from the host via a USTBATCH job. The parameters for such a backup or restore are the same as any other backup or restore with the addition of the following parameters in the file specification section (i.e. after the SPECNUMBER parameter):

```
FILES \\backupservername\PIPE\MSSQL\backupdatabasename.bin
DESTINATION \\real restore servername\PIPE\MSSQL\restoredatabasename.bin
```

```
PLUGIN MSSQL.DLL
PLUGINPARAMETERS SERVER=servername DATABASE=databasename
```

where SERVER=servername and DATABASE=databasename are as defined in the *MSSQL PlugIn Backups* section above.

For a backup, the correct format for the FILES parameter is not crucial since the MSSQL PlugIn will override it and force it to be:

```
\\real server name\PIPE\MSSQL\databasename.bin
```

The DESTINATION parameter is ignored for a backup.

For example, to backup the SERVER1 server and the master database, you might have a batch job that looks like this:

```
ACTION 1
BACKUPPROFILE <profile>
STORAGETYPE 3   * TAPE
MERGE 3         * FIRST-TIME FULL
LOGNONFATAL Y
*
SPECNUMBER 1
FILES \\SERVER1\PIPE\MSSQL\master.bin
PLUGIN MSSQL.DLL
PLUGINPARAMETERS SERVER=SERVER1 DATABASE=master
*
```

The FILES parameter for a restore must match the name of a real file in the backup version to be restored from.

For special considerations regarding SQL Server Restores see page 32-30.

For backups, the MERGE parameter controls how the databases are backed up. MERGE 1 (full merge) and MERGE 3 (first time full merge) are equivalent and create a full database backup. MERGE 2 (incremental merge) creates transaction log backups.

Most users will create and test full backup jobs. Then to create the incremental backup job, copy the parameters and change the MERGE parameter to MERGE 2.

32.4.7 Multiple Database Instances

SQL Server 2000 supports multiple database instances installed on a given server. To specify an individual instance, setup an alias using the Client Network Utility, **Alias** tab. The alias name can be any name you choose, but the Server Name, must be in the format <server>\<instance>. In the UPSTREAM MSSQL PlugIn parameters, specify the alias name instead of the server name (all aliases defined on this client will be displayed in the list).

32.4.8 Restoring Without the PlugIn

UPSTREAM backs up the data provided by SQL Server without modification. If, for some reason, you need to not use the PlugIn, you can perform a restore to a flat file which can be restored using the SQL Server file restore facilities.

In particular, if SQL Server needs to recreate the database, it may take so long that the FDR/UPSTREAM host times out the connection assuming that the PC has stopped processing. You can increase the FDR/UPTREAM TIMEOUT parameter or you can restore to a file and use the SQL Server file restore.

To restore the data to a file, bypassing the PlugIn, specify a file name in the destination field and:

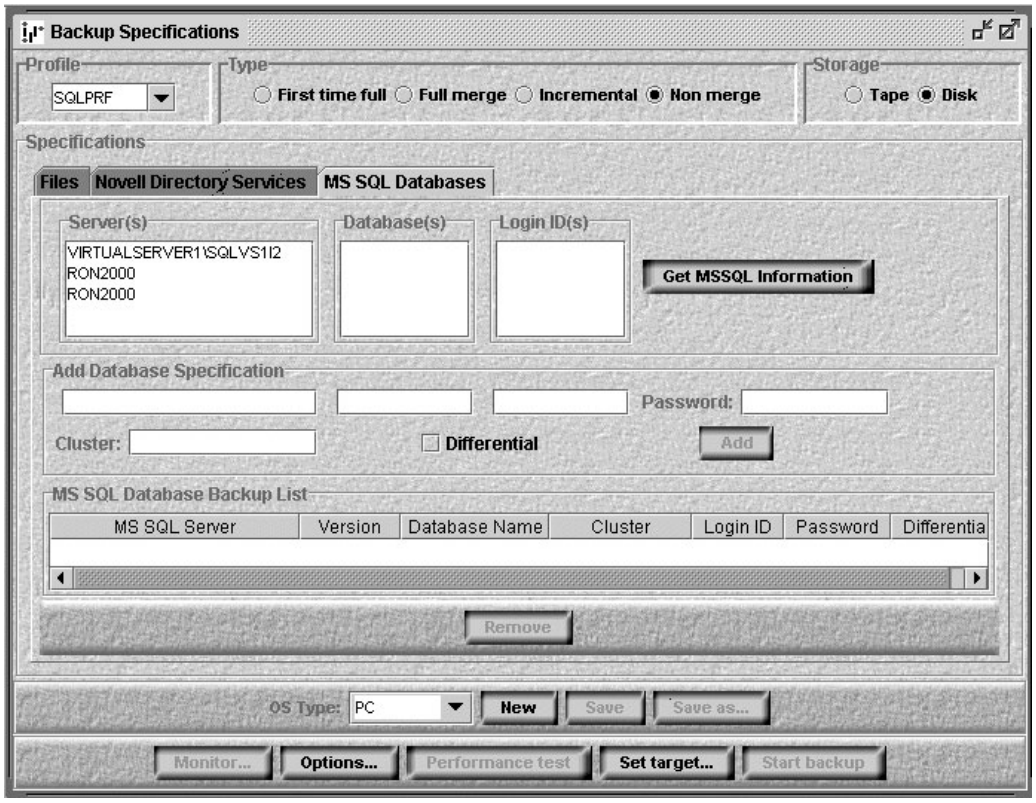
- If host initiating, specify the parameter **IGNOREPLUGINFORRESTORE Y** .
- If client initiating, simply use the *Restore and Inquiry (old)* option in the Action menu.

32.4.9 Using the UPSTREAM Director

The UPSTREAM Director fully supports the MSSQL PlugIn. In the **Backup** tab, select the Target system you wish to backup. You must specify one of the merge backup types, as non-merge backups are not supported.

You may want to press the Remove button to remove any non-SQL Server existing file specifications. You are allowed to mix PlugIn and non-PlugIn specifications if you wish, but it's not commonly done - we generally recommend separate backup profiles for your PlugIn backups.

Press the **MS SQL Databases** tab. Press the **Get MSSQL Information** button to fill in the Servers list.

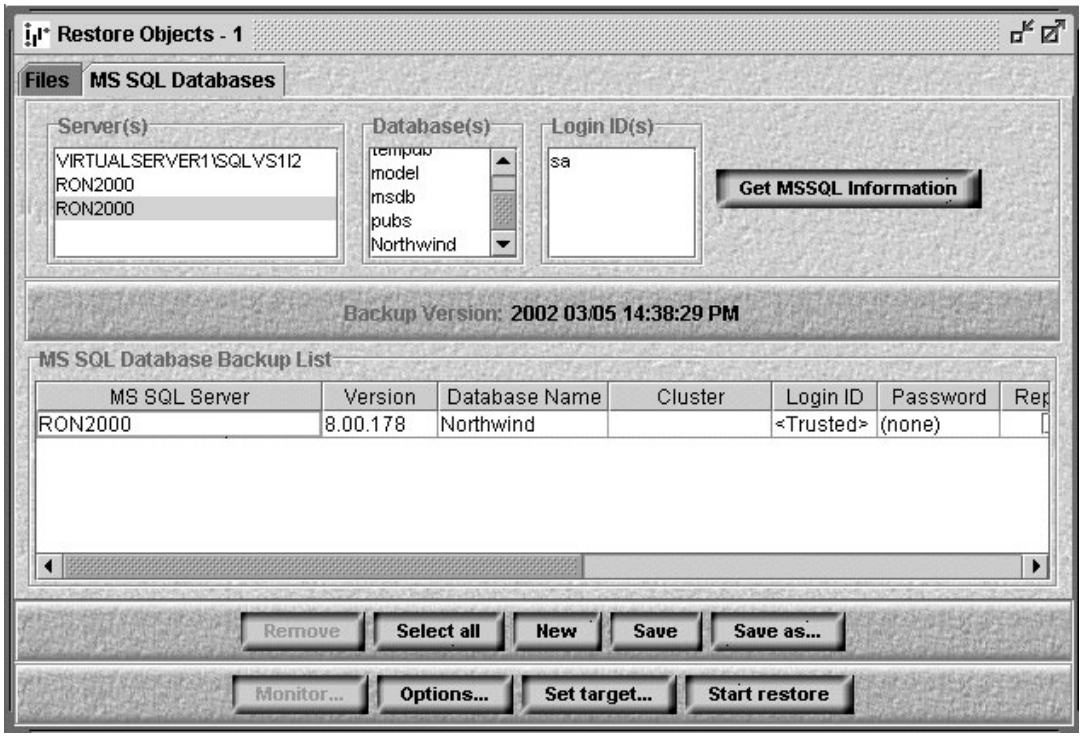


Highlight a server; it will fill in the Database list and it will enter a server in the *Add Database Specification* frame. Highlight a database which fills in the database name in the *Add Database Specification* frame. If you do not highlight a Login ID, the <Trusted> login will be used; otherwise you may also need to enter a password.

The Cluster field should only be entered if the SQL Server is installed on a cluster. The Differential checkbox is only available if this is an incremental and you are running SQL Server 7.0 or higher. See the Microsoft SQL Server documentation for a description of differential backups.

When you have completed the Add Database Specification frame, press the **Add** button to add it to the list of databases to be backed up. When you have added all of the databases you wish to back up, you can save or start the backup.

To restore a database using the Director, press the **Restore** tab. In the Version contents frame, expand the backup version you wish to restore from. When you expand it, you will see a directory with the name <server>\PIPE\MSSQL. In that directory, there will be a virtual file in the form <database name>.bin. Highlight the database file you wish to restore and press the **Add MS SQL database** button.



You can press the **Get MSSQL Information** button to see a list of servers, databases and valid logins you can restore to. Note that highlighting these fields does not affect the restore specifications.

The MSSQL Database backup list contains a number of fields which can not be modified (server, version and database name) and a number of which you can modify. Note that this is a horizontally scrollable list and quite a number of parameters require that you scroll to modify them. See the above description (section 32.4.5) for more information concerning these fields.

If you wish to restore more than one database, repeat the above process. When you have setup the restore, press the **Start restore** button to begin the restore.

32.5 SQL Server Restores

32.5.1 Restoring the Master Database

The *master* database is the most important database in a Microsoft SQL Server because it contains the configuration information for all of the other Microsoft SQL Server databases. Therefore, the procedure used to restore a damaged *master* database is different from the procedure used to restore user databases. If the *master* database becomes unusable, it must be restored from a previous full database backup (transaction log backups are not an option for the *master* database). All changes made to the *master* database after the last backup are lost when the backup is restored and therefore must be reapplied.

It is strongly recommended that the *master* database be backed up each time it is changed. This is best accomplished by prohibiting the creation of user-defined objects in the *master* database and by being aware of the Transact-SQL commands and stored procedures that modify it. Some of these commands and stored procedures are listed in the **Planning** section. If a user database is created, expanded or shrunk after the most recent backup of the *master* database and if it becomes necessary to restore the *master* database, then that user database and all data in it will be lost. Because of this, always backup the *master* database after creating, expanding, or shrinking user databases.

In most cases the reason for restoring the *master* database is to recover from a corrupted master device file. To restore a damaged *master* database, do the following:

- 1. Start the Microsoft SQL Server Setup program either from the icon in the Microsoft SQL Server folder or from the distribution media.
- 2. Respond to the on-screen instructions in Setup until the **Options** dialog box appears.
- 3. Check the **Rebuild Master Database** option and then press the **Continue** button.
- 4. When the confirmation dialog box appears choose **Resume**.
- 5. When the Rebuild Options dialog box appears use the **Sets…** and **Orders…** buttons to set the Character Set and Sort Order to what was previously used for the *master* database.
- 6. Once the Character Set and Sort Order are properly configured, press the **Continue** button.
- 7. When the **Installation Path** dialog box is displayed, set the **Drive** and **Directory** to what they were when Microsoft SQL Server was initially installed and then press the **Continue** button.
- 8. When the **Rebuild MASTER Device** dialog box is displayed, enter the **Drive**, **Directory** and **Size** of the MASTER device. The size of the master device should be at least as large as what it was the last time the *master* database was backed up.
- 9. Press the **Continue** button when you are finished with the **Rebuild MASTER Device** dialog box. Setup will then rebuild the *master* database.
- 10. When the rebuilding of the *master* database is complete (this may take a number of minutes) and the completion dialog box appears, press the **Exit** button.

Since MSSQL.EXE does not make use of a predefined disk or tape dump device, you do not have to worry about adding a dump device before performing a restore of the *master* database using MSSQL.EXE.

To restore the *master* database the Microsoft SQL Server must be started in single-user mode. If the MSSQLServer service is already executing, stop it. To start the Microsoft SQL Server in single-user mode execute the following command from a Windows NT command line:

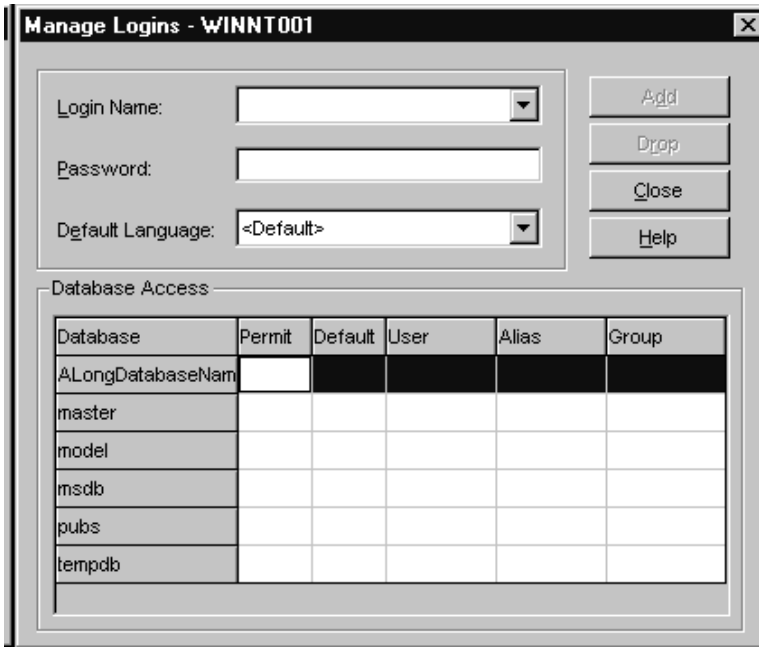
```
sqlservr /c /dmaster_device /m
```

Where:

- **/c** starts the Microsoft SQL Server independent of the Windows NT Service Control Manager.
- **/dmaster_device** specifies a physical name for the MASTER database device. For example:

  `/dc:\mssql\data\master.dat`
- **/m** Specifies single-user mode.

There is one final step that must be performed before executing the MSSQL RESTORE command for the *master* database and that is to create a Login ID for the Windows NT user account that MSSQL.EXE will run under to perform the restore. This new Login ID should have the *master* database as its default database and have an alias assigned for the *master* database to be 'dbo' (the owner of the *master* database). To create this new Login ID, start the **SQL Enterprise Manager** from the **Microsoft SQL Server** folder, expand the tree for the server whose *master* database is being restored, right-click on the Logins folder and then select **New Login…** from the popup menu to display the **Manage Logins** dialog box as follows:



After adding a Login ID is for the Windows NT user account under which MSSQL.EXE will be run, exist from the SQL Enterprise Manager. For more information about creating Login IDs to be used by MSSQL.EXE and FDR/UPSTREAM, refer to the **Microsoft SQL Server Configuration** section.

Now the 'MSSQL RESTORE MASTER VersionNumber' command can be executed. Substitute for VersionNumber the FDR/UPSTREAM version number of the last backup stored for the *master* database. This version number can be determined by issuing the 'MSSQL INQUIRE MASTER' command. Once the MSSQL.EXE RESTORE has completed you will notice that the ISQL.EXE finished with an error. This error is due to the fact that Microsoft SQL Server shuts itself down after the successful restoration of the *master* database and prematurely terminates the connection to ISQL.EXE.

Once the *master* database is restored you can continue with the restoration of any other databases that require it. One such database you may need to restore immediately is the *msdb* database. The special consideration for the *msdb* database are detailed in the next section.

For further information about the restoration of the *master* database refer to the **Restoring the *master* Database** section in the **Backing Up and Restoring** chapter of the **Administrators Companion 6.0** document.

32.5.2 Restoring the Msdb Database

The information contained in the *msdb* database is maintained by the Microsoft SQL Server scheduler which is part of the SQLExecutive service. Therefore, before restoring the *msdb* database, the SQLExecutive service must be stopped and then restarted after the restore has finished. Also, after a restoration of the *master* database you may need to expand the MSDBDATA device and allocate the expanded space to the *msdb* database before starting the restore for the *msdb* database.

The *msdb* database must have as much or more space allocated to it as was allocated to it before the *master* database was rebuilt.

For further information about the restoration of the *msdb* database refer to the **Restore the *msdb* Database** section in the **Backing Up and Restoring** chapter of the **Administrators Companion 6.0** document.

33 Novell GroupWise

FDR/UPSTREAM provides an agent which operates with GWTSA - the backup agent supplied with GroupWise 6.

The GroupWise Target Service Agent (GWTSA) provides reliable backups of a running GroupWise system by successfully backing up open files and locked files, rather than skipping them as a file-level backup facility would do.

The GroupWise Target Service Agent (GWTSA) is a GroupWise-specific API that works with other backup software. The GWTSA has no user interface of its own, but its presence running along with supporting backup software such as FDR/UPSTREAM provides GroupWise options in the backup software that would not otherwise be available.

The GWTSA backs up standard GroupWise directories and files. The GWTSA automatically time stamps all backed-up user databases (USER*xxx*.DB), so that the *Allow Purge of Items Not Backed Up* option described in *Modifying Environment Options* in the *GroupWise Administration User's Guide* can function to safeguard users' deleted items against being purged from your GroupWise system before they have been backed up. If you decide not to use the GWTSA, user databases must be manually time stamped in order for the feature to work properly.

UPSTREAM supports the full-system backup method so only a single file spec is necessary to specify a backup of an entire GroupWise database system.

UPSTREAM makes the GroupWise system appear as separate volumes for the domain database, the post office and the Document Management Services library. Within each "volume" are the files which comprise each of the facilities. This allows you to restore the entire GroupWise system, or any component down to just a single user's mailbox.

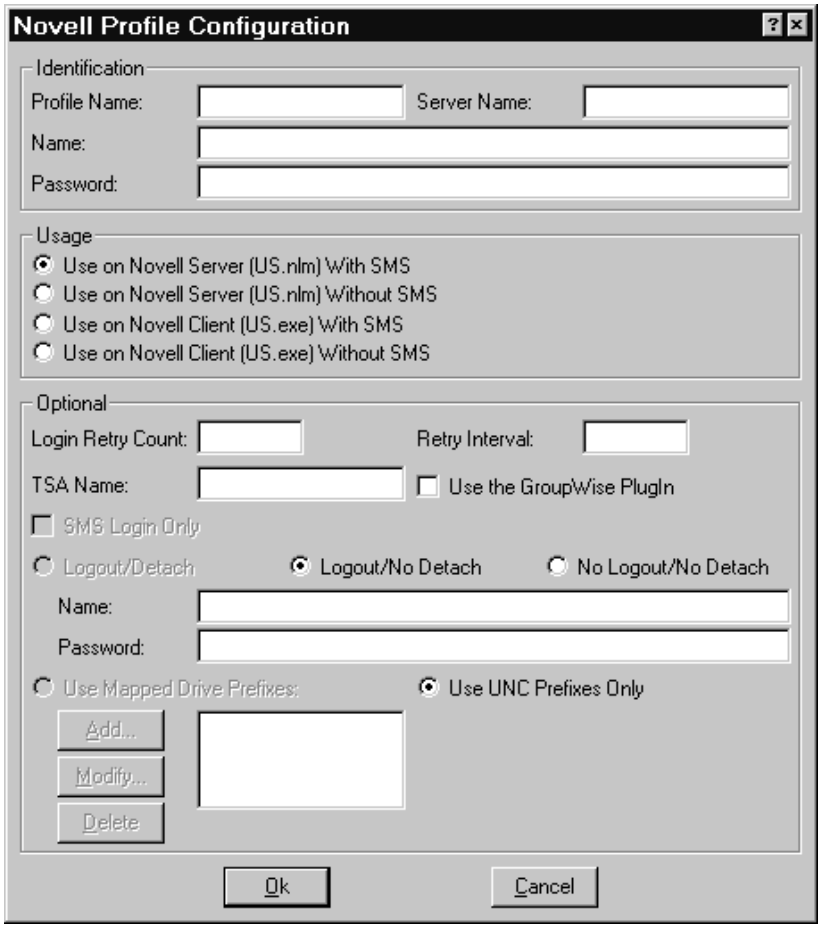
By using FDR/UPSTREAM's GroupWise agent, you get all of this support automatically.

33.1 Installation and Configuration

The UPSTREAM GroupWise agent is built-in to UPSTREAM; there are no selections to be made when installing the product.

You need to have the GroupWise TSA (GWTSA) loaded before you can perform an UPSTREAM backup or restore with the agent. Novell creates a sample GWTSA.NCF file when it installs GroupWise on the server. Simply run the script from the console, by entering **GWTSA** to load the facility. You may need to remove the comment from the line added to AUTOEXEC.NCF so that this script is run automatically when the server starts.

The Novell Profile that is used for backing up and restoring GroupWise must be configured to *Use the GroupWise Plugin*. This Novell Profile option is set via a checkbox on the Novell Profile Configuration dialog which can be reached from the Netware tab of the FDR/UPSTREAM Local Advanced Configuration dialog which is displayed by the FDR/UPSTREAM Configurator. The Novell Profile Configuration dialog follows:



The fields required for GroupWise are:

- ☐ **Profile name:** The name of this Novell Profile. Note that this name must be different than the name that you use for your regular file backups.
- ☐ **Server name:** Enter the name of the GroupWise file server.
- ☐ **Login name:** Your fully qualified NDS login name for this server (i.e. .CN=...)
- ☐ **Login password:** The password which matches the Login name.
- ☐ **Use on Novell Server (US.nlm) With SMS:** This radio button must be checked.
- ☐ **Use the GroupWise PlugIn:** This checkbox must be checked.
- ☐ **TSA name:** This field can be left blank. The default Target Service Agent (TSA) name for GroupWise generated by UPSTREAM is **server_name.GroupWise System**

Press the **Ok** button to save your Novell Profile definition.

33.2 Backups and Restores

GroupWise presents what appears as a file system to UPSTREAM and UPSTREAM presents it as a UNC name. You can use the full system backup method (\\.) to backup all objects within it. \\. is taken to indicate the server specified in the Novell Profile and does not have to be the server that UPSTREAM is running on. This is the recommended method.

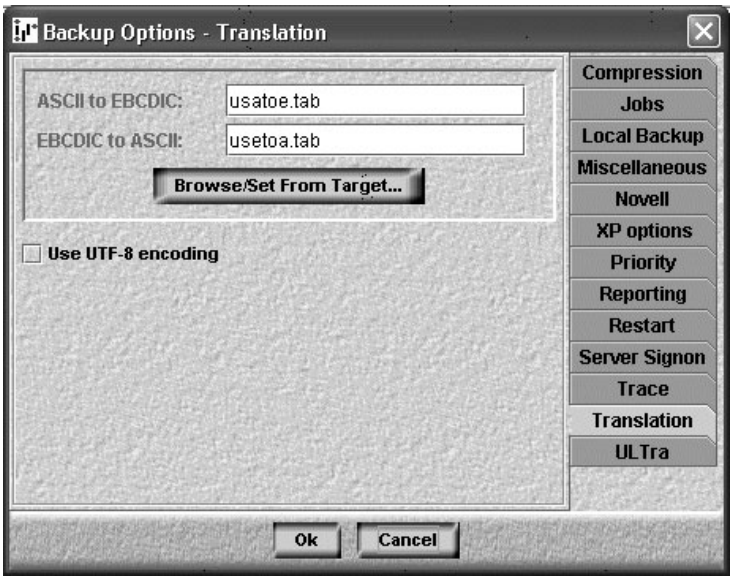
You can not mix regular backups with GroupWise backups because the Novell Profile refers to the GroupWise TSA which can't be used for regular files.

As with all backup agents, you should exclude the files you back up with the GroupWise agent from your regular file-level backups.

For PC initiated backups, inquires and restores it is recommended that you use the UPSTREAM Director. The UPSTREAM Local interface (US.EXE) can be used to request backups, however it is not designed to allow file inquiries or restore specifications.

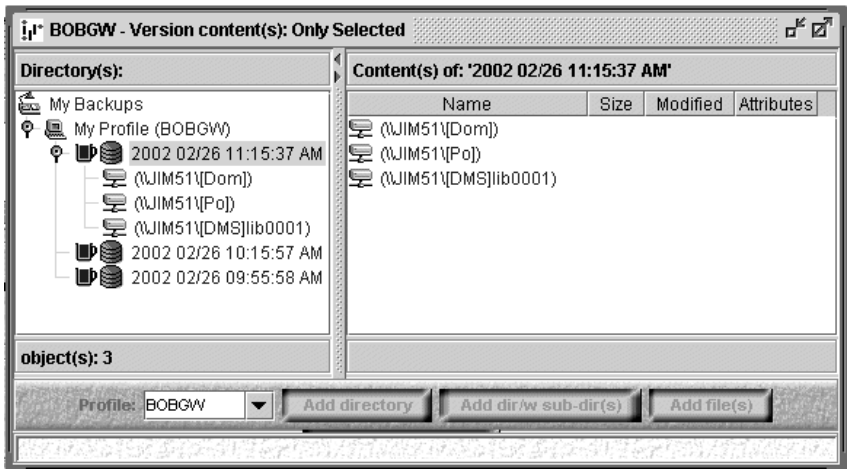
The GroupWise TSA uses volume and file names with brackets ([]) in them. For the Director to render them correctly, you need to set translation tables which match those used by the NLM version of UPSTREAM.

In the Director, you must be connected to the server. Press the **Restore** tab, select the **Restore Objects** window and press the **Options** button to display the Restore Options dialog. Press the **Translation** tab:



Enter the fully qualified UNC name to the translation table files on your server. For ASCII-to-EBCDIC it is *server*\sys\upstream\usatoe.tab and for EBCDIC-to-ASCII it's *server*\sys\upstream\usetoa.tab.

GroupWise defines resources which appear as separate volumes to UPSTREAM. Below is an example UPSTREAM Director inquiry screen which displays what was backed up from a full system backup (\\.) of a simple GroupWise server.



GroupWise has presented the resources of: \\JIM51\[Dom] for the domain database, \\JIM51\[Po] for the post office, and \\JIM51\[DMS]lib0001 for the Document Management Services library. Within each are directories and files. You can backup individual files or directories with UPSTREAM, however the full system backup method is recommended as the resource names may change.

We strongly recommend that you consult the GroupWise Administration User's Guide before performing any restores. It provides specific examples of the procedures which are required for performing restores.

Since this is a standard UPSTREAM backup, there are no specific issues regarding UPSTREAM/SOS for GroupWise.

For host initiated backups, you can use the ISPF interface. The only consideration is that you must specify a Novell Profile which has been defined for GroupWise.

For the above example, the simplest host job would consist of the following JCL for a full backup:

```
ACTION 1
BACKUPPROFILE <backup profile>
STORAGETYPE 3     * TAPE
MERGE 1           * FULL MERGE
LOGNONFATAL Y
NOVELLPROFILE <novell profile>
*
SPECNUMBER 1
FILES \\.
```

For incremental backups, we recommend that you use the same parameters, except replace the MERGE parameter with:

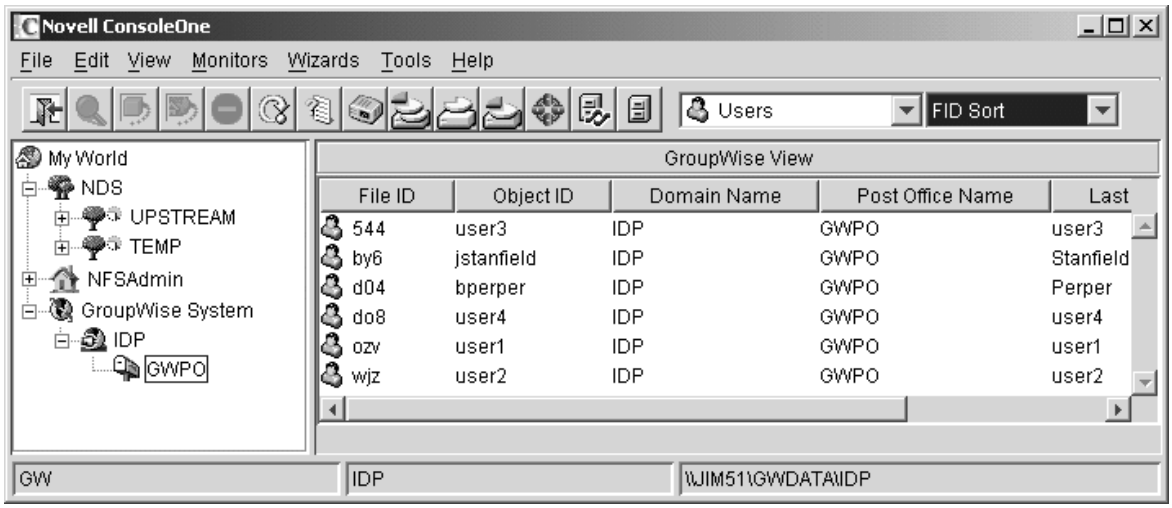
```
MERGE 2
```

33.2.1 Restoring an Individual Mailbox

To restore an individual mailbox, the user must be out of GroupWise. We further recommend that the post-office be closed to avoid SMS data set in in-use error messages.

In an UPSTREAM GroupWise backup, the user's mailbox appears to be a file in the \\server_name\[Po]\OFUSER directory, with the file name of USER<suffix>.DB where the suffix is the file ID assigned by GroupWise.

To determine the file ID, go into GroupWise ConsoleOne. In the left hand window, expand the **GroupWise System** tree, expand the domain, and highlight the post-office (usually GWPO). In the top toolbar, select the **Users** combo box option, and select the **FID** Sort combo box option:



The File ID is in the first column and the user's name is in the second. Thus in the above example, to restore the user3 user, you would need to restore the file \\server_name\[Po]\OFUSER\USER544.DB

34 Oracle

Oracle Server is a fully-functioning Relational Database Management System (RDBMS). FDR/UPSTREAM supports four ways of backing it up.

- At the file level (or logical volume level for UNIX). This offers considerable flexibility and is quite powerful when used with the procedures we recommend. This method is described in detail starting on page 34-2.
- FDR/UPSTREAM can operate as an Oracle Media Manager Library product which allows it to be used with Oracle Recovery Manager (Oracle 8) or Oracle Enterprise Backup Utility (Oracle 7). See page 34-22.
- If you wish to avoid the complexity of Oracle's Recovery Manager but need more control and flexibility than simple file backups of Oracle databases, the **FDR/UPSTREAM Backup Management Suite for Oracle** databases may be your solution of choice. See page 34-36.
- BMC's SQL-BackTrack product. See that chapter for more information on the FDR/UPSTREAM agent.

We recommend using the Oracle Recovery Manager facilities described on page 34-22 when possible as it tends to perform the best and is the backup method recommended by Oracle.

34.1 File Level Backups

34.1.1 Overview

Oracle Server is a fully-functioning Relational Database Management System (RDBMS) which operates in essentially the same manner on all supported operating system platforms. FDR/UPSTREAM also operates in a platform independent manner and this makes it possible to describe fairly straightforward and detailed procedures for using FDR/UPSTREAM for backup and recovery of Oracle databases regardless of particular operating system they are running on. Within this section, samples are provided for fully tested FDR/UPSTREAM backup and recovery scenarios running on Windows NT and OS/2 ORACLE client systems with ORACLE database servers running under NetWare.

When you create an Oracle database, you should decide how you plan to protect the database against potential equipment failures or other data losses. If such planning is not considered before database creation, database recovery may not be possible.

In order to utilize FDR/UPSTREAM for the backup and recovery of ORACLE databases the following configuration planning decisions must be made.

- Establish Your ORACLE Archive Mode
- Select Your ORACLE Backup Mode
- Select Your UPSTREAM Backup Mode
- Identify Your ORACLE Database Components

These steps are outlined in the following sections. These decisions must be made prior to beginning your backups. If they are not, significant problems may arise at a later time when attempting to recover specific data.

If you have any questions about these planning items, feel free to contact UPSTREAM technical support for assistance.

34.1.2 Establishing Your Archive Mode

When establishing your ORACLE databases, your backup and recovery methodologies should be an integral part of your database design. Oracle supports two modes of logging for committed database transactions. They are:

- ARCHIVELOG mode
- NOARCHIVELOG mode

If a database is operating in ARCHIVELOG mode, previously taken backups of the REDO logs and database files coupled with the current online REDO log can recover the database right up to the time of any non-catastrophic failure.

When ARCHIVELOG mode is enabled, there are several important database recovery factors to consider:

- Full recovery is available in case of media failure
- Recovery to a past “point-in-time” is available
- You can take backups of the ORACLE DBMS while it is up or down

When NOARCHIVELOG mode is enabled, there are several important database recovery factors to consider:

- You will lose any changes since the last full backup
- You can return only to a previous full backup
- You can take backups only when the Oracle DBMS is down

If your database has already been constructed, you can determine which ARCHIVELOG mode your database is operating in with one of two ways:

- Open the Oracle Database Manager and click on the Parameters button. If the check box 'Support Recovery' option is ON and the Edit Database Parameters screen is checked, the database is running in ARCHIVELOG mode.
- Issue the following Oracle SQL command:

```
ARCHIVE LOG LIST
```

For more information on ARCHIVELOG mode and it's implications, please refer to the ORACLE "Server Administrator's Guide".

34.1.3 Selecting Your ORACLE BACKUP Mode

ORACLE supports two modes of operation for the backing up of it's database files. They are:

- Database **OFFLINE** mode
- Database **ONLINE** mode

OFFLINE mode can be utilized when your ORACLE database is operating in either ARCHIVELOG or NOARCHIVELOG mode previously described. **OFFLINE** mode requires that the ORACLE Database Server is brought down for the duration of the backup process.

ONLINE mode is only available when the ORACLE ARCHIVELOG mode is enabled. This mode allows the continuing operation of the ORACLE server while backups are being performed.

34.1.4 Selecting Your UPSTREAM BACKUP Mode

UPSTREAM supports two modes of performing backups of the ORACLE database and REDO LOG files. They are:

- **FULL** mode
- **INCREMENTAL** mode

FULL mode can be utilized with either of the ORACLE ARCHIVELOG modes described above. **FULL** mode causes all ORACLE database files to be backed up.

When **FULL** mode is enabled, there are several important factors to consider:

- All files will be backed up
- The output of this process will contain all the user data you will need to recover in the event of a failure.

INCREMENTAL mode can be utilized ONLY with the ORACLE ARCHIVELOG mode described above During **INCREMENTAL** backup you backup only archived REDO logs.

When **INCREMENTAL** mode is enabled, there are several important factors to consider:

- The **INCREMENTAL** backup will be used in concert with a previous **FULL** backup in order to recreate your ORACLE database(s)

- Backup times can be significantly reduced
- The output of this process must be combined with previously created **FULL** backups to recover the latest versions of your data

An **OFFLINE FULL** backup taken after an ORACLE shutdown can be used to recover to that particular point in time. The recovery process is straightforward and requires only that the **FULL** backup be restored.

If running in ARCHIVELOG mode, you can use your last **FULL** backup plus all of the archived REDO logs accumulated since that **FULL** backup (if they are lost, use your **INCREMENTAL** backups to restore them back) to recover to the most current database state.

Following a clean shutdown, all of the files that constitute a database are closed. Note that a full backup taken while the database is open, after an ORACLE DBMS crash, or shutdown abort is suspect due to the fact that the database files could have been in the process of being updated.

34.1.5 Identifying ORACLE Database Components

In order for the datafiles that represent an entire ORACLE database or individual database tablespace to be backed up, the file system components that contain these database components must be identified.

An ORACLE database components to consider for the backup purposes are:

- Database Files
- archived REDO LOG Files
- Control Files

The **Database** files contain the actual user data that is stored in the database by your company's application systems. One or more database files constitute a **Tablespaces** within the database. Within the **Tablespaces** are the **Tables** which hold the actual view of user data.

The **archived REDO LOG** files contain the history of application database update **Transactions**. The transactions, often referred to as **Units of Work,** are **atomic** actions performed against the database by application programs. This grouping of units of work is critical to maintaining database integrity and recoverability.

The **Control** files contain the description of the physical aspects of the databases. Information such as file system entities, files and directories, that contain the actual database data and REDO Log files.

34.1.6 Backing Up Your ORACLE Database

For illustrative purposes, the following sections outline some basic UPSTREAM/ORACLE backup scenarios:

☐ OFFLINE Database Backups:

- Database OFFLINE, NOARCHIVELOG or ARCHIVELOG Mode, FULL Backup

☐ ONLINE Database Backups (ARCHIVELOG Mode ONLY):

- Database ONLINE, Tablespace OFFLINE Backup
- Database ONLINE, Tablespace ONLINE Backup
- REDO LOG and Control file backups

These scenarios represent the backup options for ORACLE database users that will insure full database integrity. Any other scenarios should be carefully reviewed in order to limit your exposure to the loss of data.

The examples in the following sections have been extensively tested with an ORACLE database running as a NLM under NetWare 4.b. The samples are constructed to operate via MVS mainframe initiation. This represents how the majority of customers generally choose to perform these types of backups. Other operating environments may require slight modifications to the configurations and jobs provided to perform properly.

The name for Oracle Server Manager executable varies depending on your platform and Oracle version. We will use 'SVRMGR' in all the examples to refer to it. Use your platform and version specific documentation to obtain the right name for Server Manager executable file.

If you have difficulty, feel free to contact Innovation Technical Support for further assistance.

34.1.7 Database Backups - Overview

If your ORACLE database is operating in either **NOARCHIVELOG** or **ARCHIVELOG** mode, one of the available choices for backing it up is to take the entire database OFFLINE and back it up via the UPSTREAM FULL backup process. This process makes a complete copy of the associated ORACLE database files and backs them up to the UPSTREAM HOST system. The only recovery scenario available for this type of backup involves the restoration of the most recent full backup of the database.

Keep the following important factors in mind when constructing this type of backup configuration:

- Plan to take full Offline backups regularly, according to the amount of work that you can afford to lose.
- Schedule backups only for the time of day when you are sure that the Oracle database is shutdown for systemwide use
- Whenever you alter the physical structure of the database, immediately take a full database backup. An immediate backup protects the new structure of the database which will NOT be reflected in the previous full backup.

Note that if a full backup is taken while the database is still open, after a DBMS crash, or a shutdown abort, the results should be considered highly suspect due to the fact that database integrity can NOT be guaranteed.

34.1.8 OFFLINE Database Backup

The following list outlines the steps necessary to perform this type of backup:

1) Determine which data and control files comprise your ORACLE Database

2) Shutdown the ORACLE Database Server

3) Perform the UPSTREAM FULL backup

4) Restart the ORACLE Database Server

As has been the case throughout this manual, these steps are outlined for mainframe initiation. If you wish to initiate from the FDR/UPSTREAM workstation side, use the parameter files embedded in the JCL to construct PC parameter files. These examples are intended to represent simple approaches for performing the minimal of backups. You will need to review the platform specific sections of the FDR/UPSTREAM documentation in order to be sure that these parameter files meet your requirements.

Step 1) Identify the ORACLE Database and Control Files

To determine which data files constitute your ORACLE database issue the following SQL command using an ORACLE SQL interface:

```
SELECT  TABLESPACE_NAME,  FILE_NAME  FROM  SYS.DBA_DATA_FILES;
```

You can also obtain this information directly using the Oracle Server Manager GUI.

The location of the control files is defined in the start up parameter file (CONTROL_FILES parameter) if it differs from the default location of subdirectory DATABASE of the default Oracle directory.

To determine which control files your ORACLE database is using, issue the following SQL command using an ORACLE SQL interface:

```
SHOW  PARAMETER  CONTROL_FILE
```

You may need to resolve any embedded Oracle parameters (like '%ORACLE_HOME%', which stands for the directory where Oracle was originally installed), in order to get the real path and file names of these control files.

Step 2) Shutdown the ORACLE Database

Before taking a **full Offline backup,** it will be necessary to shutdown the ORACLE database and to be sure that it was cleanly shutdown. You have two options for controlling this operation, you can use either the Oracle Database Manager GUI application to manually shut down the database or a mainframe initiated, predefined SQL procedure.

We will be outlining the second approach. This approach will allow for the automatic scheduling of the backup operation and not require manual intervention. The following example outlines minimal ORACLE database shutdown host and workstation components.

Workstation Command File (STOPORC.CMD) :

```
SVRMGR @STOPORC.SQL
```

Workstation SQL File (STOPORC.SQL) :

```
CONNECT INTERNAL/ORACLE@EVEREX;
SHUTDOWN IMMEDIATE;
EXIT;
```

Host JCL:

```
//*
//*        HALT ORACLE DATABASE OPERATION
//*
//STOP     EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=YOUR.UPSTREAM.LOAD.LIBRARY
//SYSPRINT DD   SYSOUT=*
//SYSUDUMP DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=UPSTR
USAPPL=UPSTREAM
MAXRETRY=1
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
JOBOPTIONS 3
```

```
*
SPECNUMBER 1
FILES C:\UPSTREAM\ORACLE\STOPORC.CMD
ENDPARM
/*
//
```

Use your operating system specific “Oracle Database Tools” guide for the exact command line interface parameters required to support your environment.

Step 3) Perform the FDR/UPSTREAM FULL backup

Once the ORACLE database has been shut down, you can perform the FDR/UPSTREAM backup operation. The sample below backs up a series of files that are contained in the ORACLE\DATABASE subdirectory of a Novell NetWare file server accessible via logical drive O:. These samples once again assume that the process will be mainframe initiated.

Host JCL:

```
//*
//*        BACKUP ORACLE DATABASE FILES
//*
//BACKUP   EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=YOUR.UPSTREAM.LOAD.LIBRARY
//SYSPRINT DD   SYSOUT=*
//SYSUDUMP DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=UPSTR
USAPPL=UPSTREAM
MAXRETRY=1
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 1                          * Backup
STORAGETYPE 3                     * SEQUENTIAL TAPE
MERGE 3                           * First Time Full
BACKUPPROFILE ORACLE1             * Host Backup Profile Name
NOVELLPROFILE NET41SYS            * Novell Profile Name
*
SPECNUMBER 1
FILES O:\ORACLE\*.*               * All ORACLE Files
NONFILEDATABITMAP 147
ENDPARM
/*
//
```

The intent of this example is to illustrate the minimum number of necessary FDR/UPSTREAM control statements to perform a backup. The usage of any additional features will require added customization to be performed on the above sample.

Step 4) Startup the ORACLE Database Server

Once the backup (step 3) has completed successfully, the ORACLE database needs to be restarted. The following JCL will invoke an ORACLE SQL command to restart the database.

Workstation Command File (STARTORC.CMD) :

```
SQLDBA @STARTORC.SQL
```

Workstation SQL File (STARTORC.SQL) :

```
CONNECT INTERNAL/ORACLE@EVEREX;
STARTUP PFILE=C:\TESTS\INITORCL.ORA;
EXIT;
```

Host JCL:

```
//STARTORC EXEC PGM=USTBATCH
//STEPLIB  DD DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD SYSOUT=*
//USTLOG   DD SYSOUT=*
//USTPARM  DD *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
TRACE N
JOBOPTIONS 3
SPECNUMBER 1
FILES C:\TESTS\STARTORC.CMD
ENDPARM
/*
//
```

34.1.9 ONLINE Database Backups (ARCHIVELOG Mode ONLY)

If your requirements are such that your database must stay online 24 hours a day, seven days a week and you are unable to take **Full, Offline backups** regularly, the best backup strategy will be to utilize ONLINE database backups.

Depending on the availability of the datafiles at the time of the backup, you must decide what type of tablespace backup to perform:

- **Offline Tablespace Backups** are the best approach if you are able to disconnect the tables from the database for the duration of backup. By definition this type of backup disables user access to the affected tablespace(s) while the backup is in progress, however database activity for other components of the database remain unaffected.
- **Online Tablespace Backups** are the best approach if the tables must remain available for use while the backup is in progress. With this type of backup the affected tablespaces are placed in a special “BACKUP” mode while the backup takes place. During this time any changes to the tablespaces in question will be redirected to the ORACLE online REDO log files. The use of this type of backup should be avoided when the tablespaces to be backed up are being heavily utilized. While the backup is in progress, all the changes will be accumulated in the online REDO log files only, so it is possible that you may experience performance degradation and an overflow of the online REDO log files.

34.1.10 Tablespace OFFLINE Backups

When backing up in Offline Tablespace mode there are several database components that you will need to provide in order to perform a successful recovery. These components are:

- **Database Datafile Files**
- **ORACLE Control Files**

In order to perform Tablespace Offline type backups, the following criteria should be reviewed carefully:

- When the database is initially created or when you have decided to start backing it up, you need to perform a full Offline backup. This is the foundation for your backups, which provides copies of all datafiles and the control file of the database.
- Take partial backups of your database to update backed up information in the full Offline backup. The datafiles of extensively used tablespaces should be backed up frequently to reduce database recovery time, should recovery ever be required. The closer the last **FULL** backup is to the time of the failure, the fewer REDO log files that will need to be applied to recover the database.
- Every time you make a structural change to the database, take a control file backup.
- Take backups of archived REDO log files on a regular basis and after periods of high activity or important changes.

The following describes how to take **Tablespace Offline** backups of your ORACLE Database using FDR/UPSTREAM.

As has been the case throughout this manual, these steps are outlined for mainframe initiation. If you wish to initiate from the FDR/UPSTREAM workstation side, use the parameter files embedded in the JCL to construct PC parameter files. These examples are intended to represent simple approaches for performing the minimal of backups. You will need to review the platform, specific sections of the FDR/UPSTREAM documentation in order to be sure that these parameter files meet your requirements.

Step #1) Determine Required Tablespaces

The first step will be to determine the tablespaces that you are going to back up and obtain the list of datafiles for those tablespaces. You can do this either using the Oracle Server Manager or by issuing the following SQL command:

```
SELECT  TABLESPACE_NAME,  FILE_NAME,  FROM  SYS.DBA_DATA_FILES;
```

Step #2) Place Database Tablespaces in OFFLINE Mode

Use the following sample JOB to construct a platform specific command file that will place your selected ORACLE Tablespaces into OFFLINE mode. While in this mode the Tablespaces in question will be unavailable to the applications that normally access them.

Host JCL:

```
//BACKORC  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//* ******************************************************
//* *****         ISSUE ORACLE BACKUP COMMAND          *****
//* ******************************************************
//*
//*
//CMDBORC  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
```

```
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
JOBOPTIONS 3
*
SPECNUMBER 1
FILES C:\TESTS\T16020\CMDBORC.CMD
ENDPARM
/*
//
```

Operating System Command File (CMDBORC.CMD):

```
SVRMGR  @CMDBORC.SQL
```

SQL Command File (CMDBORC.SQL):

```
CONNECT UPSTREAM/UPSTREAM@EVEREX;
—
—      Place ORACLE Database Tablespaces in BACKUP Mode
—
ALTER  TABLESPACE  USER_DATA        OFFLINE;
ALTER  TABLESPACE  TEMPORARY_DATA   OFFLINE;

ALTER  DATABASE  BACKUP  CONTROLFILE
       TO  'SYS:\ORACLE\CONTROL\IDPCTL1.BKP'  REUSE;
```

Step #3) Backup Tablespaces

The following sample JOB will backup the tablespaces whose names were obtained in step #1 of this procedure.

Host JCL:

```
//BACKORC  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//BACKUP   EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 1
BACKUPPROFILE TEST001
NOVELLPROFILE EVEREX
USERID XYZ
MERGE 3
STORAGETYPE 2
```

```
ATTENDED Y
REPORTOPTIONS 6
REPORTNAME USORACLE.RPT
LOGNONFATAL Y
*
SPECNUMBER 1
FILES O:\ORACLE\DATABASE\USER_DATA.ORA    * ORACLE DATABASE FILE
SUBDIRECTORIES Y
SPECTYPE 0
ARCHIVEBIT N
SPECNUMBER 2
FILES O:\ORACLE\DATABASE\TEMP_DATA.ORA    * ORACLE DATABASE FILE
SUBDIRECTORIES Y
SPECTYPE 0
ARCHIVEBIT N
SPECNUMBER 1
SPECNUMBER 2
FILES O:\ORACLE\CONTROL\*.BKP       * BACKUP CONTROL FILE
SPECTYPE 0
ARCHIVEBIT N
ENDPARM
/*
//
```

Step #4) Place Database in NORMAL Mode

Use the following sample to construct a platform specific command file that will place your selected ORACLE Tablespaces back into NORMAL operating mode. This causes ORACLE to begin making Tablespace changes to the Database datafiles and no longer into the REDO logfiles.

Host JCL:

```
//BACKEND  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//* ******************************************************
//* *****       ISSUE ORACLE END BACKUP COMMAND        *****
//* ******************************************************
//*
//*
//CMDBORC  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
JOBOPTIONS 3
```

```
*
SPECNUMBER 1
FILES C:\TESTS\T16020\CMDRORC.CMD
ENDPARM
/*
//
```

Operating System Command File (CMDRORC.CMD):

```
SVRMGR @CMDRORC.SQL
```

SQL Command File (CMDRORC.SQL) :

```
CONNECT UPSTREAM/UPSTREAM@EVEREX;
—
—      Take ORACLE Database Tablespaces Out of BACKUP Mode
—
ALTER  TABLESPACE  USER_DATA        ONLINE;
ALTER  TABLESPACE  TEMPORARY_DATA   ONLINE;
```

34.1.11 Tablespace Online Backups

When backing up in Tablespace Online mode, there are several database components that you will need to provide in order to perform a successful recovery. These components are:

- **Database Datafile backups**
- **ORACLE Control Files**

In order to perform tablespace type backups, the following criteria should be reviewed carefully:

- When the database is initially created or when you have decided to start backing it up, you need to perform a full Offline backup. This is the foundation for your backups, which provides copies of all datafiles and the control file of the database.
- Take partial backups of your database to update backed up information in the full Offline backup. The datafiles of extensively used tablespaces should be backed up frequently to reduce database recovery time, should recovery ever be required. The closer the last **FULL** backup is to the time of the failure, the fewer REDO log files that will need to be applied to recover the database.
- Every time you make a structural change to the database, take a control file backup.
- Take backups of archived REDO log files on a regular basis and after periods of high activity or important changes.

The following section describes how to take **Tablespace Online** backups of your ORACLE Database using FDR/UPSTREAM.

As has been the case throughout this manual, these steps are outlined for mainframe initiation. If you wish to initiate from the FDR/UPSTREAM workstation side, use the parameter files embedded in the JCL to construct PC parameter files. These examples are intended to represent simple approaches for performing the minimal of backups. You will need to review the platform, specific sections of the FDR/UPSTREAM documentation in order to be sure that these parameter files meet your requirements.

Step #1) Determine Required Tablespaces

The first step will be to determine the tablespaces that you are going to back up and obtain the list of datafiles for those tablespaces. You can do this either using the Oracle Server Manager or by issuing the following SQL command:

```
SELECT  TABLESPACE_NAME,  FILE_NAME,  FROM  SYS.DBA_DATA_FILES;
```

Step #2) Place Database Tablespaces in BACKUP Mode

Use the following sample JOB to construct a platform specific command file that will place your selected ORACLE Tablespaces into Backup mode. While in this mode any changes to the affected Tablespaces will go into the REDO LOG files, not into the Tablespace datafiles themselves.

Host JCL:

```
//BACKORC  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//* ******************************************************
//* *****         ISSUE ORACLE BACKUP COMMAND          *****
//* ******************************************************
//*
//*
//CMDBORC  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
JOBOPTIONS 3
*
SPECNUMBER 1
FILES C:\TESTS\T16020\CMDBORC.CMD
ENDPARM
/*
//
```

Operating System Command File (CMDBORC.CMD):

```
SVRMGR  @CMDBORC.SQL
```

SQL Command File (CMDBORC.SQL):

```
CONNECT UPSTREAM/UPSTREAM@EVEREX;
—
—      Place ORACLE Database Tablespaces in BACKUP Mode
—
ALTER  TABLESPACE  USER_DATA        BEGIN BACKUP;
ALTER  TABLESPACE  TEMPORARY_DATA   BEGIN BACKUP;

—     Copy ORACLE Database Control File
—
ALTER  DATABASE  BACKUP  CONTROLFILE
       TO  'SYS:\ORACLE\CONTROL\IDPCTL1.BKP'  REUSE;
```

Step #3) Backup the Tablespaces

The following sample JOB will backup the tablespaces whose names were obtained in step #1 of this procedure.

Host JCL:

```
//BACKORC  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//BACKUP   EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 1
BACKUPPROFILE TEST001
NOVELLPROFILE EVEREX
USERID XYZ
MERGE 3
STORAGETYPE 2
RECORDSIZE 6000
ATTENDED Y
REPORTOPTIONS 6
REPORTNAME USORACLE.RPT
LOGNONFATAL Y
*
SPECNUMBER 1
FILES O:\ORACLE\DATABASE\USER_DATA.ORA  * ORACLE DATABASE FILES
SUBDIRECTORIES Y
SPECTYPE 0

ARCHIVEBIT N
SPECNUMBER 2
FILES O:\ORACLE\DATABASE\TEMP_DATA.ORA   * ORACLE DATABASE FILES
SUBDIRECTORIES Y
SPECTYPE 0
ARCHIVEBIT N

SPECNUMBER 3
FILES O:\ORACLE\CONTROL\*.BKP       * BACKUP CONTROL FILE
SPECTYPE 0
ARCHIVEBIT N

*
ENDPARM
/*
//
```

Step #4) Place Database in NORMAL Mode

Use the following sample JOB to construct a platform specific command file that will place your selected ORACLE Tablespaces back into NORMAL operating mode. This causes ORACLE to begin making Tablespace changes to the Database datafiles.

Host JCL:

```
//BACKEND  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//* ******************************************************
//* *****       ISSUE ORACLE END BACKUP COMMAND        *****
//* ******************************************************
//*
//*
//CMDBORC  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
JOBOPTIONS 3
*
SPECNUMBER 1
FILES C:\TESTS\T16020\CMDRORC.CMD
ENDPARM
/*
//
```

Operating System Command File (CMDRORC.CMD):

```
SVRMGR  @CMDRORC.SQL
```

SQL Command File (CMDRORC.SQL) :

```
CONNECT UPSTREAM/UPSTREAM@EVEREX;
—
—      Take ORACLE Database Tablespaces Out of BACKUP Mode
—
ALTER  TABLESPACE  USER_DATA        END BACKUP;
ALTER  TABLESPACE  ROLLBACK_DATA    END BACKUP;
ALTER  TABLESPACE  TEMPORARY_DATA   END BACKUP;
```

34.1.12 REDO LOGS and Control File Backup

Step #1) Switch REDO LOG Files and Create a Backup Database Control File

Use the following sample to construct a platform specific set of files that will backup your selected ORACLE Database Control File and switch REDO LOG files to incorporate the most recent database changes. It is important to back up the ORACLE Control File in every backup as it reflect the current database configuration.

Host JCL:

```
//BACKCTL  JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//* ********************************************************
//* *****     BACKUP ORACLE DATABASE CONTROL FILE      *****
//* ********************************************************
//*
//*
//CONTROL  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
JOBOPTIONS 3
*
SPECNUMBER 1
FILES C:\TESTS\T16020\BACKCTL.CMD
ENDPARM
/*
//
```

Operating System Command File (BACKCTL.CMD):

```
SVRMGR  @BACKCTL.SQL
```

SQL Command File (BACKCTL.SQL) :

```
CONNECT UPSTREAM/UPSTREAM@EVEREX;
—
—     Copy ORACLE Database Control File
—
ALTER  DATABASE  BACKUP  CONTROLFILE
       TO  'SYS:\ORACLE\CONTROL\IDPCTL1.BKP'  REUSE;

—
—     Switch ORACLE Database REDO Log Files
```

```
ALTER SYSTEM SWITCH LOGFILE;
```

Step # 2) Backup the REDO Log and Control Files

Use the following sample JOB to construct a platform specific command file that will backup your selected ORACLE Database REDO Log files. This step is important in order to insure that the Log files for the database just backed up contain any database changes that would need to be applied in case of a restore.

In order to guarantee that all committed transactions can be recovered, you have to have a full set of archived REDO log files available at the time of the recovery. You must save all the REDO log files from the time the last tablespace backup was taken and up to the recovery point-in-time. This is necessary in order to be able to provide the Oracle recovery tools with all the necessary REDO log files.

Host JCL:

```
//BACKREDO JOB (ACCOUNTING INFO),'BACKUP ORACLE', CLASS=A
//BACKUP   EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
TPNAME=UPSTREAM
ACTION 1
BACKUPPROFILE ORCREDO
NOVELLPROFILE EVEREX
USERID XYZ
MERGE 3
STORAGETYPE 2
RECORDSIZE 6000
COMPRESSLEVEL 0
RESTARTTYPE 0
ATTENDED Y
REPORTOPTIONS 6
REPORTNAME USORACLE.RPT
LOGNONFATAL Y
*
SPECNUMBER 1
FILES O:\ORACLE\LOGFILE\*.LOG       * REDO LOG FILES
SPECTYPE 0
ARCHIVEBIT N
*
SPECNUMBER 2
FILES O:\ORACLE\CONTROL\*.BKP       * BACKUP CONTROL FILE
SPECTYPE 0
ARCHIVEBIT N
```

```
*
ENDPARM
/*
//
```

34.1.13 Recovering Your ORACLE Database

In every database system, the possibility of a system or media failure is always present. In some cases you may also need to recover to a point in time in the past in order to undo erroneous operational or programmatic changes to a database. Before recovering a database, you must choose an appropriate recovery method. Regular database backups taken using UPSTREAM and the previously outlined backup procedures will provide you with all the necessary components to perform a successful recovery.

For illustrative purposes, this section outlines the following UPSTREAM/ORACLE database recovery scenarios:

- **NOARCHIVELOG (OFFLINE) Mode Recovery**
- **ARCHIVELOG (ONLINE) Mode Recovery**

These scenarios represent the sample database recovery options for ORACLE database users that performed backups, based upon the previously supplied backup scenarios, that will insure full database integrity. Any other scenarios should be carefully reviewed in order to limit your exposure to the loss of data.

34.1.14 NOARCHIVELOG (OFFLINE) Mode Recovery

If your database is running in NOARCHIVELOG mode, this is the only recovery option you have. This recovery scenario assumes that you used Database OFFLINE mode backup procedures previously outlined. During the backup, you took the ORACLE operating environment down and performed FULL backups of the database and its additional components (control files, etc.).

To perform this type of recovery the following steps must be taken:

- 1) Shutdown the ORACLE Database
- 2) Restore the ORACLE Database components
- 3) Restart the ORACLE Database with the RECOVERY option

Step # 1) Shutdown the ORACLE Database

Before performing an ORACLE OFFLINE Database recovery it will be necessary to shutdown the ORACLE database, if it is currently operating. You have two options for controlling this operation, you can use either the Oracle Database Manager GUI application to manually shut down the database or a predefined SQL procedure.

As with the processes outlined earlier, we will be outlining the second approach utilizing mainframe initiation. This approach will allow for the automatic scheduling of the recovery operation and not require manual intervention. The following example outlines a minimal ORACLE database shutdown of host and workstation components.

Workstation Command File (STOPORC.CMD) :

```
SVRMGR @STOPORC.SQL
```

Workstation SQL File (STOPABRT.CMD) :

```
CONNECT INTERNAL/ORACLE@EVEREX;
SHUTDOWN ABORT;
EXIT;
```

Host JCL:

```
//STOPORC  JOB (ACCOUNTING INFO),'STOP ORACLE', CLASS=A
//*
//*        HALT ORACLE DATABASE OPERATION
//*
//STOP     EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=YOUR.UPSTREAM.LOAD.LIBRARY
//SYSPRINT DD   SYSOUT=*
//SYSUDUMP DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=UPSTR
USAPPL=UPSTREAM
MAXRETRY=1
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
JOBOPTIONS 3
*
SPECNUMBER 1
FILES C:\UPSTREAM\ORACLE\STOPABRT.CMD
ENDPARM
/*
//
```

Use your operating system specific “Oracle Database Tools” guide for the exact command line interface parameters required to support your environment.

Step # 2) Restore the ORACLE Database Components

Host JCL:

```
//RESTORE  EXEC PGM=USTBATCH
//STEPLIB  DD   DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD   SYSOUT=*
//USTLOG   DD   SYSOUT=*
//USTPARM  DD   *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
*
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 0
BACKUPPROFILE TEST001
NOVELLPROFILE EVEREX
RECORDSIZE 6000
ATTENDED Y
LOGNONFATAL Y
```

```
*
SPECNUMBER 1
FILES O:\ORACLE\*.*              * ALL ORACLE FILES
SUBDIRECTORIES Y
SPECTYPE 0
*
ENDPARM
/*
//
```

Step 4) Startup the ORACLE Database Server

Once the database recovery has completed successfully, the ORACLE database needs to be restarted. The following JCL will invoke an ORACLE command to restart the database.

Host JCL:

```
//STARTORC EXEC PGM=USTBATCH
//STEPLIB  DD DISP=SHR,DSN=USTEST.UPSTREAM.LOAD
//SYSUDUMP DD SYSOUT=*
//USTLOG   DD SYSOUT=*
//USTPARM  DD *
APPLPREF=USTST
USAPPL=USTSAPPL
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
TARGLU=luname    or    TCPTARG=nn.nn.nn.nn
ACTION 5
ATTENDED Y
TRACE N
JOBOPTIONS 3
SPECNUMBER 1
FILES C:\TESTS\STARTRCV.CMD
ENDPARM
/*
//
```

Workstation Command File (STARTRCV.CMD) :

```
SQLDBA @STARTRCV.SQL
```

Workstation SQL File (STARTORC.SQL) :

```
CONNECT INTERNAL/ORACLE@EVEREX;
STARTUP OPEN RECOVER PFILE=C:\TESTS\INITORCL.ORA;
EXIT;
```

34.1.15 ARCHIVELOG (Online) Mode Recovery

When running in ARCHIVELOG mode, several recovery options are available to restore a damaged database to a transaction-consistent state:

- ☐ Complete media recovery:
  - Closed Database Recovery
  - Open-Database, Offline-Tablespace Recovery

- Open-Database, Offline-Tablespace, Individual Datafile recovery

☐ Incomplete media recovery:

- Cancel-Based Recovery
- Time-Based Recovery
- Change-Based Recovery

Consult your platform and version specific Oracle Server Administrator's Guide (Backup and Recovery Guide) for the applicable recovery procedures. FDR/UPSTREAM backups of Oracle database files and archived REDO logs will provide you with all the necessary data for performing those recovery operations.

34.2 Oracle Media Manager Support (RMAN)

FDR/UPSTREAM can now operate as an Oracle Media Manager Library product which allows it to be used with Oracle Recovery Manager (Oracle8 and Oracle9) or Oracle Enterprise Backup Utility (Oracle 7).

The Oracle Recovery Manager is an extremely full featured backup facility. Through its use you can use FDR/UPSTREAM to perform full, incremental and tablespace backups of databases, tablespaces and datafiles. Some of the features supported include backup sets, image copies, stored scripts, Recovery Manager reports, tags, integrity checking and more. All of the powerful features of recovery manager are now available to UPSTREAM users under both local and host control.

Because the Oracle Recovery Manager is so complex, we recommend that you become familiar with its use before referencing this documentation. See the *Oracle Backup and Recovery Guide* for a complete description of the Recovery Manager. Since backup and restore operations are controlled there and since UPSTREAM is merely a Media Manager Library the description of backups and restores is left to that guide.

For simplicity we refer only to Recovery Manager but the concepts apply both to Recovery Manager and Enterprise Backup Utility.

34.2.1 Installation

Before beginning installation of FDR/UPSTREAM media manager software (**usorasbt**), make sure that you are familiar with Recovery Manager basic backup/recovery techniques. Recovery Manager is distributed with built in capabilities of doing disk backups. Prepare and run a test set of small backup and recovery jobs to verify that all your scripts work correctly.

Also make sure that your FDR/UPSTREAM is installed and properly configured, and you can run successful backups and restores.

34.2.2 Windows NT Installation

The UPSTREAM interface to Recovery Manager is the dynamic link library **orasbt.dll**. It is normally copied into your UPSTREAM directory during the UPSTREAM install together with **usorasbt.cfg.sample** sample configuration files and **usora.dat.sample** sample FDR/UPSTREAM parameter file.

To install the UPSTREAM Media Manager library:

- Stop the Oracle service for your instance. Oracle opens this DLL during Oracle service start up and keeps it open until you stop Oracle. Go into the **Control Panel**, select the **Services** applet, highlight the **OracleService{instance}** for each database instance you have installed and press the **Stop** button.
- Rename the current orasbt.dll. Oracle has placed the default Media Manager Library into your Windows system directory (%SystemRoot%\system32). Use a command line rename command or Explorer to rename the file to some other name (such as orasbt.default) in case you wish to uninstall UPSTREAM at some later time.
- Copy **orasbt.dll** from the UPSTREAM directory to your Windows system directory.
- You can now restart the Oracle services using the Services applet in the Control Panel.

NOTE: You have to use Services applet to restart Oracle. Server Manager in Windows stops only the database instance, not the service itself (the new DLL doesn't get loaded).

34.2.3 UNIX installation.

On UNIX systems three files included in the FDR/UPSTREAM distribution to support interface to Oracle Recovery Manager: shared library **libobk** (extension differs from system to system), **usorasbt.cfg.sample** sample configuration file and **usora.dat.sample** sample FDR/UPSTREAM parameter file.

WARNING: Starting with version 8.0.4, Oracle is usually shipped with the default media manager software installed. Examine your $ORACLE_HOME/lib directory for any files or symbolic links called libobk.*. Rename or remove those files before installing FDR/UPSTREAM media manager software.

☐ Oracle 8.0.x installation:

To include FDR/UPSTREAM as media manager software, you have to re-link Oracle with FDR/UPSTREAM library **libobk** included in the FDR/UPSTREAM directory during regular installation. Shutdown all Oracle database instances first, then do the following:

- Solaris (the shared library name is **libobk.so**, it is in FDR/UPSTREAM directory **/opt/fdrupstream**):

```
cd $ORACLE_HOME/lib

rm libobk.so

ln -s /opt/fdrupstream/libobk.so libobk.so

cd $ORACLE_HOME/rdbms/lib

make -f  ins_rdbms.mk  ioracle LLIBOBK="-lobk"
```

- AIX: (the shared library name is **libobk.a**, it is in FDR/UPSTREAM directory **/usr/lpp/fdrupstream**):

```
cd $ORACLE_HOME/lib

rm libobk.a

ln -s /usr/lpp/fdrupstream/libobk.a libobk.a

cd $ORACLE_HOME/rdbms/lib

make -f  ins_rdbms.mk  ioracle LLIBOBK="-lobk"
```

Make sure **libobk.a** has all execute permissions set.

- HP-UX (the shared library name is **libobk.sl**, it is in FDR/UPSTREAM directory **/opt/fdrupstream**):

```
cd $ORACLE_HOME/lib

rm libobk.sl
```

```
ln -s /opt/fdrupstream/libobk.sl libobk.sl

cd $ORACLE_HOME/rdbms/lib

make -f  ins_rdbms.mk  ioracle LLIBOBK="-lobk"
```

Make sure **libobk.sl** has all execute permissions set.

- ☐ Oracle 8.1x and Oracle 9.1.x installation:

Shutdown your Oracle database, go to **$ORACLE_HOME/lib** directory and substitute existing **libobk.*** symbolic link with the link to libobk shared library in your FDR/UPSTREAM directory:

- **libobk.so** for SUN Solaris and Linux;
- **libobk.a** for AIX;
- **libobk.sl** for HP-UX (make sure it has execute permissions set!).

For example:

```
ln -s  /opt/fdrupstream/libobk.so /ora01/oracle/lib/libobk.so
```

After you startup the database, FDR/UPSTREAM media manager will be activated.

If you are getting error messages referencing libobk or shr.o double check the symbolic link **libobk.*** created, existence of **libobk** shared library in your FDR/UPSTREAM directory, and then call FDR/UPSTREAM Tech Support.

NOTE: Oracle recommends to perform re-linking of Oracle 8.1.x with libobk shared library the same way as for Oracle 8.0.x.

NOTE: If you are running a 64-bit version of Oracle on HP-UX or Solaris system, make sure that you are using the 64-bit version of libobk.sl (rename files libobk.sl.64 or libobk.so.64 in UPSTREAM directory to libobk.sl or libobk.so). The directory for libobk.sl or libobk.so on 64-bit HP-UX or Solaris is $ORACLE_HOME/lib64.

NOTE: If you are running a 64-bit version of Oracle on AIX system, make sure that you are using the correct 64-bit version of libobk.a: for AIX versions 4 rename file libobk.a.64 in UPSTREAM directory to libobk.a; for AIX version 5 and up rename libobk.a.64.5L.

NOTE: According to Oracle, specifying BACKUP_TAPE_IO_SLAVES=TRUE in the Oracle initialization parameters may improve the performance.

34.2.4 Configuring FDR/UPSTREAM for Recovery Manager

Starting with version of 2.0.6.0 of **usorasbt** FDR/UPSTREAM must operate in MULTI-user mode: one or more instances of FDR/UPSTREAM running in parallel accepting backup/restore requests from different sources (like mainframe initiates, database agents, etc.). Using this mode allows you to take full advantage of RMAN multi-channel backups.

To be able to use FDR/UPSTREAM as your Oracle backup media management software you have to create/update a configuration file which points to the main FDR/UPSTREAM files and defines the FDR/UPSTREAM

operating mode in which you intend to use it. A sample configuration file **usorasbt.cfg.sample** is provided by installation in the FDR/UPSTREAM directory.

The **usorasbt** configuration file consists of the following:

- *PARAMETER /usr/lpp/fdrupstream/usora.dat* - required, the template parameter file (see further note).
- *PROFILE ORCL*- optional, RMAN and EBU provide **usorasbt** with the name of the database instance it is working with. We use that name as an FDR/UPSTREAM backup profile as a default. If you want to use a different backup profile name – specify it here, and make sure that it is a unique name. You must configure this backup profile as a "generic prefix", and it must be no more than 7 characters long. This value can get overwritten by USBKPROFILE environment variable.
- *ALIASFILE /usr/lpp/fdrupstream/alias.ora* - optional, if your database instance name is not valid for an FDR/UPSTREAM backup profile name, use an alias for your backup profile name. Create an ASCII file with one or more lines. Each line contains a pair of names separated by a space: database instance name and it's alias, which will be used as a backup profile name for this database instance.
- *LOGFILE /home/oracle/usorasbt.log* - optional, specifies the name of the log file where all database backup/restore activities using FDR/UPSTREAM are recorded. Should be placed in the directory with read/write access for Oracle user. If not specified, the log is not created – this is not recommended!
- *USINPORT 1972* - required, the port number the running FDR/UPSTREAM daemon (UNIX) or service (Windows) is listening on (INPORT parameter of the FDR/UPSTREAM configuration file in use), this parameter indicates that FDR/UPSTREAM will be used in a MULTI-user mode. You have to have an FDR/UPSTREAM daemon (UNIX) or service (Windows)running on this same machine.
- *WORKPATH /usr/lpp/usorasbt* - required, the full path to the directory where Oracle users have full read/write access.
- *CHANNELS 36* - optional, the maximum (and the default) number is 36. RMAN allows you to specify a number of backup/restore channels to use in parallel to improve the performance. Starting with 1.1.0.2 version of FDR/UPSTREAM MMAPI you can take advantage of this RMAN feature and will be able to run parallel FDR/UPSTREAM backups/restores if requested by RMAN. You specify the actual number of parallel RMAN sessions (channels) in the RMAN script. Each FDR/UPSTREAM backup session will perform a backup using a backup profile name generated by adding a unique one-symbol session identifier to the original backup profile name. The total number of FDR/UPSTREAM backups (which is the sum of all RMAN backup channels) running in parallel and using the same FDR/UPSTREAM backup profile is limited by this parameter. The FDR/UPSTREAM backup profile name must be no longer than 7 characters and configured as a "generic prefix".
- *USERNAME ORACLE* - optional, the name of the registered FDR/UPSTREAM user if required by security settings.
- *NOTRACE* - Oracle has a default setting that enables tracing of the MMAPI layer. The trace file name is **sbtio.log** and it may appear in different locations under $ORACLE_HOME depending on the configuration settings. After you successfully finish your evaluation we recommend adding this parameter to suppress writing the trace entries. It is recommended to know where your sbtio.log file resides and clean (remove) it from time to time to recover the disk space during and after the evaluation process.

Most users will place the **usorasbt.cfg** file in the FDR/UPSTREAM directory and then use environment variable USORASBTCFG (see below) to point to it from Recovery Manager. Make sure that **usorasbt.cfg** file is accessible for read by the Oracle owner (user account that installed Oracle database) .

You must create a template parameter file for FDR/UPSTREAM to use when backing up Oracle. You can create it by starting FDR/UPSTREAM, going into the backup dialog, specifying the desired options, and saving the parameter file under the name you specified in the **usorasbt.cfg** configuration file PARAMETER. Sample parameter file **usora.dat.sample** is provided during installation. Even though some settings in this file will be overwritten by **usorasbt**, you should specify:

- **Storage Type** for backups (STORAGETYPE parameter). If you perform disk backups and working with Oracle 8.0, you have to go to 'More…' screen and specify a **DASDOVERRIDE** parameter. Oracle 8.0 utilities do not always provide us with the size of the backup to be performed, so you have to specify the number of bytes in the biggest backup set you expect. Starting with Oracle 8.1.7 RMAN provides us with the valid backup size.
- **Compression Level** in "More…" screen (COMPRESSLEVEL parameter).
- **Local Backup** parameters if you are using UPSTREAM/SOS. If you are running in a MULTI-user mode and want to take full advantage of SOS Local Backup (specified LOCALBACKUP 2) and multiple backup channels, so that every one of RMAN backups running in parallel uses it's own local backup disk, follow these recommendations. Prepare a number of local backup disks with volume names following the pattern: CCCCC0, CCCCC1, ..., CCCCCN, where CCCCC is a 5-character volume prefix followed by a number starting with 0 (see FDR/UPSTREAM Setup chapter for details). You have to prepare as many such volumes as many backup channels you are planning to use (or the limit you set in CHANNELS parameter in **usorasbt.cfg** file). In the **usora.dat** file (or any other template parameter file specified in PARAMETER parameter **usorasbt.cfg** file) specify (together with other local backup parameters, like LOCALBACKUP etc):

  ```
  LOCALBACKUPDIR CCCCC%
  ```

  where CCCCC is the volume prefix above. For each backup channel this name will be resolved to the appropriate valid volume name to use in SOS Local Backup.

  Oracle doesn't always supply us with the size of the backup, so you have to set **DASDOVERRIDE parameter (even for tape backups!) to the number of bytes you want to allocate on the SOS local disk for the backup.**

Parameters which are automatically overridden by the UPSTREAM Recovery Manager facility includes:

- **Backup Profile.** The Oracle instance name is used. Recovery Manager determines when to delete backups and they will be deleted automatically via UPSTREAM so we recommend that in the host configuration for your Backup Profile you specify a retention period which is quite long so as not to defeat the Recovery Manager retention algorithms. You may need to configure a Backup Profile on the host by this name if the GLOBAL profile does not meet your needs.
- **File specifications.** UPSTREAM will generate the file names to be used.
- **Backup type.** You do not need to specify separate configuration files for fulls and incrementals as these will be set as appropriate.
- **Restart.** Restart is not supported.

34.2.5 Using Recovery Manager With FDR/UPSTREAM

RMAN provides **usorasbt** with the name of the database instance it is working with. We use this name as an FDR/UPSTREAM backup profile. You can specify the FDR/UPSTREAM backup profile you want to use by including PROFILE configuration parameter in **usorasbt.cfg** file, or by specifying USBKPROFILE environment variable in the script that invokes RMAN (overwrites value in **usorasbt.cfg**).You have to configure this backup profile before starting production backups, otherwise they will use your generic profile settings.

Tapes with RMAN backups should never expire, and should not be a member of GDG.

We strongly recommend that you configure FDR/UPSTREAM backup profiles for Oracle backups as a "generic prefix" profiles, so you can advantage of RMAN multi-channel operations. Remember that the backup prefix MUST NOT be more than 7 characters long allowing at least 1 character for the channel number.

It is recommended (especially for multi-channel backups) that in the FDR/UPSTREAM backup profile configuration you specify DSN prefix special way: it's last qualifier matches the profile name. In this case the actual DSN prefix created will be replaced with the actual profile name used for the backup ensuring the uniqueness of the file name.

It is not recommended to remove FDR/UPSTREAM backups created by RMAN directly using FDR/UPSTREAM (bypassing RMAN). RMAN keeps internal track of it's backups (either in it's own database, or using the control file, depending on how you configured it), and may rely on those backups in the recovery process. To perform a clean up of the backups you don't need, use RMAN "change … delete" command (see "Keeping backups" section in Oracle "Backup and Recovery Guide, Recovery Manager Scenarios").

There is a set of environment variables which helps you to control FDR/UPSTREAM backup process:

- NEWTAPE = YES | NO - allows you to control the creation of new tapes (see the NEWTAPE discussion below).
- USPATH - specifies the directory where FDR/UPSTREAM software (including **usorasbt.cfg** file) is installed, no default value;
- USORASBTCFG – the full name of the **usorasbt** configuration file if not in the UPSTREAMPATH directory, no default value;
- USBKPROFILE - the FDR/UPSTREAM backup profile name to overwrite the value set by PROFILE parameter in the **usorasbt** configuration file (or to set it if PROFILE was not defined),must be no more than 7 characters long and configured as a "generic prefix";
- USORASBTUSTO – the number of seconds **usorasbt** waits for FDR/UPSTREAM to start up and open communication pipe, the default is 300 sec.;
- USORAUSWAITTO – **usorasbt** will try for up to this number of seconds to start an FDR/UPSTREAM instance. If, by the end of this period, FDR/UPSTREAM is still too busy, **usorasbt** fails with "device busy" condition. The limit of 36 maximum backup channels can be a contributing factor. The default value is 600 second.

If you do not specify either USPATH or USORASBTCFG, **usorasbt** will try to find the **usorasbt.cfg** file in the default FDR/UPSTREAM directory (**c:\upstream** for Windows NT and **/usr/lpp/fdrupstream** or **/opt/fdrupstream** on UNIX)

To take the full control over the creation of new tapes using the **NEWTAPE** environment variable you must configure your backup profile in the FDR/UPSTREAM host in the following way:

- The backup profile must be no more than 7 characters. We recommend to explicitly specify it in the **usorasbt.cfg** file using the PROFILE parameter.
- **PREFIX=YES** If using the UPSTREAM Client Profile Configuration, check **Profile a Generic Prefix.**
- **NEWTAPEI = NO** If using the UPSTREAM Client Profile Configuration, do **not** check **New tape for Incr. Merge.**

- **NEWTAPEF = YES** If using the UPSTREAM Client Profile Configuration check **New tape for Full Merge**.
- **MERGE=YES.** If using the UPSTREAM Client Profile Configuration, check **Merge backups allowed**.
- **DASD=YES.** If using the UPSTREAM Client Profile Configuration check **Seq. DASD Backups Allowed**. This is required even if you don't use disk backups.
- **TAPE=YES**. If using the UPSTREAM Client Profile Configuration check **Seq. Tape Backups Allowed**. This is required even if you don't use tape backups.
- We strongly recommend that you specify the last file name qualifier in the DSN prefix (for both tape and DASD) to match the name of the backup prefix (this will ensure that all the backup file names created are unique). For example:
  - `Backup profile prefix: ORCLBKP`
  - `DSN prefix: MY.BACKUP.ORCLBKP`

  This would result in actual backups of:
  - `Channel 1: actual backup profile is ORCLBKP0, DSN is MY.BACKUP.ORCLBKP0…`
  - `Channel 2: actual profile is ORCLBKP1, DSN is MY.BACKUP.ORCLBKP1…`
  - `and so on …`

When your FDR/UPSTREAM backup profile is properly configured, you can easily control the creation of new tapes for your backups from RMAN scripts using ALLOCATE CHANNEL command:

```
ALLOCATE CHANNEL … PARMS="ENV=(... NEWTAPE=YES | NO, ...)" ...
```

- Specify NEWTAPE=YES for the channel (in the RMAN script) if you want this backup to start on a new tape; all the backup files created during this backup (more than one if you have FILESPERSET, or more backup commands before you release the channel) will go to the same newly created tape.
- Specify NEWTAPE=NO (or omit NEWTAPE) if you want all the backup files in the set to append to the previous tape.

It is recommended that you specify HOLDTAPE Y in the template parameter file (file specified in PARAMETER in usorasbt.cfg) if you expect to have more than one backup file created during RMAN backup – it will prevent tapes from being unloaded between backups.

When you create Recovery Manager scripts, you must specify the following parameters in channel allocation:

- type 'sbt_tape' This will instruct Recovery Manager to use media manager software installed (i.e. FDR/UPSTREAM), not internal disk backup support.
- PARMS="ENV=(USORASBTCFG=<full path to usorasbt configuration file> [,env-name=env-value])"
  or
  PARMS="ENV=(USPATH=<UPSTREAM directory>[,env-name=env-value])"

For example (all in one line):

```
ALLOCATE CHANNEL TYPE "sbt_tape" ...
PARMS="ENV=(USORASBTCFG=/opt/fdrupstream/usorasbt.cfg,...)" ...;
```

Oracle9i ONLY:

If your are running Oracle9i you can pre-configure the backup channel (for example):

```
CONFIGURE CHANNEL DEVICE TYPE ussbt
PARMS='ENV=(USORASBTCFG=/opt/fdrupstream/usorasbt.cfg)'
```

Note that the above must be on one line. When you specify your backups or restores use in your scripts:

```
ALLOCATE CHANNEL ussbt;
```

WARNING: If the usoracbt.cfg configuration file is not found, your backup/recovery scripts will fail!

We strongly recommend that you define LOGFILE configuration parameter, and that is the place to check the backup/restore results if RMAN returns an error. For a more detailed explanation of errors occurred during the backup process check FDR/UPSTREAM log (LOGFILE parameter of the FDR/UPSTREAM configuration file).

Usorasbt caches backup information to improve performance, especially for maintenance procedures. We recommend that you run all your maintenance jobs (cross-checks, backup removing, etc.) through one channel, and not in parallel with other backup/recovery operations.

RMAN doesn't always provide MMAPI layer with the size of the upcoming backup, that's why FDR/UPSTREAM inquire version reports do not show the correct size of the MMAPI Oracle backups.

34.2.6 Initiating FDR/UPSTREAM RMAN backups from the mainframe.

After you created and tested your RMAN backup scripts, you may want to set it up so that these scripts will be initiated from the mainframe side.

This is a sample mainframe job to start **full.sh** script using FDR/UPSTREAM **Run Job** facility:

```
//AGKTST2 JOB (ACCOUNT),'NAME',CLASS=N,NOTIFY=AGK
//TSTOS201 EXEC PGM=USTBATCH,PARM='NOTIMER'
//STEPLIB  DD DISP=SHR,DSN=USTSYS.TESTLIB
//SYSUDUMP DD SYSOUT=*
//USTLOG   DD SYSOUT=*
//USTPARM DD *
APPLPREF=UPSTR
USAPPL=UPSTREAM
LOGMODE=USTMODE
MAXRETRY=0
CONV=WAIT
TCPTARG=192.168.150.104,1973
ACTION 5                              * RUN A JOB
JOBOPTIONS 2                          * WAIT FOR THE JOB TO TERMINATE
FILES /home/oracle/backups/full.sh
ATTENDED N
ENDPARM *
//
```

Keep in mind that the scrip (**full.sh** in this example) will run under superuser (**root**) account. Depending on your Oracle setup and configuration, you may need to include **root** user in the **dba** group and set some environment variables (like ORACLE_SID and ORACLE_HOME) in the script before invoking RMAN itself:

```
ORACLE_SID=orcl817
export ORACLE_SID
ORACLE_HOME=/ora01/oracle/8.1.7
export ORACLE_HOME
RMAN target …
```

34.2.7 Backup and recovery considerations.

As RMAN manages backup and recovery operations, it requires a place to store necessary information about the database and the backups taken. RMAN always stores this information in the target database control file. You can also store RMAN metadata in a recovery catalog schema contained in a separate database. The recovery catalog schema must be stored in a database *other than* the target database. RMAN periodically migrates information from the control file to the recovery catalog.

The recovery catalog is maintained solely by RMAN; the target database never accesses it directly. RMAN propagates information about the database structure, archived redo logs, backup sets, and datafile copies into the recovery catalog from the target database's control file. Here are some recommendation on how to maintain RMAN backup repository:

- It is strongly(!) recommended that you include the Oracle control file in each and every RMAN backup. Pre-configure RMAN with **CONFIGURE CONTROLFILE AUTOBACKUP ON** (Oracle9i) or have in every backup script command **INCLUDE CURRENT CONTROL FILE**;
- Keep all the relevant RMAN data in the control file by specifying a long enough **CONTROL_FILE_RECORD_KEEP_TIME** parameter in the init*sid* file. This is absolutely required if you work without recovery catalog, and it will allow you to proceed with full database recovery (disaster or off-site) without restoring the recovery database;
- RMAN can create message logs if you startup RMAN with the MESSAGELOG parameter. These logs may come in extremely handy in case of the disaster recovery if you have to help RMAN to find the right backup pieces and to set your DBID. Note that keeping message logs requires some management on your part in cleaning up the old ones;
- Make sure you perform the required maintenance on the recovery catalog (register, resynchronize, reset the target database, etc.) - RMAN will not maintain the recovery catalog automatically for you!
- Make backups of the recovery catalog itself: you can use RMAN or shutdown the recovery database (while RMAN is not active) and proceed with offline backups;
- Don't forget to backup Oracle software, configuration, initialization parameter and password files and Oracle Net files (usually the whole $ORACLE_HOME directory except oradata subdirectory) at the file level (using regular UPSTREAM file level backups). Make sure that control file(s) are **NOT(!)** included in the regular file backups: in case of a disaster recovery you **MUST(!)** restore the control file from your RMAN backups, because the control file backed up during regular file backup can be outdated or in an inconsistent state and will prevent database instance from starting.

34.2.8 Advanced Backup Scenarios.

The method described above will allow UPSTREAM to work with Oracle and produce complete backups. However, if you'd like to optimize the performance of your backups we recommend considering one of these sample approaches:

- ☐ 1. Take regular RMAN backups of datafiles and archived redo logs according to your schedule. If you have EMC Symmetrix Storage Subsystem, you can take advantage of UPSTREAM/SOS to speed up your backups (see UPSTREAM/SOS section of this manual). Apply recommendations from section 19.2.5 "Identify the Local Backup Disk" to the template parameter file specified in **usorasbt.cfg** in the PARAMETER parameter(**usorasbt.dat** is the default).

- ☐ 2. If you have Oracle database files installed on EMC2 Symmetrix Storage Subsystem, you can use FDR/SOS backup solution. To be able to perform FDR/SOS backups of your Oracle database you have to be able to shut it down for the duration of the backup. If this is not an option, you can try to take advantage of a TimeFinder option of EMC2 Symmetrix Storage Subsystem (see section 19.11 "Non Disruptive Backups using BCVs"). Just keep in mind that you have to either shutdown your database or put it into backup mode (ALTER … BEGIN BACKUP) before the split of the BCV pair. Startup or return database from backup state (ALTER … END BACKUP) after the split is done. For further considerations and available options see "EMC Solutions Enabler SYMCLI TimeFinder Component Product Guide" section "BCV Splits Impacting DB Applications". To be able to perform all types of recovery take RMAN backups of the archived redo logs on regular basis.

- ☐ 3. RMAN allows you to create image copies of your datafiles, archived redo logs and control files to some disk location. Oracle doesn't use these files, so you can include them in your regular file backups (FDR/UPSTREAM or FDR/SOS if you copy all the datafiles on an EMC device). Disaster recovery procedure for this scenario doesn't require RMAN: after all the system and Oracle software is recovered you need to restore the most current copies of the datafiles and control file(s) to their original locations, then restore all the archived redo logs since the oldest image copy of the datafile restored, and then start Oracle to perform RECOVER DATABASE UNTIL… operation. After successful recovery open database in RESETLOGS mode, because online redo logs are unavailable.

34.2.9 Disaster or off-site recovery.

You have to install or restore your operating system environment and your Oracle software with all the parameter, configuration and initialization files ($ORACLE_HOME directory) first. Make sure that the right set of backup tapes was used to regenerate FDR/UPSTREAM on-line repository on the mainframe side.

Prepare and test your disaster recovery plan based on Oracle recommendations from "Performing Recovery After a Total Media Failure" (Oracle8i Recovery Manager User's Guide and Reference) or "Performing Disaster Recovery" (Oracle9i Recovery Manager User's Guide). These recommendations, in short, consist of the following steps:

- ☐ 1. After Oracle initialization, network, password files, etc. restored, start Oracle instance in NOMOUNT mode and restrict connections to DBA-only users.

- ☐ 2. If your control file was large enough to keep all the latest backup information (as recommended), you don't have to restore the recovery catalog. Start RMAN without connecting to the target database and specify the DBID for the target database (SET DBID command). If you have restored your recovery catalog and it was dedicated to this database only (no other databases were registered in it) you don't have to set the DBID – the recovery catalog has it.

- ☐ 3. Connect to the target database and restore your control file.

- ☐ 4. Specify the latest backed up archived redo log or it's time in SET UNTIL command, and mount the restored control file.

- ☐ 5. Restore the datafiles. If you used FDR/SOS to backup datafiles (scenario #2), skip this step.
- ☐ 6. Recover the database. (You can specify the recovery limit using UNTIL clause of the RECOVERY command instead of SET UNTIL … in step 4)
- ☐ 7. Open database in RESETLOGS mode.

  Oracle recommends to immediately close the database and perform a full backup after opening a database in RESETLOGS mode because this creates a new incarnation of the database.

34.2.10 Error Reporting.

Even though all the backup events, including errors, are logged in the log file specified in LOGFILE parameter of orasbt.cfg file, you will see them first in the Recovery Manager output:

```
Recovery Manager: Release 8.0.5.0.0 - Production

RMAN-06009: using target database controlfile instead of recovery catalog
RMAN-06005: connected to target database: ORCL

RMAN> run {
2> allocate channel ch1 type 'sbt_tape' debug=2;
3> backup format '\test%t%s%p' tablespace user_data;
4> }
5>
RMAN-03022: compiling command: allocate
RMAN-03023: executing command: allocate
RMAN-08030: allocated channel: ch1
RMAN-08500: channel ch1: sid=10 devtype=SBT_TAPE

RMAN-03022: compiling command: backup
RMAN-03023: executing command: backup
RMAN-08008: channel ch1: starting datafile backupset
RMAN-08502: set_count=41 set_stamp=392992363
RMAN-08010: channel ch1: including datafile 2 in backupset
RMAN-00569: ================error message stack follows================
RMAN-03007: retryable error occurred during execution of command: backup
RMAN-07004: unhandled exception during command execution on channel ch1
RMAN-10032: unhandled exception during execution of job step 1: ORA-06512: at line 88
RMAN-10035: exception raised in RPC: ORA-19624: operation failed, retry possible

ORA-19506: failed to create sequential file, name="\test392992363411", parms=""
ORA-27006: sbtremove returned error


OSD-00115: Message 115 not found;  product=RDBMS80; facility=SOSD  (OS083)
ORA-06512: at "SYS.DBMS_BACKUP_RESTORE", line 408
RMAN-10031: ORA-19624 occurred during call to DBMS_BACKUP_RESTORE.BACKUPPIECECREATE

Recovery Manager complete.
```

In the listing above error message 115 shows not found as it is not a Recovery Manager message (sometimes it is reported as OS error message). If the error number is in the 100 – 150 range, then it is most likely an **orasbt** error message number. Looking it up in the list below you can see that it's an UPSTREAM startup error and you should check if the UPSTREAM parameter in the usorasbt.cfg file has a valid full file spec for uscmd and that it is accessible for Oracle.

The **orasbt** error messages:

- 100 – internal memory allocation problems: check if your are running low on memory, call Tech Support;
- 102 – neither UPSTREAMPATH nor USORASBTCFG environment variables specified;
- 103 – unable to open template parameter file specified in usorasbt.cfg in PARAMETER: check if the file specification is correct and that it is accessible by Oracle;
- 104 – unable to create a new parameter file: orasbt attempts to create it's temporary files in the FDR/UPSTREAM working directory specified in WORKPATH parameter in FDR/UPSTREAM configuration file – CONFIGFILE parameter from usorasbt.cfg file. Check if Oracle has write access to that directory;
- 105 – error in reading from a template parameter file: see error 102 comments;
- 106 – error in writing to a new parameter file: see error 104 comments;
- 108 – (UNIX only) communication pipe to FDR/UPSTREAM not opened for inquiry versions: check other messages in usorasbt.log and upstream.log for FDR/UPSTREAM start up problems;
- 109 – (UNIX only) errors closing communication pipe to FDR/UPSTREAM: see error 108 comments;
- 110 – FDR/UPSTREAM reported an error: check usorasbt.log and upstream.log for error messages;
- 111 – (NT only) unable to open us.ret file: FDR/UPSTREAM creates us.ret file with the operation return code and some additional information in the working directory (WORKPATH parameter of FDR/UPSTREAM configuration file specified in CONFIGFILE parameter of usorasbt.cfg file). Check if that directory and file and accessible by Oracle;
- 111 – (UNIX only) unable to open a pipe to getret program: check if getret executable is installed, check usorasbt.log file, call Tech Support;
- 112 – (NT only) unable to read us.ret file: see error 111 comments;
- 112 – (UNIX only) unable to read from pipe to getret program: see error 111 comments;
- 113 – FDR/UPSTREAM failed the requested operation: see usorasbt.log and upstream.log files for details;
- 114 – unable to read version number from us.ret file: usually indicates problems with FDR/UPSTREAM. Check usorasbt.log and upstream.log for details.
- 115 – errors in FDR/UPSTREAM startup: check if UPSTREAM parameter of usorasbt.cfg file has a valid full file spec for uscmd and that it is accessible for Oracle;
- 116 – (UNIX only) error creating an FDR/UPSTREAM process: call Tech Support;
- 117 – file name for backup file generated by Recovery Manager exceeds 244 characters: respecify backup format parameter in your Recovery Manager script;
- 118 – FDR/UPSTREAM is too busy with other Recovery Manager backup/restore operations: you can run up to 36 (default value) FDR/UPSTREAM backup or restore at a time. **usorasbt** waits for up to predefined period of time (specified by USORAUSWAITTO environment variable, the default value is 10 min.) for FDR/UPSTREAM to become available before reporting this error. Verify that you have an FDR/UPSTREAM daemon (UNIX) or service (Windows) running, or check the total number of RMAN backup channels (for all Oracle instances) using the same FDR/UPSTREAM backup profile in parallel;

- 119 – unable to create a data pipe to FDR/UPSTREAM: check **usorback.log** and **upstream.log** for errors in FDR/UPSTREAM start up or running;
- 120 – errors opening data pipe to FDR/UPSTREAM: see error 119 comments;
- 121 – errors while waiting for FDR/UPSTREAM to open data pipe: see error 119 comments;
- 122 – wait for FDR/UPSTREAM to open data pipe connection timed out: usorasbt waits for up to 300 seconds for FDR/UPSTREAM to open data pipe connection. If it may take more than that for FDR/UPSTREAM to start up, adjust this wait time out by specifying USORASBTUSTO environment variable (see previous section);
- 123 – (NT only) error setting blocking mode for data pipe: call Tech Support;
- 124 – (NT only) error flushing data pipe to FDR/UPSTREAM: call Tech Support;
- 125 – FDR/UPSTREAM ended while usorasbt was waiting on data pipe: check **usorasbr.log** and **upstream.log** for FDR/UPSTREAM startup and run errors;
- 126 – (NT only) errors obtaining FDR/UPSTREAM exit code: check **usorasbt.log**, **upstream.log** and call Tech Support;
- 127 – errors writing to FDR/UPSTREAM data pipe: check **usorasbt.log**, **upstream.log** and call Tech Support;
- 128 – unable to access usorasbt.cfg file: check if you specified the right USORASBTCFG or UPSTREAMPATH environment variables (see previous section), check if Oracle has read access to **usorasbt.cfg** file;
- 129 – unable to read from **usorasbt.cfg** file: check if you have read access to the file;
- 130 – unable to access FDR/UPSTREAM configuration file specified in CONFIGFILE parameter in **usorasbt.cfg** file: check if the full file name is correct and if Oracle has read access to the file;
- 131 – backup profile name is invalid: backup profile name is your Oracle database instance name, it should be no longer than 7 alphanumeric characters (excluding $, #, @) and starts with an alphabetic character;
- 132 – the required UPSTREAM parameter not found in **usorasbt.cfg** file;
- 133 – the required CONFIGFILE parameter not found in **usorasbt.cfg** file;
- 134 – the required PARAMETER parameter not found in **usorasbt.cfg** file;
- 135 – the USPATH parameter not found in **usorasbt.cfg** file and UPSTREAMPATH environment variable is not specified (see previous section);
- 136 – FDR/UPSTREAM directory is not accessible for Oracle;
- 137 – (UNIX only) error obtaining data pipe flags: call Tech Support;
- 138 – (UNIX only) error setting data pipe flags: call Tech Support;
- 139 – error reading FDR/UPSTREAM data pipe: check **usorback.log** and **upstream.log** for errors in FDR/UPSTREAM start up or running;
- 140 – wrong backup profile reported in inquiry versions output: call Tech Support;
- 141 – no version information obtained from FDR/UPSTREAM: usually caused by FDR/UPSTREAM problems. Check **usorasbt.log** and **upstream.log** files for errors in FDR/UPSTREAM start up and running;
- 142 – (NT only) error opening inquire versions output: FDR/UPSTREAM creates a temporary report file in FDR/UPSTREAM working directory (WORKPATH parameter of FDR/UPSTREAM configuration file specified in CONFIGFILE parameter of **usorasbt.cfg** file).

Check if this directory is accessible by Oracle. Check usorasbt.log and **upstream.log** for errors in FDR/UPSTREAM startup and run. Call Tech Support;

- 142 – (UNIX only) **usorasbt** reads versions listing directly from FDR/UPSTREAM output. Check usorasbt.log and **upstream.log** for errors in FDR/UPSTREAM startup and run;
- 143 – error accessing inquiry versions output: see error 142 comments for the appropriate OS;
- 144 - error accessing database profile alias file;
- 145 - error sending RUN_FUNCTION to FDR/UPSTREAM;
- 146 - error accessing FDR/UPSTREAM;
- 147 - error sending parameters to FDR/UPSTREAM;
- 148 - FDR/UPSTREAM rejected processing of the function (user name required by the FDR/UPSTREAM security, but was wrong or not specified);
- 149 - error receiving final response from FDR/UPSTREAM;
- 150 - WORKPATH configuration parameter was not specified.
- 151 - Incomplete buffer received from UPSTREAM. Internal error. Call Tech Support.
- 152 - Invalid NEWTAPE env. var. Must be FULL, INCR, YES or NO.
- 153 - Operator intervention not supported.
- 154 - Profile name is too long.
- 155 - ProxyCopy not supported.
- 156 - Profile (through Oracle DB name) not specified.
- 157 - Single-user mode is no longer supported.

34.3 Backup Management Suite for Oracle databases.

34.3.1 Overview.

If you don't want to deal with the complexity of RMAN and/or Enterprise Manager, and are having problems scheduling file-based backups of Oracle databases this is an easy to use, powerful solution for your Oracle backup/recovery needs.

The FDR/UPSTREAM backup for Oracle databases includes these products: a Backup Management tool (GUI written in Java) and command line utilities – scheduling utility USORMGR, backup utility USORBACK, restore utility USORREST and supplemental CONNSTR program.

The FDR/UPSTREAM backup for Oracle databases primarily targets databases running in ARCHIVELOG mode. In this case you can take full advantage of FDR/UPSTREAM backup suite options, like ONLINE (hot) backups, incremental backups of REDO logs, and perform full database and tablespace media recovery.

If your database is running in NOARCHIVELOG mode the only way to perform backup/recovery is to take full offline backups, and, in case of media failure or any other disastrous conditions, restore all the database files back and re-enter all the work performed since the last backup.

Multithreaded and partitioned databases are not supported.

34.3.2 FDR/UPSTREAM configuration.

Before you run any of the FDR/UPSTREAM backup for Oracle tools be sure that FDR/UPSTREAM software is properly installed, configured and fully functional.

You must create a dedicated backup parameter file for Oracle backups. It will be used as a template for generating actual backup parameter file. You should specify parameters like 'Storage Type', 'Non-File Data' settings, Reporting options, Local Backup (if you wish to use it), compression level and alike.

There are some parameters that are dynamically updated by backup tools, so your settings for those parameters will have no effect. These parameters are (parameter names in the parameter file):

PARAMETER
ACTION
LISTENFORREMOTE
FILES
DESTINATION
MERGE
VERSIONDATE
LATESTVERSION
INQOPTIONS
BACKUPPROFILE
ATTENDED
NORESTART
SPECNUMBER
CONTROLFILE
USECONTROLFILE
SUBDIRECTORIES

ARCHIVEBIT
INCREMENTAL
LOGNONFATAL
SKIPOLD

You can find a sample FDR/UPSTREAM parameter file **usora.dat.sample** provided by installation.

If you are planning to run backups from Backup Manager Tool (GUI) we recommend setting these options in your FDR/UPSTREAM configuration file (usually, **upstream.cfg**):

USNLMOPTIONS 8
PERCENTINTERVAL 5

This will allow you to watch the progress of backup/restore operations in the Messages window.

34.3.3 UNIX considerations.

According to our recommendations, the FDR/UPSTREAM installation is supposed to be run as the root user to allow UPSTREAM full backup/restore access to all files on your system.

You don't have to be root to perform Oracle database backup/recovery operations, that's why we recommend that you install the FDR/UPSTREAM Oracle backup tools in a separate directory to which the Oracle SYSDBA user responsible for backups has full access (**/usr/lpp/orabackup**, for example).

To install the Backup Management Suite for Oracle databases:

- Create a directory which the Oracle database administrator has ownership and full access.
- Copy the **usorback.tar** file from the **/upstream/usora/<operating system>** directory of the CD to this directory.
- untar the file:

  ```
  tar -xvf usorback.tar
  ```

- make sure that files **usorback** and **usorrest** are owned by **root** and have *set-UID and set-GID* bits on:

  ```
  chown root usorback

  chmod 6751 usorback

  chown root usorrest

  chmod 6751 usorrest
  ```

NOTE: usorrest and usorback must be owned by root if you intend to use the default FDR/UPSTREAM (installed as root) to be able to have access to it's files. usormgr doesn't work with FDR/UPSTREAM directly, but accesses Oracle database and should run under Oracle account.

If you want to keep your FDR/UPSTREAM log records apart you can create a copy of a working **upstream.cfg** file in the FDR/UPSTREAM directory (**oraupstream.cfg**, for example) and make the following changes to this new FDR/UPSTREAM configuration file:

- LOGFILE parameter should specify the UPSTREAM log file, fully qualified with the full path to your Oracle backup tools directory (**/usr/lpp/orabackup**). For example:

  ```
  LOGFILE /usr/lpp/orabackup/upstream.log
  ```

- Set USNLMOPTIONS and PERCENTINTERVAL according to the previous recommendations.

Create a template parameter file (**usora.dat**, for example) in the Oracle backup tools directory (**/usr/lpp/orabackup)** according to the previous recommendations.

Use these files (**/usr/lpp/fdrupstream/oraupstream.cfg** and **/usr/lpp/orabackup/usora.dat**) in the configuration below when asked for FDR/UPSTREAM configuration and parameter files.

34.3.4 Backup Management Tool (GUI interface).

The purpose of the Backup Management tool is to give you a simple but powerful GUI to backup your Oracle data files and to create backup schedules. It is a GUI supplement to the command line utilities from this suite.

34.3.5 Prerequisites.

The Backup Management tool is a Java application. It requires Java Runtime Environment (JRE) be installed. For the Oracle database connection it utilizes the JDBC OCI interface provided by Oracle. You have to have Oracle Client with JDBC OCI drivers installed from Oracle version 8.0.4 or later (earlier versions didn't have JDBC support). The JDBC OCI driver provided by Oracle (up to Oracle 8.1.5) requires JRE 1.1 (shipped with Oracle 8.1), it will not work with JRE 1.2 (JAVA2).

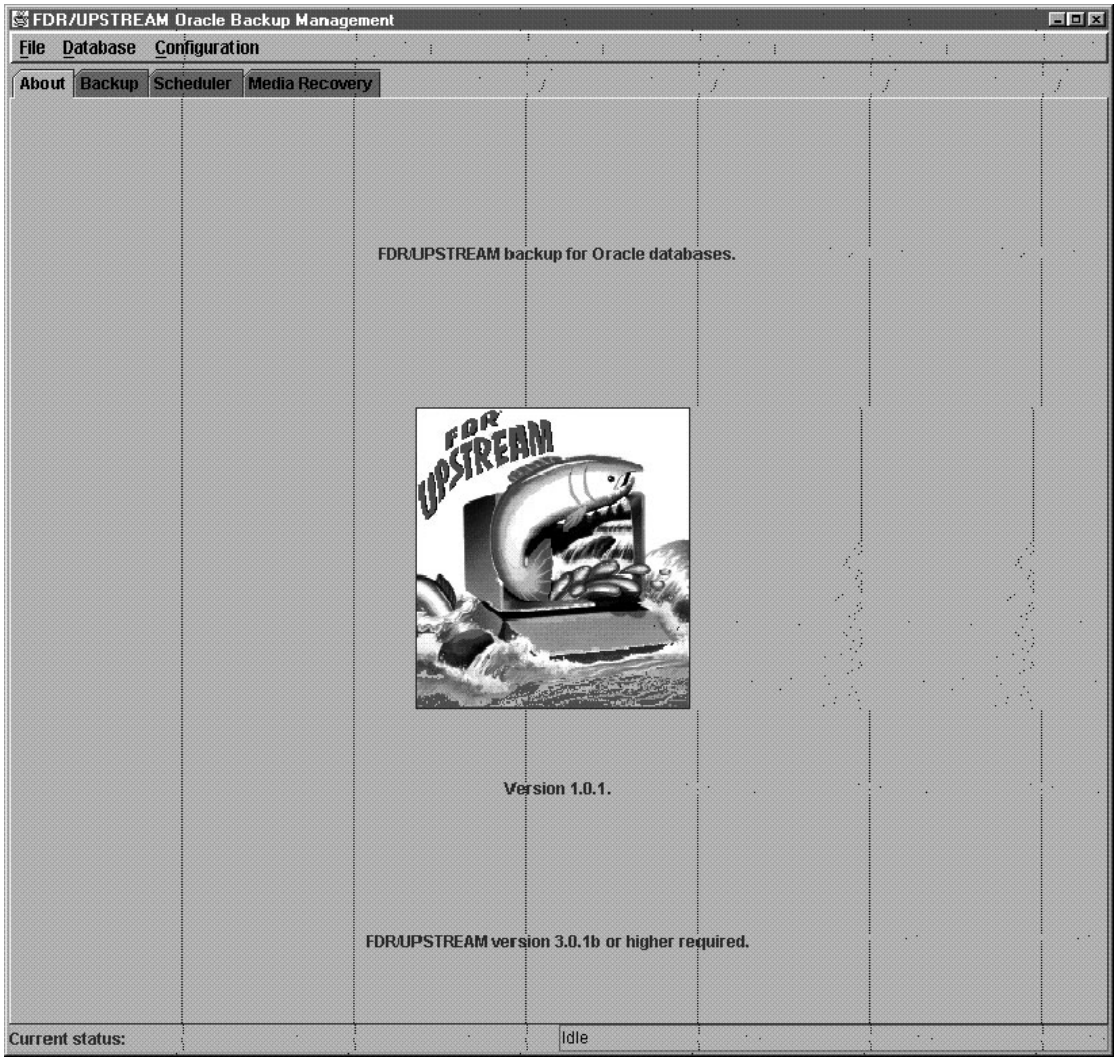
NOTE for UNIX Oracle 8.0.4 customers: Contact Oracle technical support for bug fixes. For AIX reference bug #660475; for HPUX reference bug #660333. When you receive the Oracle bug fix, make sure that you set the execute permission on the JDBC driver.

You can access and backup Oracle7 databases, if you have the Oracle8 client with JDBC OCI support installed.

This version of FDR/UPSTREAM backup for Oracle tools requires that these tools and FDR/UPSTREAM software to be installed on the Oracle server machine.

34.3.6 Start up and configuration.

To start FDR/UPSTREAM Backup Management for Oracle switch to the directory where you installed it and type ***usora*** (***usora.cmd*** on Windows NT).

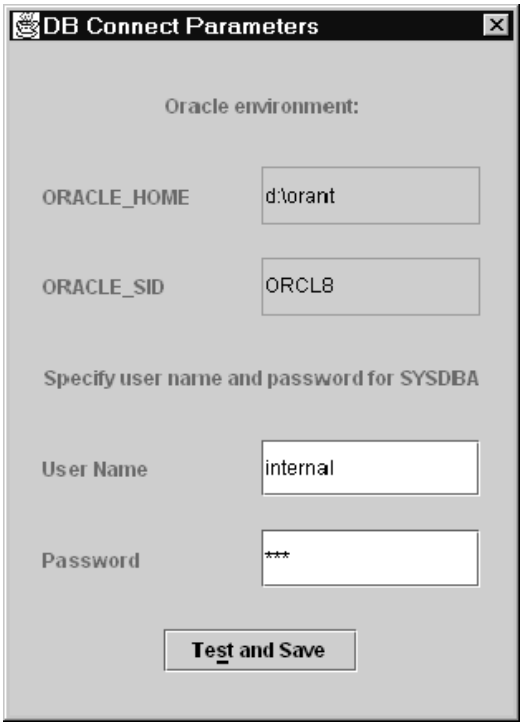


This command file starts the Java virtual machine and has reference to some local JAR files and ***classes111.zip*** provided by Oracle. Please, take a moment and check if the file names in **usora** (**usora.cmd** on Windows NT) match the directory structure of installed Oracle software.

Before you can start using Oracle Database Management tools, you have to specify database connection parameters and configuration settings.

34.3.7 Database connection parameters.

Pull down the **Database** menu and select **Connect parameters** to open the **DB Connect Parameters** dialog.



Specify the user name and password for DBA account here.

When you press the **Test and Save** button, the Backup Management tool will try to connect to Oracle using parameters provided. It will also check whether the specified user has DBA privileges.

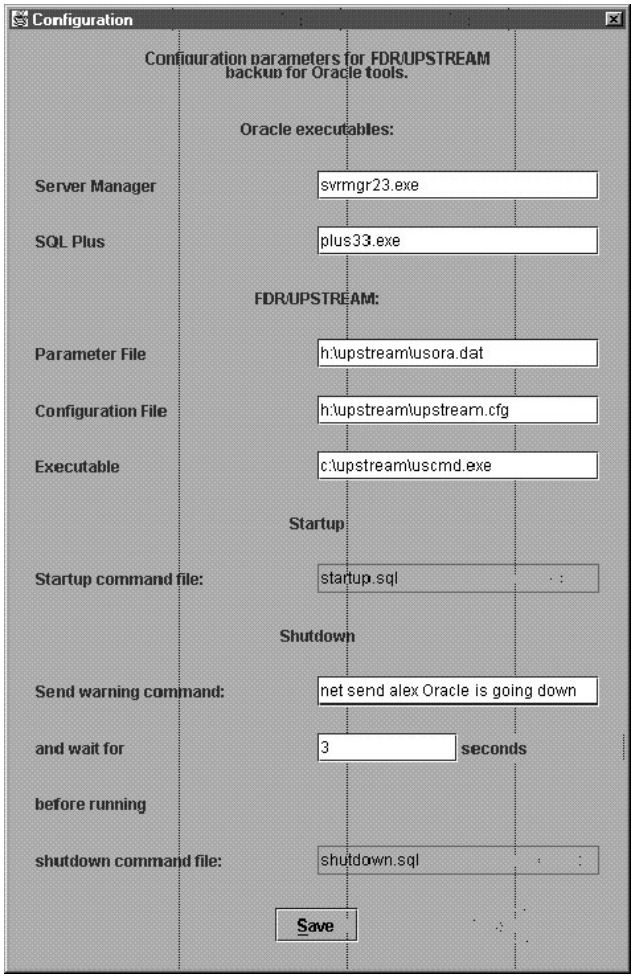
If connection is not successful, an error message window will pop up with the message from Oracle indicating the problem. Press the **Ok** button and change the connect values. The status line will read 'Connection test FAILED!' to remind you about the problem to fix.

If the attempt is successful, the dialog will go away and the status line will show 'Connection test succeeded'.

Information from this dialog is saved in the **connect.<ORACLE_SID>.dat** file in an encoded format and is used by all FDR/UPSTREAM Oracle Backup Management tools.

34.3.8 Configuration settings.

Pull down the **Configuration menu** and select **Create/Modify** to open the **Configuration** dialog. In this dialog you specify settings that all FDR/UPSTREAM Oracle Backup Management tools use.



You have to specify names for Oracle Server Manager and SQL Server tools. These names may differ from one version of Oracle to another. Always specify the full path to those programs.

Also we need to know the full path to the FDR/UPSTREAM template parameter file mentioned above, the full path to FDR/UPSTREAM configuration file, and the full name of the FDR/UPSTREAM executable file. We recommend that you specify **uscmd** so as not to have the overhead of the FDR/UPSTREAM user interface.

Pay attention to Startup and Shutdown sections. Specify the command to send a message before the database shuts down, and set the time it will wait after sending this warning message and before actually going into shutdown procedure.

Both Startup and Shutdown sections remind you to check and tune these files according to your needs:

- **startup.<ORACLE_SID>.sql** – the startup command for your database. USORBACK uses this command to start up the database if needed. If USORBACK starts the database for internal purposes (to obtain information about table spaces, data files or redo logs) it modifies the startup command provided with EXCLUSIVE option. The provided sample **startup.sql.sample** file contains the following command:

```
STARTUP
```

- **shutdown.<ORACLE_SID>.sql** – the shutdown command for your database. USORBACK uses this command to shut down the database for OFFLINE backups. The provided sample **shutdown.sql.sample** file contains the following command:

```
SHUTDOWN IMMEDIATE
```

- **OFFLINE.<ORACLE_SID>.CMD** – the command to send a message to all users that the Oracle database is going down (sample **OFFLINE.CMD.sample** file provided). Our USORBACK utility sends this message if you requested OFFLINE backup but the database is up at that time. The configuration parameter WAIT specifies the number of seconds USORBACK waits after issuing the message and before going into database shutdown procedure.

  For Windows NT you can use NET SEND command in format:

  ```
  NET SEND <name | * | /DOMAIN[:name] | /USERS> <message>
  ```

  For UNIX **OFFLINE.<ORACLE_SID>.CMD** you can use **wall** command:

  ```
  /etc/wall  -a <message>
  ```

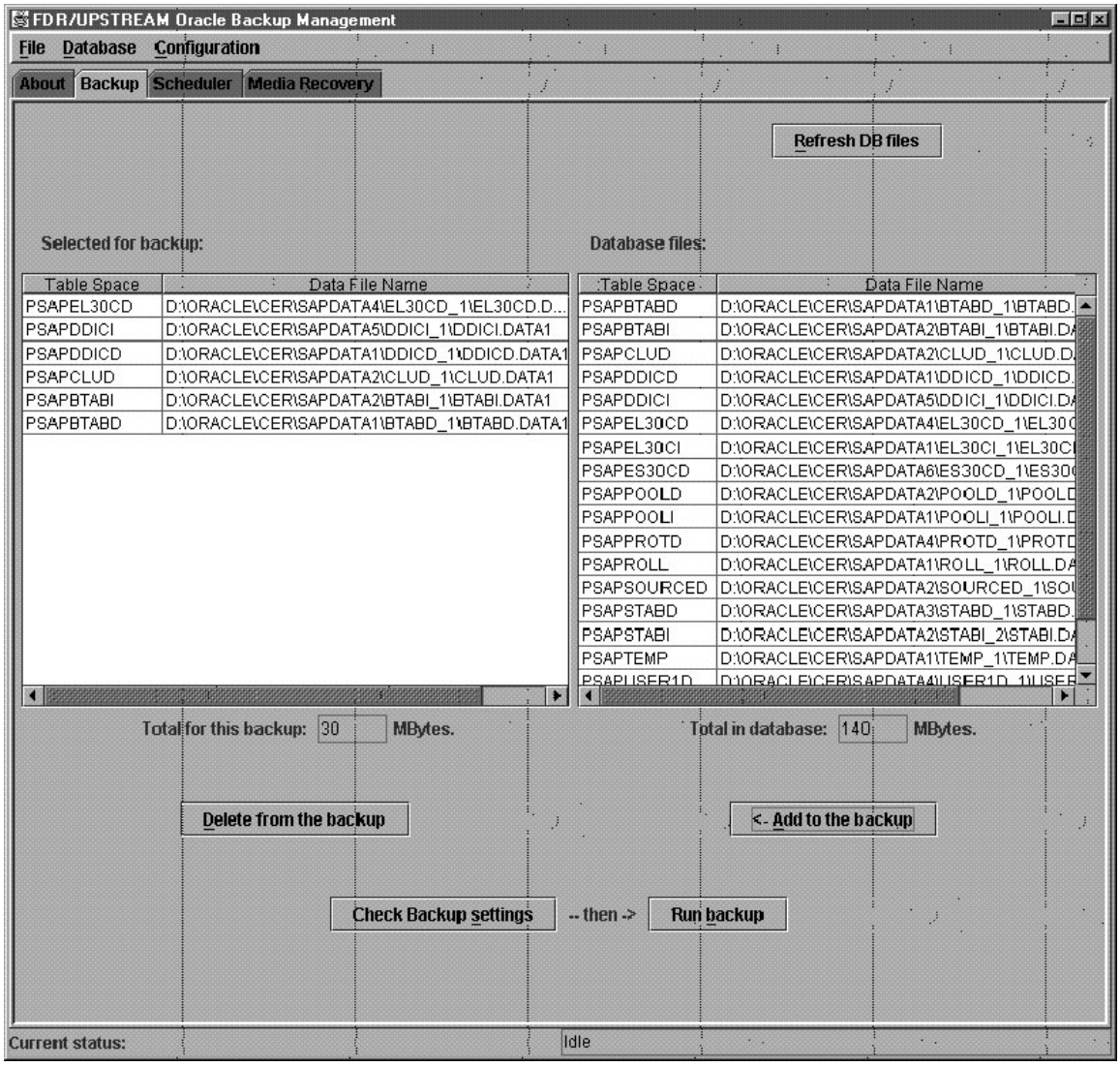
Press the **Save** button to create/modify the **usorback.<ORACLE_SID>.cfg** file with the new values. If some of the files specified do not exist or have no full path, you will get self-explanatory error messages.

34.3.9 Working with Oracle Backup Management Tool.

When the Backup Management workbook starts, the **About** tab is opened. It has the FDR/UPSTREAM logo and some additional information about the currently running version of Database Manager.

34.3.10 Database Backups.

Press the **Backup** tab to create and run Oracle database backups using FDR/UPSTREAM.

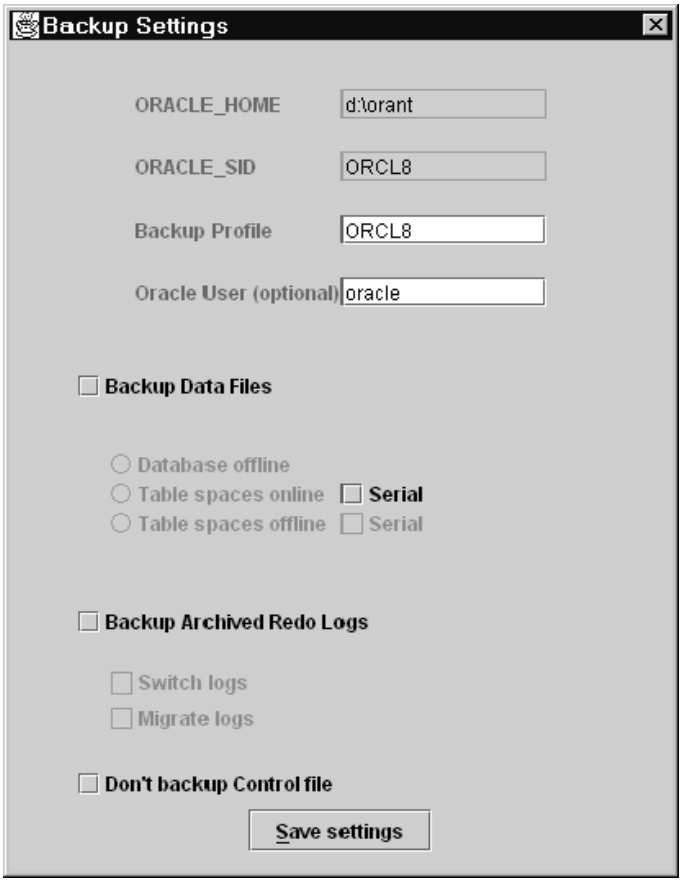


When you press the **Backup tab** the status line (at the bottom of the workbook) changes to 'Accessing database…' and Database Manager Tool opens the connection to Oracle database instance using setting from **DB Connection Parameters** dialog.

The table on the right side shows all the data files of your database, table spaces they belong to and their sizes. By highlighting rows in this table and clicking on **Add to the backup** button, you add the desired data files to the **Selected for backup** table, which keeps the list of all the data files included in the backup. **Total for this backup** counts the number of Mbytes selected for the backup.

If you wish to remove databases from a backup, highlight rows in **Selected for backup** table and click on **Remove from the backup** button.

After you finish creating the list of data files to back up, press the **Check Backup Settings** button. This will open the **Backup Settings** dialog.



This dialog allows you to specify the way database backup will be taken. Values for ORACLE_HOME and ORACLE_SID environment variables are displayed here for your reference. These values will be added to the backup script generated.

- **Backup Profile**. The UPSTREAM backup profile for these backups. The default is your ORACLE_SID environment variable value.

- **Oracle User (optional)**. Optional parameter, specifies UNIX user name in Oracle group to be used for database access. You should specify this name if root is not in your Oracle group. This parameter has no effect in Windows.

- **Backup Data Files**. Determines whether data files will be included in the backup. If you check this, you must specify how the data files will be backed up.

  - **Database offline. usorback** utility will shut down the database instance before going into backup (it will send the warning message and wait as defined in **Configuration** dialog), and then start up the database after the backup process is finished. Check and update **startup.<ORACLE_SID>.sql**, **shutdown.<ORACLE_SID>.sql** and **OFFLINE.<ORACLE_SID>.CMD** files (sample files **startup.sql.sample**, **shutdown.sql.sample** and **OFFLINE.<ORACLE_SID>.CMD** provided by installation) if you have special startup/shutdown requirements;

  - **Table spaces online**. **usorback** utility will put table spaces requested for the backup in BACKUP state before backing them up. After the backup is over, USORBACK will put them back into their normal state. While a table space is in BACKUP state, users can access it, but all the updates are recorded and kept only in the active redo logs. To reduce the stress on the redo logs you can check the **Serial**

checkbox. In this case **usorback** will switch table spaces to BACKUP state and back, on a file by file basis;

- **Table spaces offline**. **usorback** utility will put the table spaces requested for the backup offline before backing them up. After the backup process is over, **usorback** will put them back online. If the **Serial** checkbox is checked, an OFFLINE/ONLINE switch is performed on file-by-file basis minimizing the OFFLINE time for the table spaces scheduled for the backup.

If the table space is READ-ONLY or is in OFFLINE state, **usorback** will not attempt to change its state, but will back it up.

☐ **Backup Redo Logs** Check this box if you wish to include redo logs in your backup. In this case you will have additional options:

- **Switch logs** instructs **usorback** to switch redo logs before going into backup process;
- **Migrate logs** forces **usorback** to delete redo logs from your hard drive in case of a successful backup.

☐ **Don't backup Control File**. It is recommended that you keep a backup of the Oracle control file with every backup. Thus we recommend that you not check this box.

Press the **Save settings** button to save these values and close the dialog. These settings are stored in **usorback.<ORACLE_SID>.cfg** file in the current directory and are used by all the tools in the suite. The sample configuration file provided by installation is **usorback.cfg.sample.**

There are additional details about these parameters in the **usorback** section below.

Now you are ready to start the backup you defined. When you press the **Run backup** button, Backup Manager creates two files:

- **USORABKP.<ORACLE_SID>.CMD** Sets the environment variables for ORACLE_HOME and ORACLE_SID and calls **usorback** utility with all the parameters required.
- **USORABKP.<ORACLE_SID>.LST** with a list of data files to back up.

You can use these files as a reference for the backup. Then Backup Manager executes **USORABKP.<ORACLE_SID>.CMD** and opens the **Messages from the started program** window. Here you can watch the ongoing backup process.

Also you can see the **Cancel** window with a pumping red button. If you think that something is going wrong with the backup, click this button to interrupt the backup process. Be advised that in this case you will have to check/change the status of table spaces involved.

NOTE: If you click on Messages from the started program window, it may hide Cancel dialog. You can find it by moving Messages… window around.

The bottom **Current status** line will tell you whether the backup is still running.

Even though all the messages are logged in the **usorback.log** and **upstream.log** files, you have an option to save/append all the messages from **Messages …** windows to the log file of your choice using **Save to File…** and **Append to File…** buttons. Press the **Close** button to close **Messages from the started program** window. If you're planning to run another backup and keep messages, just move the **Messages…** window out of the way of the **Backup** frame, and specify and run a new backup. Messages from this new run will append to the previous ones.

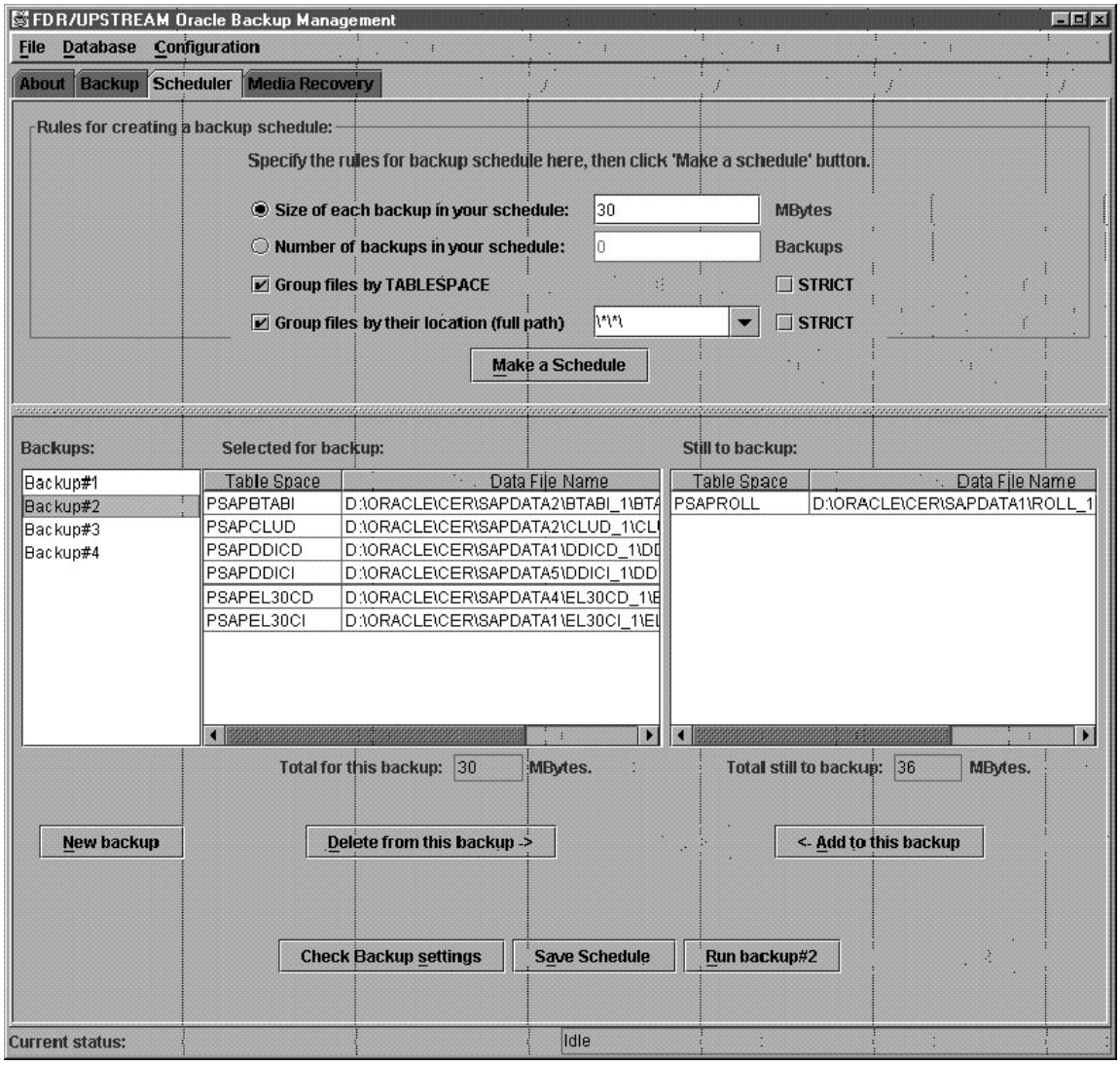
Between backups you can change your database connection by pulling down the **Database** menu, selecting **Connect parameters** and changing values in that dialog. Then press the **Refresh DB files** button to obtain the list of data files from the new database instance.

NOTE: Backup Manager will retain Backup settings from the previous run, so you have to press the Check Backup Settings button to review and set new backup parameters. It is always recommended having different backup profile names for different databases.

You can always check the last backup performed by this facility by reviewing **USORABKP.<ORACLE_SID>.CMD** and **USORABKP.<ORACLE_SID>.LST** files.

34.3.11 Creating a backup schedule.

Press the **Scheduler** tab to create a set of partial backups if your time table doesn't allow to take a full database backup at one time.



When you open the **Scheduler** folder, Database Manager attempts to read the existing schedule. If it doesn't exist (you run this facility for the first time, for example) the folder opens with default settings and empty tables.

The job of creating a database backup schedule consists of two parts. First of all configure the rules (constraints) for the partial backups to be created:

- **Size of each backup in your schedule** gives you an opportunity to limit the size (in Mbytes) of every individual partial backup.

- **Number of backups in your schedule** allows you to specify how many partial backups should cover the whole database.

- **Group files by TABLESPACE.** If you check this checkbox, the **usormgr** utility will try to keep data files from the same table space together in the backup; by checking **STRICT** you force it not to combine data files from different table spaces in one backup.

- **Group files by their location (full path).** If you check this checkbox, **usormgr** will try to keep together data files based on their location. Use the drop down box (or type in) the pattern to specify how many directory levels of data file full names (full paths) should match. Checking **STRICT** forces **usormgr** to put in one backup ONLY data files which have the same directory path of the length defined by the pattern.

Read more about the scheduler constraints in the **usormgr** section.

After the rules are defined, press the **Make a Schedule** button. It will save the scheduler rules (constraints) in **CONSTR.<ORACLE_SID>.DAT** file and start **usormgr** utility to build the backup schedule. As always, you can watch the progress and results in **Messages from the started program** window, you can stop the process using **Cancel** dialog; you can save the messages to the log of your own (even though they are logged to **usormgr.log**). At the bottom of the screen the **Current status** line tells you whether the **usormgr** is still running.

Unless there were major problems with **usormgr**, you will have tables in the lower part filled in.

You will have the list of created **Backups**, and for every highlighted backup from the list (just click on it) you will see the set of data files with the table spaces they belong to and their sizes under **Selected for backup**.

If there were data files which **usormgr** was not able to distribute based on the rules you defined earlier, they would appear in the **Still to backup** table.

Regardless of whether you have or don't have files in the **Still to backup** table, you can use the **Remove from this backup** and **Add to this backup** buttons to redistribute data files between backups. If you need, click on the **New backup** button to create a new initially empty backup.

Check Backup settings opens the same dialog as in the **Backup** folder. These settings apply to all backups in the list. If you want to change backup settings for some individual backups, highlight and right click on that backup under **Backups** and select **Change backup settings for the highlighted backup**. It will open **Backup Settings** dialog where you can make changes for this particular backup. Make sure that it shows the proper backup number. All your database backups are supposed to go to the same **Backup Profile**, that's why you are not allowed to change this field here.

If you right click the mouse on a backup, a menu pops up which allows you to choose **Add files to the highlighted backup** if you want to add some non-database files to this particular backup.

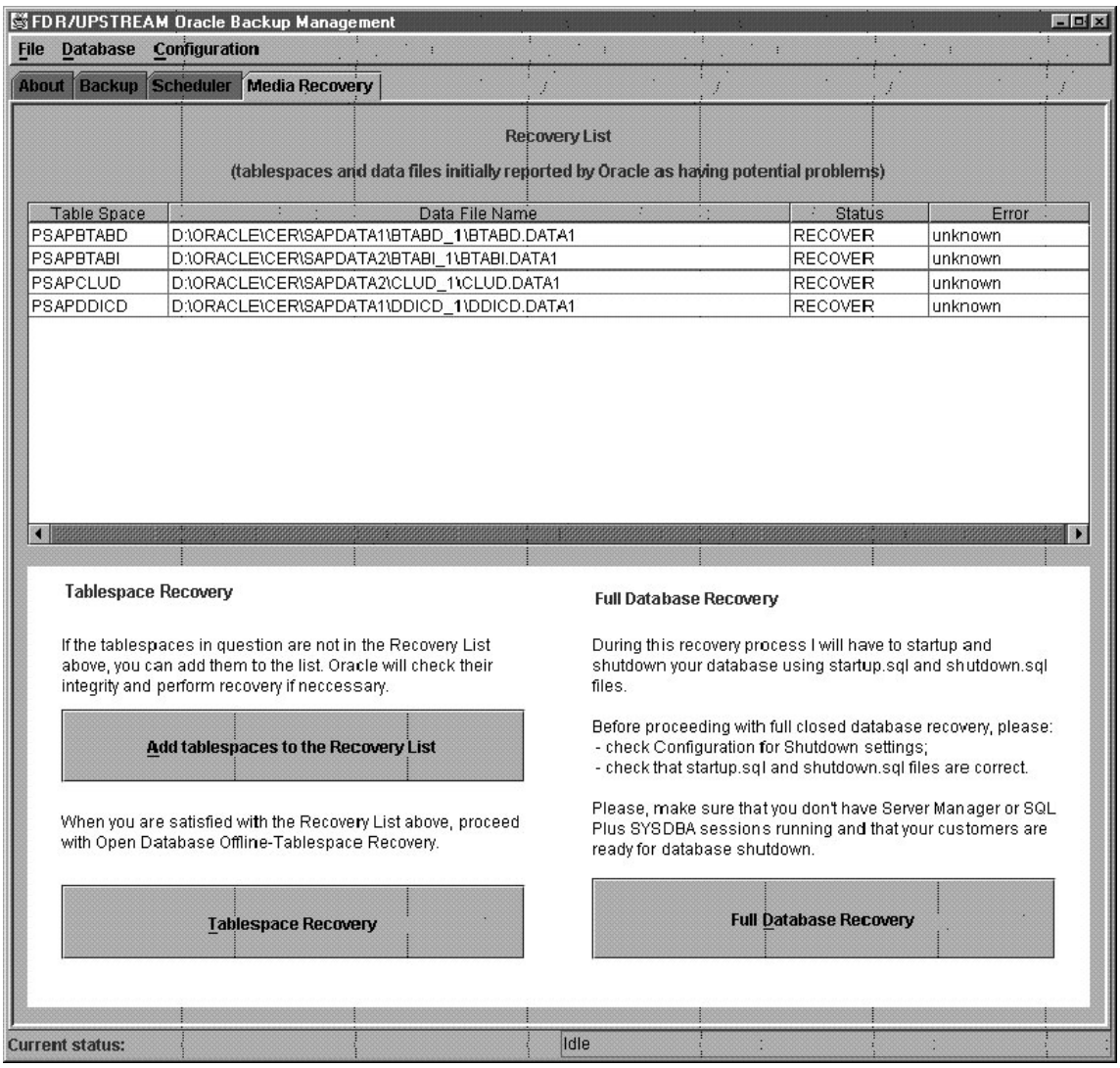
After you finish configuring your database backup schedule, press the **Save Schedule** button. This will create a set of file pairs in the current directory: **USORA_xx.<ORACLE_SID>.CMD** and **USORA_xx.<ORACLE_SID>.LST**, where **xx** is the backup number these files constitute. The **CMD** files are the command files that start **usorback** with the appropriate set of parameters and a reference to the **LST** file with the list of data files to backup.

Now you can schedule submission of these command files by specifying /R[un] switch for **usormgr** utility, use Run Job facility of FDR/UPSTREAM, or use your favorite scheduler.

You can also start the backups created by clicking on **Run Backup#n** button. In this case Backup Manager will start the **usorback** utility from the appropriate **CMD** file and open **Messages…** dialog to show the backup progress.

34.3.12 Performing a database media recovery.

If you experience data media problems, or your data files became corrupted by any other hardware/software failure, press the **Media Recovery** tab.



The Recovery List displays the tablespaces and datafiles which are considered by Oracle to have potential problems or are manually added by you.

While opening the **Media Recovery** folder, The Backup Manager will try to access your database to retrieve information about potentially problem data files from the V$RECOVER_FILE view. Your database instance has to be started, but not necessarily mounted or opened to have access to these views.

If you want to exclude data files from the list, highlight them and right click on the **Recovery List** table and choose **Remove highlighted files**.

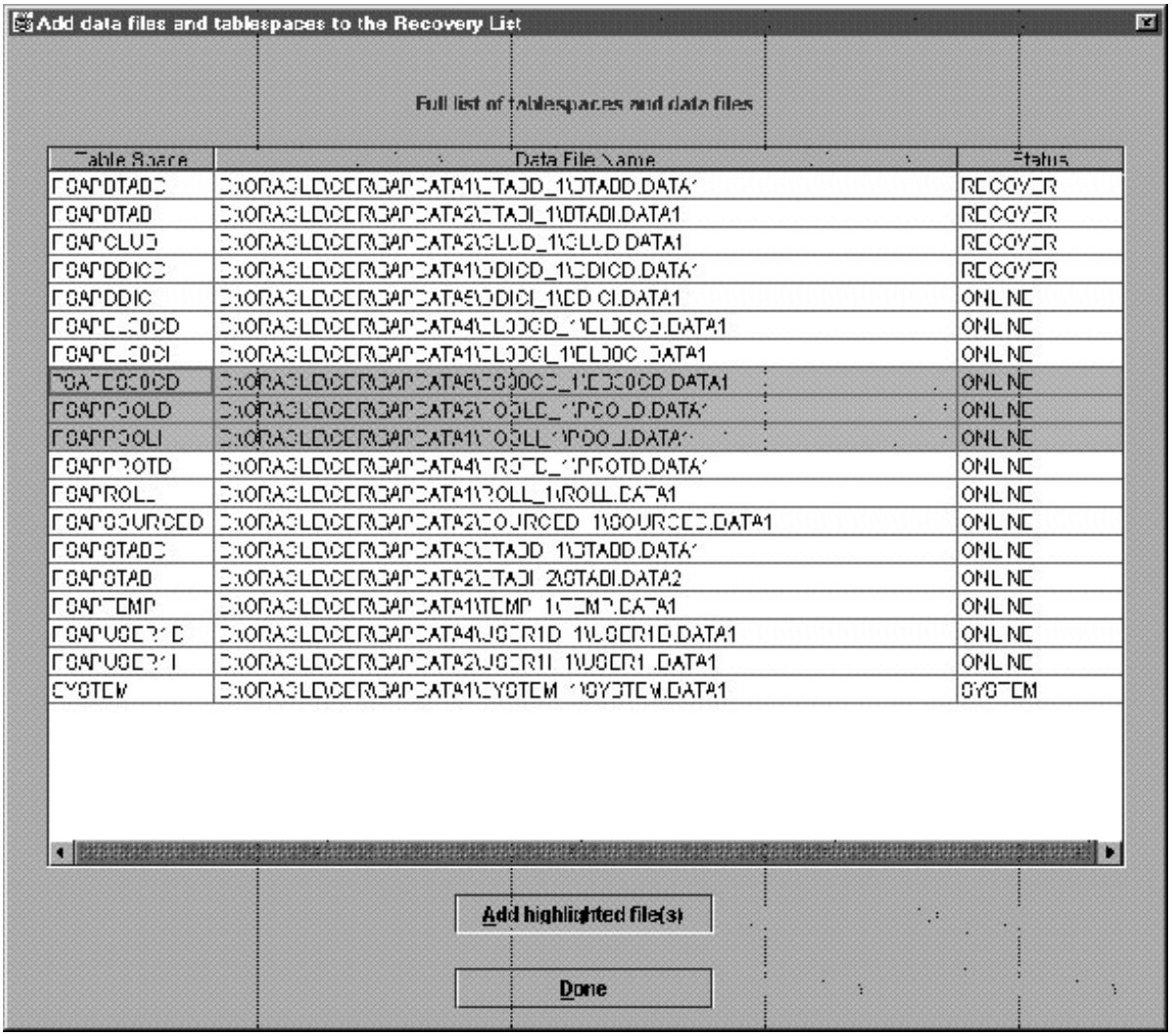
Depending on the condition of your database and information in the Recovery list, you have to choose between Tablespace and Full Database recovery.

34.3.13 Open Database Offline-Tablespace Recovery.

These methods apply only to databases running in ARCHIVE log mode. If your database is running in NOARCHIVELOG mode, go to the Full Recovery scenario.

If your database is operational and you have problems only with some of the tablespaces, proceed with Tablespace recovery (this section), so your users can still work with the undamaged part the database.

To add tables to the Recovery List, from the Media Recovery tab, press the **Add Tablespaces to the Recovery List** button.

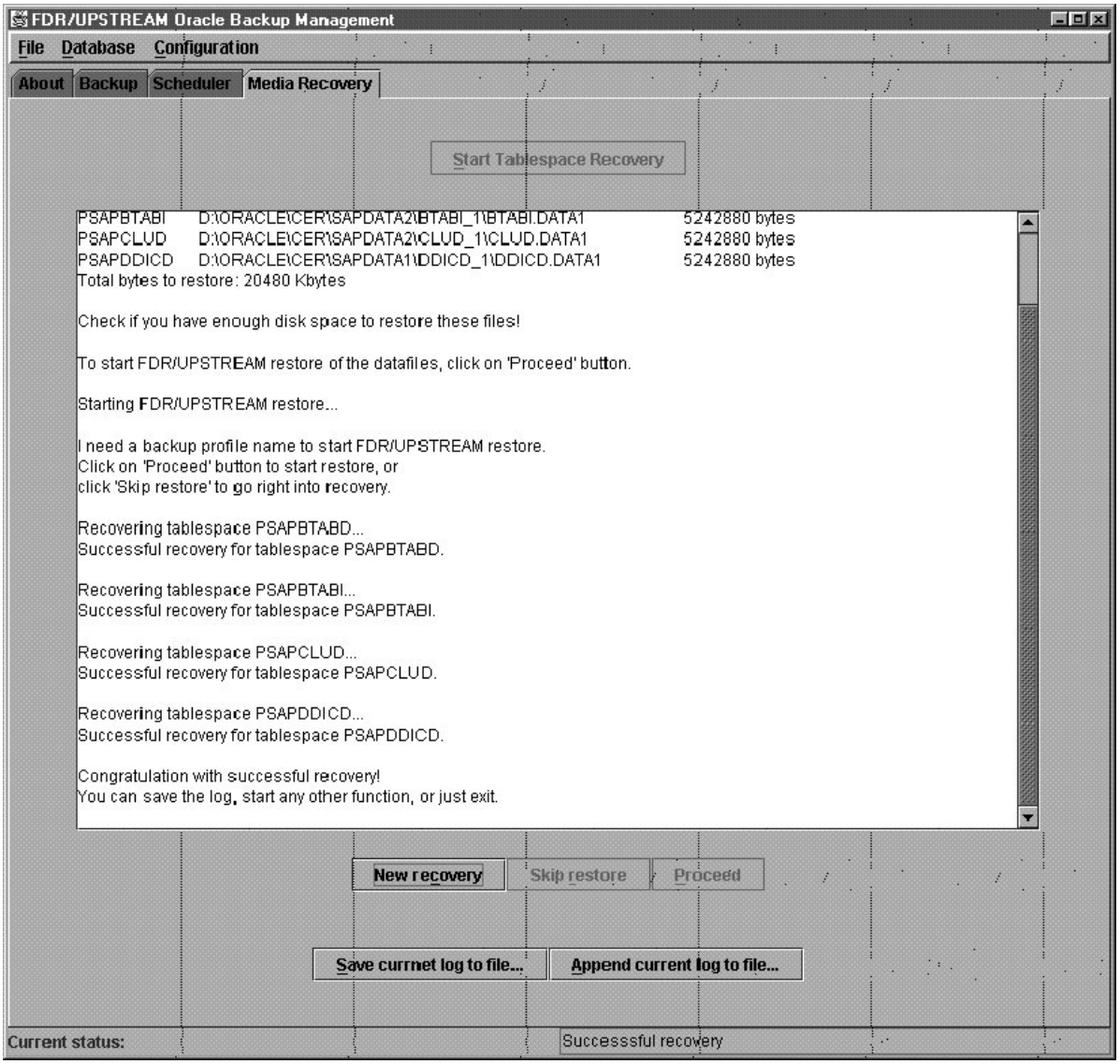


Highlight files you want to include in the recovery list and press the **Add Highlighted file(s)** button. After you finish with the selection, click on **Done** button. Check the **Recovery List** to be sure that is has all the tablespaces and data files you want to recover.

After you assembled the list which looks right for you, click on **Tablespace Recovery** button to start the recovery process.

Now you have the last chance to leave your database intact by recovery process and return back to the previous view by clicking the **Cancel** button. The **Cancel** button will remain active during the whole process, so you will be able to stop it at any time, but you will most likely have to make manual database changes to have selected tablespaces operational again.

To start the recovery process press the **Start Tablespace Recovery** button.



Only OFFLINE tablespaces can be recovered, so if some of the tablespaces you selected for recovery are still ONLINE, you will be asked if you want to switch them OFFLINE. If you choose not to switch the tablespace OFFLINE, it will be excluded from the recovery process.

You will be presented with the list of the data files to restore. If you want to try recovery without restoring data files, press the **Skip restore** button. If you press the **Proceed** button, FDR/UPSTREAM will restore data files in the list from the most recent available backup of those files. To be able to access backup of those files you will be prompted for the backup profile name of the backup. The default is the current ORACLE_SID value.

If for some reason the restore process failed for any of the files to be restored, you will have an option either to fix the problem (configuration parameter errors, mainframe FDR/UPSTREAM connection problems, etc.) and start the restore again – (by pressing the **Retry** button), or skip the restore operation and try to recover anyway (by pressing the **Proceed** button).

During recovery Oracle may figure out that it needs some archived redo logs to apply to tables in recovery which are missing, because you migrated them out. If you backed up archived redo logs using FDR/UPSTREAM (by means of Backup Manager, **usorback** utility, or any other way) press the **Proceed** button. If you used other tools to migrate redo logs, use them to return the required for recovery redo logs in the list back, and when you are done, press the **I am ready** button.

After redo logs are back, the recovery process will be started again.

This recovery with request for additional redo logs loop may repeat a number of times.

After all the redo logs are applied and all the requested tablespaces recovered, you will get 'Congratulations with successful recovery' message and the status line will read 'Successful recovery'.

Recovered tablespaces that were ONLINE before we started the recovery will be automatically put ONLINE at the end of the recovery. If some of the tablespaces were OFFLINE when we started their recovery, you will be prompted for each such tablespace whether you want to have it ONLINE, or leave OFFLINE.

At the end you should save/append the current log messages to the log file of your choice using the **Save current log to file…** or **Append current log to file…** buttons.

WARNING: We do not log these messages to any default log file, so you will lose this log if you do not save it here!

34.3.14 Full closed database recovery.

If your database is so damaged, that it is not possible to open it, use this scenario.

During full closed database recovery your database will need to be shutdown and started several times. Oracle's Server Manager will be run using the **startup.<ORACLE_SID>.sql** and **shutdown.<ORACLE_SID>.sql** scripts. If you have additional parameters in your regular startup or shutdown procedures, please apply them to the default **startup.<ORACLE_SID>.sql** and **shutdown.<ORACLE_SID>.sql** scripts supplied during installation.

If your database is down you will be prompted to indicate whether you are running in ARCHIVE or NOARCHIVE log mode.

For NOARCHIVE log mode the only possible way to recover a database is to restore the most recent full backup, and then apply all the changes made since that backup was taken.

If your database is running in ARCHIVE log mode, you are able to perform a full up to date recovery if all the necessary archived redo logs are available.

First of all, information about damaged data files and redo logs required for full recovery using will be obtained from the V$RECOVER_FILE and V$RECOVERY_LOG views. If this information is not immediately available, your database will be shutdown start up with OPEN RECOVERY option.

If the result is successful recovery, you will get a message 'Congratulation with successful recovery' and the status line will read 'Successful recovery'. The last thing to do will be to restart and open your database in a regular way. You will be prompted to restart the database using the **startup.<ORACLE_SID>.sql** script, or you can opt to do it manually.

If the recovery attempt was not successful, Oracle records information about damaged files and archived redo logs in V$RECOVER_FILE and V$RECOVERY_LOG views.

After obtaining this information you will be asked for the backup profile name to perform the FDR/UPSTREAM restore for those files, and then the recovery attempt will be repeated.

You will be prompted before going into every step of this recovery procedure, so you can prepare resources (disk space to restore files to, tapes with the backup, etc.). If FDR/UPSTREAM restore fails for any of the files to be restored, you have an option to either rerun the restore (after changing configuration settings, backup profile name, fixing connectivity problems, etc.), or try to perform the recovery from the current state.

The restore – recovery – restore loop may repeat a number of times until all the damaged files and redo logs are successfully restored and applied for the full database recovery to succeed. At that time you will be greeted with 'Congratulations with successful recovery' message and status line will read 'Successful recovery'. After that you'll be prompted whether to automatically restart the database in a regular way using **startup.<ORACLE_SID>.sql** or you can restart it later manually.

At the end you should save/append the current log messages to the log file of your choice using the **Save current log to file…** or **Append current log to file…** buttons.

WARNING: We do not log these messages to any default log file, so you will lose this log if you do not save it here!

34.3.15 Command Line Utilities Introduction

The UPSTREAM Oracle Backup Management Suite uses a number of command line utilities for its various functions:

- USORMGR: Command line utility to create and/or run schedules.
- USORBACK: Command line utility for backups.
- USORREST: Assists GUI in recovery operations.
- CONNSTR: Creates database connection string.

You need to schedule USORMGR or USORBACK via host jobs or local time scheduling (such as cron) for backups to occur.

All command line utilities require an **usorback.<ORACLE_SID>.cfg** file be created by the java GUI or manually from the provided **usorback.cfg.sample** file.

The format for **usorback.<ORACLE_SID>.cfg** is:

- ☐ **SVRMGR=** The name of the command line version of Oracle server manager. The default for UNIX platforms is **svrmgrl**, for Windows NT differs depending on the Oracle version, but usually has a **svrmgr**xx format where xx is it's own version number (in Oracle8.1 is finally called **svrmgrl**). Always specify the full path.

- **SQLPLUS=** The name of the command line version of SQL Plus utility. The default for UNIX platforms is **sqlplus**, for Windows NT it differs depending on the Oracle version, but usually has **plus**xx format (in Oracle8.1is finally called **sqlplus**). Always specify the full path.

- **UPSTREAM=** The full path to FDR/UPSTREAM command line executable. This is the required parameter.

- **CONFIGFILE=** The full path to the FDR/UPSTREAM configuration file. This is the required parameter.

- **PARAMETER=** The full path to the template FDR/UPSTREAM parameter file. This is the required parameter.

- **WAIT=** The interval in seconds between sending a warning message that Oracle database is going down and the start of database shutdown process. The default value is 60 seconds. The command sending warning message should be placed in the file **OFFLINE.<ORACLE_SID>.CMD**, like **net send** command (Windows NT) or **wall** (for UNIX) or any other applicable command(s) that will send the warning message to Oracle users indicating that the database is going down.

- **PIPE=** Optional (internal) parameter. Specifies the name for the status named pipe to FDR/UPSTREAM.

34.3.16 Scheduling utility (USORMGR).

The main purpose of the USORMGR command line utility is to create a backup schedule for your database: a set of command files and data file lists. Each command file in the set calls USORBACK utility with the appropriate set of parameters and a reference to a data file list to perform the database backup.

After the set is created, you can run scheduled backups in a number of different ways:

- use USORMGR /R format. In this case USORMGR will run command files from the schedule (one per call) starting with the first one. After going through the whole list it will start from the beginning again, and so on;
- use FDR/UPSTREAM 'Run Job' facility to run USORMGR /R ;
- use FDR/UPSTREAM 'Run Job' facility to run a specific command file from the schedule;
- use your favorite scheduler to run command files from the schedule.

USORMGR full command line format (all options must be on a single line):

```
USORMGR  /S[chedule] | /D[ynamic] | /R[un]
 CONSTR=<file_name0>

[ ORACLE_USER=<user-name>]
[ /BATCH]
[ /TRACE]
[ PROFILE=<name>]
[ TYPE=OFFLINE | FILE_OFFLINE[_SERIAL] | FILE_ONLINE[_SERIAL]]
[ REDO=NONE | ONLINE | [SWITCH_]SAVE | MIGRATE]
[ /NO_CONTROL_FILE]
[ NDBFILES=@<file_name3>]
[ CONFIG=<file_name4>]
[ JAVA]
[ /Q]
```

The parameters are:

- **/S**[chedule] | **/D**[ynamic] | **/R**[un]. Type of action:

- **/S**[chedule]. Schedule a set of backups based on constrains defined;
- **/D**[ynamic] - create a new dynamic backup based on the set of files been backed up and the current constrains defined;
- **/R**[un] - run the next backup from the set previously created in schedule mode.

☐ **/BATCH**. Forces USORMGR to run in a batch mode, so it doesn't place any messages to the console, and fails if interaction required. All the messages are logged as usual in the **usorback.log** file.

☐ **/TRACE**. Enables tracing for debugging purposes.

☐ **/JAVA**. Indicates that the scheduler was called from the Backup Manager (Java GUI). In this case PROFILE and TYPE parameters are not required, and it runs without user interaction, like in BATCH mode, but with full console output, which is intercepted by Backup Manager.

☐ **CONSTR = <file_name>**. The file name for the set of constraints to use when grouping database files into backup sets.

There are four types of constraints you can define in the file specified by the CONSTR parameter:

- **SIZE = x…xM/G.** Specifies the size if each incremental backup in either megabytes (x…xM) or gigabytes (x…xG). Exclusive with the PERIOD constraint.
- **PERIOD =** nn. Number of incremental backups in the full set required to backup all the data files in the database. Exclusive with the SIZE constraint.
- **FILES =** [/ | \ * [/ | *[…]]]. The directory pattern for data files to be backed up together. Files with the same directory structure of the specified number of directory levels will be placed into the same incremental backup set first. Use the appropriate for your platform name separator.
- **BY_TABLESPACE**. This parameter forces USORMGR to place data files from the same table space into one incremental backup set first.
- **STRICT** If you add this keyword to FILES=… or BY_TABLESPACE constraint, USORMGR will not mix files from different table spaces or with different directory structure (within the levels defined in FILES) into the same incremental backup set.

It is not necessary to specify more than one constrains. If more than one constraint specified USORMGR attempts to create incremental backup sets with files compliant with all constraints specified.

If this parameter is not specified the file **constr.<ORACLE_SID>.dat**, or, if it is not present and for compatibility with previous versions, **constr.dat** is used as a default

☐ **ORACLE_USER=<user-name>** Optional parameter, specifies UNIX user name in Oracle group to be used for database access. You should specify this name if root is not in Oracle group. This parameter has no effect in Windows.

The rest of the parameters are USORBACK parameters, and defined with USORBACK command line format. These parameters are used to create USORBACK command files. See section 34.3.17, 35.3.17 on page 34-56 for the description of the USORBACK parameters.

If running in a schedule mode, USORMGR creates two sets of files:

- **USORA_NN.<ORACLE_SID>.LST** - data file lists for incremental backups;
- **USORA_NN.<ORACLE_SID>.CMD** - command files with the call for USORBACK with the DBFILES parameter referencing the appropriate data file list

(**USORA_NN.<ORACLE_SID>.DAT**) and all the rest of USORBACK parameters specified at start up.

When running with **/R** switch, USORMGR keeps track of the command files run by changing the name of the command file it is about to run to **USORARNN.<ORACLE_SID>.CMD**. Next time USORMGR /R is called, it finds the **USORAR*.<ORACLE_SID>CMD** file renames it back to its original name, then finds the next command file, renames it to **USORARNN.<ORACLE_SID>.CMD** format and runs it. So, between runs, you have only one file with the name format **USORARNN.<ORACLE_SID>.CMD**, and that's the last command file ran by USORMGR.

This method works only if you have a stable database environment, when the set of table spaces and data files doesn't change, and sizes of the data files do not increase or decrease too much. If you have a constantly changing database, you should consider the dynamic mode.

When run in the dynamic mode, USORMGR analyzes the size and structure of the database each time it runs. It also keeps track of the data files it already backed up by creating the same pairs of **USORA_NN.<ORACLE_SID>.LST** and **USORA_NN.<ORACLE_SID>.CMD** files. So, when USORMGR called in dynamic mode, it obtains information about the database, rules out all the data files been backed up before, and then created a new **USORA_NN.<ORACLE_SID>.LST** and **USORA_NN.<ORACLE_SID>.CMD** file based on backup constrains defined, and runs this newly created backup.

When USORMGR in dynamic mode realizes that all the data files in your database have already been backed up by previous runs, it logs an information message, wipes out all the previous command and data files lists (files **USORA_NN.<ORACLE_SID>.LST** and **USORA_NN.<ORACLE_SID>.CMD**), and starts the new cycle again.

34.3.17 Backup utility (USORBACK).

The purpose of USORBACK command line utility is to run a database backup based on the specified parameters by calling FDR/UPSTREAM.

USORBACK full command line format:

```
USORBACK [PROFILE=<name>]

[ ORACLE_USER=<user-name>]
[ TYPE=OFFLINE | FILE_OFFLINE[_SERIAL] | FILE_ONLINE[_SERIAL]]
[ TABLES=NONE | ALL | @<file_name1>]
[ DBFILES=@<file name2>]
[ DBLIST=@<file_name3>]
[ REDO=NONE  | ONLINE  |  [SWITCH_]SAVE | MIGRATE]
[ /NO_CONTROL_FILE]
[ NDBFILES=@<file_name3>]
[ CONFIG=<file_name4>]
[ /Q]]
[ /TRACE]
```

The USORBACK parameters are:

- **PROFILE=**<name> Optional parameter. Specifies the backup profile name for the database backup. If not specified, USORBACK uses the currently active Oracle database instance name from environment variable ORACLE_SID.

- **ORACLE_USER=<user-name>** Optional parameter, specifies UNIX user name in Oracle group to be used for database access. You should specify this name if root is not in Oracle group. This parameter has no effect in Windows.

- **TYPE=** Optional parameter, specifies the type of the database backup. You must specify TYPE if you requested data file backup by specifying TABLES, DBFILES or DBLIST parameters.
  - **OFFLINE** USORBACK will shutdown the database before backing up the requested data files.
  - **FILE_OFFLINE[_SERIAL]** USORBACK will put the table spaces requested for the backup offline before backing them up. After the backup process is over, USORBACK will put them back online. If the **_SERIAL** suffix is specified the OFFLINE/ONLINE switch is performed on a file-by-file basis minimizing the OFFLINE time for the table spaces scheduled for the backup.
  - **FILE_ONLINE[_SERIAL]** USORBACK will put table spaces requested for the backup in BACKUP state before backing them up. After the backup is over, USORBACK will return them back. While a table space is in BACKUP state, users can access it, but all the updates are recorded in the active redo logs only. To reduce the stress on redo logs you can use the **_SERIAL** suffix. In this case USORBACK will switch table spaces to BACKUP state and back on a file-by-file basis.

- **TABLES=** Optional parameter, specifies a file which contains the set of table spaces to back up:
  - **ALL** USORBACK will backup all the data files in your database.
  - **@file_name** USORBACK will read the list of table spaces to back up from the file specified. The list of table spaces in the file may consist of more than one line, use either spaces or commas as separators. USORBACK uses **sys.dba_data_files** view to obtain the data file names associated with the specified table spaces.
  - **NONE** The default value.

- **DBFILES=@<file_name>** Optional parameter, specifies the file with the list of database data files to back up. The list may consist of more than one line, use spaces or commas as separators. All the file names must be fully qualified. USORBACK uses **sys.dba_data_files** view to retrieve the list of table spaces to which data files belong.

- **DBLIST=@<file name>** Optional parameter, specifies the file with the list of database and non database files to back up. Each line specifies one file and has three fields delimited by a space: table space name, file name, size in Mbytes. The DBLIST parameter and the list is usually created by the Scheduler. Note that the non-datafiles has **~US#ADDFILE!** instead of a tablespace name.

- **REDO=** Optional parameter, specifies whether USORBACK should backup archived redo logs.
  - **SAVE | MIGRATE** Instructs USORBACK to backup offline redo logs. If MIGRATE specified, the offline redo logs will be deleted after successful backup (not by UPSTREAM, but by USORBACK itself).

    SWITCH_ prefix to the **SAVE** or **MIGRATE** modifiers instructs USORBACK to switch the current redo log before starting the database backup.

    For example, to have the redo logs switched and saved, specify **REDO=SWITCH_SAVE**.
  - **ONLINE** Instructs USORBACK to backup online redo logs if you are doing database offline backup.
  - **NONE** Do not backup redo log files. The default value.

- **/NO_CONTROL_FILE** This switch instructs USORBACK not to backup the database control file. As a default the Oracle control file is being backed up every time you specify data files backup. If you are doing database offline backup, all the copies of your control file are backed up from their original locations, so during restore operation you have to decide either to restore them to the location they used to be at the backup time or to specify the different destination (and proceed with recovery operations from there). You can also choose not to restore old control files. In

case of database online backups the control file is copied using Oracle ALTER DATABASE BACKUP CONTROL FILE command to the working directory and is backed up from that location (recorded in the USORBACK log file). Depending on your recovery scenario, you can either specify the proper destination in FDR/UPSTREAM restore job, or let FDR/UPSTREAM restore the old control file to the working directory and then copy it to the proper location later.

- **NDBFILES=@<file_name>** Optional parameter, specifies the file name for the list of non-database files you may want to backup together with the database backup. The list may consist of more than one line, use spaces or commas as delimiters. All the file names must be fully qualified.

- **CONFIG=<config_file>** Optional parameter. Specifies the file with USORBACK configuration parameters. If not specified, USORBACK uses the default file **usorback.<ORACLE_SID>.cfg** in the current directory. If this file is not present, for compatibility with the previous versions, USORBACK will use **usorback.cfg** file.

- **/Q** Optional switch. Quiet mode. If specified suppresses all the output from USORBACK to the console. USORBACK doesn't require any operator intervention or responses, so if you do not want it to send any messages to the console, specify /Q switch. USORBACK still logs all the messages in **usorback.log** file.

- **/TRACE** Optional switch. Forces USORBACK to record a trace file, **usorback.trc** for debugging purposes.

Additional files required for USORBACK, database offline backups:

- **startup.<ORACLE_SID>.sql** – the startup command for your database. USORBACK uses this command to start up the database if needed. If USORBACK starts the database for internal purposes (to obtain information about table spaces, data files or redo logs) it modifies the startup command provided with EXCLUSIVE option. The provided sample **startup.sql.sample** file contains the following command:

```
STARTUP
```

- **shutdown.<ORACLE_SID>.sql** – the shutdown command for your database. USORBACK uses this command to shut down the database for OFFLINE backups. The provided sample **shutdown.sql.sample** file contains the following command:

```
SHUTDOWN IMMEDIATE
```

- **OFFLINE.<ORACLE_SID>.CMD** – the command to send a message to all users that the Oracle database is going down (sample **OFFLINE.CMD.sample** file provided). USORBACK sends this message if you requested OFFLINE backup but the database is up at that time. The configuration parameter WAIT specifies the number of seconds USORBACK waits after issuing the message and before going into database shutdown procedure.

For Windows NT you can use NET SEND command in format:

```
NET SEND <name | * | /DOMAIN[:name] | /USERS> <message>
```

For UNIX **OFFLINE.<ORACLE_SID>.CMD** you can use **wall** command:

```
/etc/wall  -a <message>
```

34.3.18 Restore utility (USORREST).

The purpose of USOREST utility is to restore the list of files specified by calling FDR/UPSTREAM.

The USORREST full command line format is:

USORBACK [PROFILE=<name>[,]]
[FILES=@<file_name>[,]]
[CONFIG=<config_file[,]]

[/TRACE]
[/Q]

The USORREST parameters are:

- **PROFILE=** Optional parameter. Specifies the backup profile name for the database backup. If not specified, USORBACK uses the currently active Oracle database instance name from environment variable ORACLE_SID.

- **FILES=@<file_name>** Required parameter, specifies the file name for the list of files you want to restore. The list may consist of one or more lines. Each line should specify a file name to restore in double quotes and an optional new name under which to restore this file in double quotes too. All the file names must be fully qualified.

- **CONFIG=<config_file>** Optional parameter. Specifies the file with USORBACK configuration parameters. If not specified, USORREST uses the default file **usorback.<ORACLE_SID>.cfg** in the current directory. If this file is not present, and for compatibility with the previous versions, USORREST will use **usorback.cfg** file.

- **/Q** Optional switch; quiet mode. If specified suppresses all the output from USORREST to the console. USORREST doesn't require any operator intervention or responses, so if you do not want it to send any messages to the console, specify /Q switch. USORBACK still logs all the messages in **usorrest.log** file.

- **/TRACE** Optional switch. Forces USORBACK to record a trace file **usorback.trc** for debugging purposes.

USORREST doesn't interact with the Oracle database. It calls FDR/UPSTREAM to restore files specified, checks the results and logs the results to the **usorrest.log** file. USORREST is usually called by Backup Manager during recovery operations.

34.3.19 Database connect parameters (CONNSTR).

Use this utility to set the Oracle user ID/password for your database when you intend to use the command line USORBACK or USORMGR utilities outside the GUI interface. This information is stored in the **connect.<ORACLE_SID>.dat** file in an encoded format. Information in this file is shared with the Backup Management tool, so you can access and change connect parameters either way.

You must be logged on as a UNIX or PC user which is setup with the Oracle environment. This user will need permission to write to your UPSTREAM directory.

34.3.20 Additional considerations for using command line utilities.

Backup profile name.

The main identifier of the backup is its backup profile name. You have to pay attention to how it is used with your **usorback** backups. **usorback** tries to obtain the backup profile name for the current backup from the PROFILE parameter. If it is not specified, **usorback** gets the value of environment variable ORACLE_SID and makes it your backup profile name. If this environment variable is not defined or this name is not valid for the backup profile name, USORBACK exits without doing a backup.

If you are planning to have different backups for the same database (data files and redo logs, for example) and want to keep them separate, you have to explicitly specify the PROFILE parameter.

Supported backup types.

OFFLINE backups.

If your database happened to be OFFLINE USORBACK will start the database (in EXCLUSIVE mode) to obtain information about data files and table spaces. After that USORBACK will shutdown the database (using **shutdown.<ORACLE_SID>.sql**) and proceed with the backup. If at the time you started USORBACK the database was up, it starts it up after the backup is done using the **startup.<ORACLE_SID>.sql** provided.

ONLINE backups.

USORBACK supports two types of ONLINE database backups:

- OFFLINE table space backups. USORBACK changes the state for all the table spaces you specified (directly - using the TABLES parameter, or indirectly - using the DBFILES parameter) to OFFLINE before going into backup, and changes it back to ONLINE after the backup is complete. To reduce the OFFLINE time for the table spaces you can specify _SERIAL option. In this case USORBACK changes the state of the table space to OFFLINE before starting the backup of the file(s) for this particular table space, and returns it back ONLINE right after the backup of the file(s) for this table space is finished.
- ONLINE table space backups. USORBACK changes the state of all the table spaces you specified for backup (directly or indirectly) to BACKUP before going into backup, and returns them back after the backup is complete. All the tables are still accessible during the backup, but it puts a lot of stress on redo logs, because all the changes to those tables go to the logs. To reduce this stress you can specify _SERIAL option. In this case USORBACK keeps table space in BACKUP state only for the time while it backs up the data file(s) for that table space.

Control file backup.

If you don't specify /NO_CONTROL_FILE switch USORBACK takes control file backup when you specify data file backup. In case of a database ONLINE backup USORBACK uses the Server Manager command:

```
ALTER DATABASE BACKUP CONTROL FILE TO <file_name>
```

to backup the control file to the directory it was started from, and then back it up from there.

In case of a database OFFLINE backup, USORBACK backs up ORACLE control files from their original locations.

Redo log backups.

You can take archived redo log backup together with the data file backup or as a separate backup.

If you specify SWITCH_ option USORBACK will switch the current log file before starting the backup.

All the files in the archive log location with the names following the format for archive logs are included in the backup.

If you specify MIGRATE instead of SAVE, USORBACK deletes those backed up files if the backup was successful.

If you are doing database OFFLINE backup you have an option to backup online redo logs by specifying REDO=ONLINE.

Non-database files backup.

You can include additional non-database files in the same backup. Specify the list of these files in the NDBFILES parameter. The list must consist of fully qualified file names without wildcards.

34.3.21 Automation of Oracle Database Backups.

There are two steps you can take to automate Oracle backups using FDR/UPSTREAM Oracle Backup tools.

The **first step** is to create script(s) with the call(s) to **usorback** utility with the required set of parameters and a list of data files or table space names. We strongly recommend to use GUI interface or USORMGR utility to create these scripts with the right set of parameters. After the script(s) are created you can either start them manually, or use any available scheduler to start them at the desired time.

- **For UNIX customers:** The **usorback** and **usorrest** utilities are shipped with the set-user-id and set-group-id bits on and must be owned by **root**. This allows them to work properly with FDR/UPSTREAM when started by a scheduler or using the FDR/UPSTREAM Run Job facility. If you experience problems with **usorback** not being able to work with Oracle (Server Manager reports authentication errors) make sure that ORACLE_USER parameter on the command line specifies a member of the Oracle **dba** group (check your **/etc/group** file).
  In some installations the default name of the Oracle DBA group may differ from the default **dba** name. Obtain the correct Oracle DBA group name from your Oracle database administrator.

- **For Windows NT customers:** The user who runs the backup/restore scripts must be a member of the ORA_DBA group. If you are planning to run FDR/UPSTREAM or the FDR/UPSTREAM Attach Manager as a service, we recommend adding the account under which the service is running to ORA_DBA group. See the *Transaction Program Definition for a Service* section in the *32-bit Windows* chapter for information on setting FDR/UPSTREAM service.

If you created a backup schedule using **usormgr** utility or from the GUI, you will see a set of **USORA_nn.<ORACLE_SID>.CMD** scripts.

Before running scripts, check if you have the right settings in the **usorback.<ORACLE_SID>.cfg** file. It is required that you specify full path names for Server Manager and SQL Plus executables: when starting those scripts from your scheduler or running as an FDR/UPSTREAM job you can not be certain about your environment, and those executables may not be in the PATH. For the same reason you should specify full file names (with path) for all files in your scripts and explicitly set at least two Oracle environment variables before calling **usorback.** For example:

```
ORACLE_HOME=/ora01/oracle/8.1.5
export ORACLE_HOME
ORACLE_SID=ORCL8

export ORACLE_SID
```

Also be sure that you created the **connstr.<ORACLE_SID>.dat** file with the connect parameters (using either **connstr** utility or the GUI).

The following are some useful examples (check the full syntax of the **usorback** command line utility in the USORBACK section.). In all the examples the command line should be a single line.

- Full database backups.

```
/usr/lpp/orabackup/usorback profile=<backup profile> tables=all
type=file_online_serial config=/usr/lpp/orabackup/usorback.<ORACLE_SID>.cfg
```

- Backup a subset of tablespaces and archived redo logs.

```
/usr/lpp/orabackup/usorback profile=<backup profile>
tables=@/usr/lpp/orabackup/tables.dat type=file_online redo=switch_save
config=/usr/lpp/orabackup/usorback.<ORACLE_SID>.cfg
```

Create a **tables.dat** file in the same directory as the list of tablespaces you wish to backup. For example:

```
system, user, temp
```

usorback will also switch and backup all archived redo log files.

- Backup a subset of data files.

```
/usr/lpp/orabackup/usorback profile=<backup profile>
dbfiles=@/usr/lpp/orabackup/dbfiles.dat type=file_online
config=/usr/lpp/orabackup/usorback.<ORACLE_SID>.cfg
```

Create a **dbfiles.dat** file in the same directory with the list of data files you want to backup, its content may look like this:

```
d:\oracle\oradata\oracle8\user01.dbf
d:\oracle\oradata\oracle8\oemrep01.dbf
d:\oracle\oradata\oracle8\rbs01.dbf
```

Remember, that if you don't specify the **redo** parameter, archived redo logs are not included in the backup as a default.

- Backup archived redo logs and clean up.

```
/usr/lpp/orabackup/usorback profile=<backup_profile> redo=switch_migrate
config=/usr/lpp/orabackup/usorback.<ORACLE_SID>.cfg
```

usorback will switch and backup all archived redo log files and, if the backup is successful, will delete them to clear space for further archives.

In this case there will be no data files in your backup, because the default value for **tables** is **none.**

The **second step** is to prepare a USTBATCH job to invoke Oracle backups from the mainframe side if you want your Oracle backups to be mainframe initiated.

You can use the ISPF panels (option 3 – Run a PC Job from USTBATCH panel) or create batch job following the instructions in the UPSTREAM MVS manual (use ACTION 5 in the batch job). Don't specify any ULTra or LAN interface parameters. On the Command Line specify the full path to the **usorback** script (use FILES parameter in the batch job). In the job options section check only "Run job from UPSTREAM or ULTra and:", do not(!) check "Wait for job completion" (use JOBOPTIONS 1 in the batch job).

Remember that for mainframe initiated jobs to be run you have to have FDR/UPSTREAM running on the UNIX side (the FDR/UPSTREAM daemon running or you must manually start UPSTREAM). For Windows NT you have to have FDR/UPSTREAM running (either as a service or manually started), the UPSTREAM TCP/IP attach manager or SNA server running.

34.3.22 Parallel Backups and Multiple Databases

- This version allows you to prepare and run backups of multiple database instances from the same installation directory by including the ORACLE_SID value in the names of all the essential files.
- You must set the environment variables ORACLE_HOME and ORACLE_SID for a database before you run the **usora script** (Java GUI interface). It generates scripts including ORACLE_SID in the names of the scripts with these environment variables explicitly defined; note that **usorback** and **usorrest** (and Oracle itself) require that these environment variables be set to point to the correct database instance.
- You are not allowed to run more than one backup using the same backup profile name. Create partial backup sets (distribute data files from different physical media to different sets, if possible) and assign different backup profile names to those sets (like ORCL1, ORCL2, etc.) so you will be able to run these backups in parallel.

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35 SAP R/3 Support

35.1 Introduction

FDR/UPSTREAM now supplies an agent for backing up Oracle based SAP R/3 databases. Systems supported include Windows NT, AIX, Solaris and HPUX.

SAP R/3 backup agents (including UPSTREAM) are referred to as external Media Management Software (MMS).

Backups and restores are requested using SAP utilities (sapdba, brbackup, brarchive, etc.). These utilities will drive the FDR/UPSTREAM SAP backup agent to perform the actual backups and restores. Virtually all of the extended UPSTREAM functionality can be used including reporting, FDR/UPSTREAM/SOS local backups, etc.

35.2 Installation and Configuration

Before beginning installation of the SAP agent, you will need to have Oracle, SAP R/3, and FDR/UPSTREAM installed and operational.

For Windows NT, you should be logged in using the account setup for SAP R/3 backup. When you install UPSTREAM, you must press the **Change...** button in the Select Components dialog and check the **SAP/Oracle external MMS** option to have the necessary files installed.

For UNIX in many cases you will want to use the account setup for SAP R/3 backup. However, you must use **root** if:

- SAP R/3 is running on a raw logical or physical volume.
- You wish to use FDR/UPSTREAM/SOS.
- You regularly use root for UPSTREAM backups/restores.

For UNIX, the UPSTREAM SAP agent (BACKINT), by default is installed with the SUID (set user ID) bit enabled. This will cause backint to run with effective users rights of the owner of backint. If this bit is set, **both** backint and UPSTREAM will run using the effective user rights of the owner of backint. Is you wish to run your backups as root or a specific user, you will need to set the owner of backint to be the user you wish to use and you will need to have the SUID bit enabled. Both of these can be displayed with an *ls -l* command. Instructions for modifying the owner and the SUID bit are in the DataTools section, of the Databases chapter of the UPSTREAM manual.

Before performing the UPSTREAM SAP installation, you will need to create a parameter file template which will be used for these backups and restores. We recommend that you use the UPSTREAM user interface, go into the backup panels and modify or create a set of parameters to meet your environment's needs. Some of the parameters you may wish to change include:

- Compression
- Reporting
- Local backup settings (particularly for FDR/UPSTREAM/SOS local backups).

Some of the parameters which have no affect include (and thus don't have to worry about the values of):

- Backup Profile (though you must specify one). Backup Profiles are further discussed below.
- File specifications (though you must specify one)
- Restart (SAP backups are never restartable).
- Backup Type (determined by the type of backup you request using SAP utilities).

When you have completed reviewing your parameters, save them to a parameter file. We recommend the name **USSAP.DAT**.

In these instructions, there are cases where you must specify something specific to your environment (such as the Oracle SID for SAP), which are also operating system environment variables. If you see a value surrounded by percent signs, such as %ORACLE_SID%, you should use the environment variable specified. For example, if your ORACLE_SID is CER, and these instructions suggest the file name init%ORACLE_SID%.utl, you will use the file name initCER.utl.

Change to the UPSTREAM directory and run the UPSTREAM SAP agent installation program **ussapins**. The ussapins installation program is only for convenience. It merely creates the file init%ORACLE_SID%.utl file. Instructions for creating this are at the end of this section.

When you run ussapins you will see the following:

```
You are about to install FDR/UPSTREAM MMS for SAP on this computer.

To avoid installation complications we recommend:
1. Log in using account prepared for SAP/Oracle database administration
   (ORACLE_SID and ORACLE_HOME environment variables must be set);
2. Run this program from FDR/UPSTREAM directory.

WARNING: Empty input in most cases will
         terminate this installation.

   Do you want to continue (Y/N)?
```

Enter '**Y**' to begin the installation. The installation program will verify that you have the ORACLE_SID and ORACLE_HOME environment variables set and if they are not, ask you their values.

It will then ask you if you are installing from the UPSTREAM directory. Since this is the recommended directory, enter '**Y**'.

You will be further prompted for:

- (Windows NT only) the drive letter where the SAP utilities are installed. Most users will enter **C:**.
- To verify the directory where SAPDBA, BRBACKUP and other SAP utilities are. Enter '**Y**' if you are satisfied with the location.
- The name of the UPSTREAM executable. Most users will press [ENTER] to accept the default.
- The name of the UPSTREAM configuration file. Most users will press [ENTER] to accept the default.
- The name of the UPSTREAM parameter file. Most users will use the default of **USSAP.DAT** (see above for instructions on creating this file).

It will then create the UPSTREAM BACKINT parameter file and report it's name (initCER.sap) for example. It will also modify the SAP parameters files of init%ORACLE_SID%.sap and init%ORACLE_SID%.dba and create backup versions of these files.

It will also copy the **backint** program (or for UNIX create a symbolic link to the copy in the UPSTREAM directory) to the directory where the SAP utilities (like SAPDBA, BRBACKUP, BRARCHIVE, etc.) reside.

Finally, it will also tell you the backup profile name for this database. If the ORACLE_SID is an acceptable backup profile name, it will be used. Otherwise, it will dynamically create a backup profile name and report it at this time. There are special considerations for host backup profile configuration, described in the next section.

35.2.1 Host Backup Profile Configuration

NOTE: The Backup Profile Name you must use is your Oracle SAP database instance name.

When the SAP utilities drive UPSTREAM to perform a backup, they actually start UPSTREAM twice:

- The first time to backup the dataspaces or redo log files.
- The second time to backup of control files and SAP logs

These two backups will generate separate files on the host. If you are using GDGs to store your backups, you must allow for this.

If you are backing up to tape, UPSTREAM will automatically take action to keep a single incremental or full from using two tapes. To facilitate this, you must create your backup profile using some specific options:

If you are configuring your backup profile from the PC:

- Check “Seq. DASD Backups Allowed” even if you are backing up to tape only. UPSTREAM will create a dummy backup to disk during the fulls (described below).
- Do not check “New Tapes for Full Merge”
- Do not check “New Tapes for Incr. Merge”
- Check “Merge Backups Allowed”

From the host ISPF panels:

- DASD: YES
- NEWTAPEF: NO
- NEWTAPEI: NO
- MERGE: YES

From the FDR/UPSTREAM USTCONFG utility:

- DASD
- NONEWTAPE=FULL
- NONEWTAPE=INCR
- MERGE=YES.

Even if you intend to backup all your database data to tape, enable DASD backups in the configuration. With this FDR/UPSTREAM configuration, BACKINT, when creating parameter file for FDR/UPSTREAM, will set HOLDTAPE=Y to prevent the backup tape from being dismounted, so the second and third (if used) backup will go to the same tape without operator intervention. FDR/UPSTREAM holds the tape for 5 minutes, so if there is more than a 5 minute delay between backups, there will be a mount request for the tape used for the first backup.

When the first backup starts, a dummy backup is run to force this backup to go to a new tape. This initialization step creates a dummy file **DUMMY.FIN** in FDR/UPSTREAM directory and performs a backup of this file to DASD.

If you use GDGs allocate 2 generations for every backup you want to keep. If you do not use GDGs, keep in mind that FDR/UPSTREAM maintenance utility does not delete data sets on DASD and does not release tapes with deleted backups.

If you send your backups to DASD, there is no initialization step and no dummy backups.

BACKINT is now capable of performing backups of Oracle database in parallel. To enable this feature you have to add a new parameter CHANNELS to init%ORACLE_SID%.utl file (see section 35.3.4). If you specified more than 1 channel, you have to configure your backup profile for SAP as a generic prefix profile, and it must be no more than 7 characters long to provide space for an additional character for the backup channel number. If your SAP database name is longer than 7 characters, you have to create an **sapalias.dat** file (see section 35.3.4).

35.3 Backups and Restores

Backups and restores of SAP/Oracle databases are run using from SAP utilities. You can use their full featured database administration program **sapdba** or call the command line utilities **brbackup**, **brarchive** or **brrestore** directly to perform appropriate backup/restore operations.

Most users will use the command line utilities for backups as they work best for automation. They are fully described in the *SAP Database Administration Guide for Oracle* and you should refer to that document for a detailed description of the utilities:

- brbackup: The SAP brbackup tool allows an online or offline backup of the control file, of data files in individual or all tablespaces and if necessary of the online redo log files. This is analogous to full backups. Moreover, brbackup saves the profiles and logs relevant for the backup. Note that brbackup is not the appropriate tool to backup complete files systems (i.e. A lot of small files and directories).
- brarchive: The SAP tool brarchive allows you to archive the offline redo log files that are the online redo log files saved to the archiving directory by Oracle. This is analogous to an incremental backup.
- brrestore: Restores backups generated by brbackup and brarchive.

These utilities will prompt you a number of times to confirm the operation they are about to perform, depending on the operation you requested and the state of your database instance. When you feel comfortable with the way the utilities work and decide on how and when you want your backups run (full or partial, online or offline, backup of data tables or redo logs), you can start automating your backups.

35.3.1 Automating your backups

There are two steps to automate your SAP database backups using FDR/UPSTREAM:

- 1. Create a set of scripts using the **brbackup** or **brarchive** utilities to automate the backup execution process.
- 2. Determine which side (host or PC/UNIX) will be performing the backups and appropriately schedule them.

You must create a script which calls the **brbackup** or **brarchive** utilities with the appropriate set of parameters. Since these utilities request user input for confirmation (in some cases even more than once), you will need a separate file (a response file) which contains the input expected. Input redirection, which is specified with the less-than sign ('<') is used to redirect the response file to the SAP utility. Most likely you will have to create a set of simple scripts for different types of backups.

For example, to perform full offline backup in Windows NT you would create two text files: a script file **sapfull.cmd** with the utility call and the response file **sapfull.rsp).**

sapfull.cmd would contain:

```
brbackup -u CER/system -d util_file -t offline -m all<sapfull.rsp
```

In this command, you have specified the command line options:

- **-u CER/system**: -u is the option to specify the oracle user name and password. In this case, it is the user *CER* and the password *system*.

- **-d util_file**: -d is the device specification. *util_file* specifies a 3rd party MMS. You must specify this option.
- **-t offline**: This is an *offline* backup. *online* backups are also supported.
- **-m all**: -m specifies the dataspaces, files, etc. to be included in the backup. *all* indicates a complete backup. One of their samples is PSAPBTABD.

We recommend that you create a test these backups manually, noting the user input required. In the example above, SAP asks: *Please enter 'cont' to continue, 'stop' to cancel the program:*

Thus, **sapfull.rsp** would contain:

```
cont
```

An example brarchive incremental might include two text files **sapincr.cmd** and **sapincr.rsp**. **sapincr.cmd** would be:

```
brarchive -u CER/system -d util_file -s<sapincr.rsp
```

In this command, you have specified the command line options:

- **-u CER/system**: -u is the option to specify the oracle user name and password. In this case, it is the user *CER* and the password *system*.
- **-d util_file**: -d is the device specification. *util_file* specifies a 3rd party MMS. You must specify this option.
- **-s**: Specifies that this is a backup of offline redo log files.

Again, we recommend that you create a test these backups manually, noting the user input required. In the example above, SAP asks: *Please enter 'cont' to continue, 'stop' to cancel the program:*

Thus, **sapincr.rsp** would contain:

```
cont
```

To execute your scripts depends on which side initiates (starts) the backups:

- ☐ *PC/UNIX initiated backups.* You can use any available scheduler (including the one shipped with FDR/UPSTREAM) to start a backup script

- ☐ *Host initiated backups.* You can initiate your database backups from the mainframe side using FDR/UPSTREAM's ability to run jobs on the target machine. In this case after you prepare a set of non-interactive scripts, prepare and schedule FDR/UPSTREAM mainframe batch jobs to start these scripts at the desired time.

  Note that the host request is to run a job not a backup. The backup will run and complete before the job terminates.

  All SAP utility programs return program return codes. These are:

  - 0: Successful backup/restore
  - 1: Backup/restore ended with warnings. All files were backed up/restored.
  - 2: Backup/restore canceled during the initialization phase by a user or other signal.
  - 3: Errors occurred during the initialization phase by a user or other signal.
  - 4: Backup/restore was canceled by a user or other signal during processing.
  - 5: Backup/restore was started, but not completed because errors occurred during processing.
  - 6: Internal termination of backup/restore.

  If you host initiate your backups, we recommend that you use the default JOBRETURNCODEMAP which will map all non-zero return codes to 8 which can be used to indicate that the backup did not run successfully.

35.3.2 Restores

Both **brrestore** and **sapdba** can be used for restores. However, **sapdba** is the recommended tool as it will walk you through the steps of a complete and partial database restore and recovery.

The actual restore is only one of many steps in SAP database recovery. Thus we recommend that you read carefully the *BC SAP Database Administration Guide* for a description of the restore procedures.

If you wish you can use **brrestore** to restore data files, control files and online redo log files saved by the brbackup/brarchive utilities. You can specify files, tablespaces, complete backups, and specific log sequence numbers of redo log files to be restored. The brrestore program automatically identifies the correct backup and files needed for the restore. brrestore checks whether the required free disk space is available to allow the files to be restored and restores the directory and link structure automatically.

Before you start brrestore, take your database instance down. You can not restore into an active database.

For example, if you wished to perform a complete restore you would enter:

```
brrestore -d util_file -b last -m all
```

35.3.3 Problems

BACKINT creates a log, **backint.log** in the directory **backint** was run from. In this file **backint** logs the time and the parameters it was started with, the set of files to be backed up/restored, the parameters FDR/UPSTREAM is started with, and the results of the FDR/UPSTREAM operation. In case of an error in FDR/UPSTREAM it is always recommended to check FDR/.UPSTREAM log on both PC and mainframe sides. If there are any problems, you should check this file as well as the UPSTREAM client and host log files.

If a tape backup failed, check **backint.log** for message: “Finalizing was successful”. If it is not there, the tape will remain mounted for up to 5 minutes and subsequent backups will be appended to this tape. To release the tape and allow subsequent backups to use a new tape, you should attempt to remedy any errors which are logged in the backint.log file or the UPSTREAM logs. Then you can manually run a non-merge backup of the **DUMMY.FIN** file (or any file for that matter) using your Oracle database instance name (or its alias if required) as a backup profile name.

Note that UPSTREAM can not support file names greater than 255 characters.

SAP itself also keeps track of all the backup/restore operations performed:

- brbackup logs are stored in the */oracle/%ORACLE_SID%/sapbackup* directory. The file *back%ORACLE_SID%.log* keeps the list of individual backup logs listing dates and return codes.
- brrestore stores its logs in the same directory (*oracle/%ORACLE_SID%/sapbackup*), but there is no cumulative log for restores.
- brarchive logs are stored in the */oracle%ORACLE_SID%/saparch* directory. *arch%ORACLE_SID%.log* keeps the list of all redo logs which have been backed up with the date/time, brachive log name and some additional information.

35.3.4 Internals

This sections describes the format of files used by the UPSTREAM BACKINT agent.

The parameters specified in the init%ORACLE_SID%.utl (initSAP.utl) file are:

- UPSTREAM - full name with the path to FDR/UPSTREAM executable;
- USPATH - full path to FDR/UPSTREAM directory;
- CONFIGFILE - FDR/UPSTREAM configuration file;
- PARAMETER - FDR/UPSTREAM parameter file;
- CHANNELS - the number of backup channels. The list of files for backup will be spread over the specified number of channels, and they will be backed up in n parallel streams by **n** started FDR/UPSTREAM instances running in parallel. If it is a TAPE backup, make sure that there are **n** tape devices available for FDR/UPSTREAM on the mainframe side. If you specify **n** greater than 1, you have to configure your backup profile for SAP as a generic prefix profile, and it must be no more than 7 characters long to provide space for an additional character for the backup channel number. If your SAP database name is longer than 7 characters, see discussion on an **sapalias.dat** file at the end of this section. The maximum number of backup channels is 10. The default value is 1; the number of channels specified by CHANNELS defines only the number of parallel backup sessions.

  All inquires are performed through a single channel.

  The number of channels for restore is defined dynamically based on the list of the files to restore:

  - if files were spread over a number of channels during their backup we'll need to start as many restore channels as there were backup channels (backup profile names);

  - if there were **backup_id**s specified, we may need to increase the number of channels even more to accommodate all backup profile – version date combinations.

  As a result the number of channels may go over the limit of 10 channels. In this case those files that we are not able to restore within 10 channels will fail.

NOTE: In Windows environments there is still a limit of 1 channel.

- STARTUSTO - the start FDR/UPSTREAM time-out value in seconds. If **backint** can't open communication with the started instance of FDR/UPSTREAM within this time-out, it fails the backup. The default value is 10 seconds;
- READUSTO - the communication with FDR/UPSTREAM time-out in seconds. If FDR/UPSTREAM didn't report the end of the backup and didn't send any status information back to **backint** within this time-out, **backint** will consider UPSTREAM dead and fail the backup. The default value is 600 seconds (10 minutes). If you expect long waits for tape mounts, or very large files (takes more than 10 minutes to backup any single file) increase this value;
- PIPE - Optional parameter. The name to be used to communicate with FDR/UPSTREAM. In UNIX environment it must point to an existing directory. The default name is <FDR/UPSTREAM-directory>/BACKINT;
- TRACE - activates tracing, use ONLY when advised by FDR/UPSTREAM tech support.

Installation program **sapinst** updates two SAP profile files. They can be found in **%ORACLE_HOME%\database** (Windows NT) or **%ORACLE_HOME%/dbs** (UNIX) directory.

In SAP backup profile file **init%ORACLE_SID%.sap sapinst** sets these two parameters:

- **Util_par_file=<initSAP.utl** path> This is the full path (including drive letter) of BACKINT parameter file created in the install.
- **backup_dev_type=util_file**

The original (unchanged) version **init%ORACLE_SID%.sap** is copied to the same location with the extension **.sa1**(or **.sa***n*, where *n* is the next available number, so up to 9 previous versions of this file are preserved).

In SAP profile file **init%ORACLE_SID%.dba sapinst** sets the parameter:

- **Backup_util_name=FDR/UPSTREAM** This name will appear in all SAP reports.

The original (unchanged) version **init%ORACLE_SID%.dba** is copied to the same location with the extension **.db1**(or **.db***n*, where *n* is the next available number, so up to 9 previous versions of this file are preserved).

SAP defines that the database ID (**%ORACLE_SID%**) can be of up to 16 characters. Since this is a fundamental name, FDR/UPSTREAM attempts to use it as the backup profile name.

Backup Profile names are limited to 8 alpha-numeric and national (@,#,$) characters. If installation program sees that **%ORACLE_SID%** is longer than 8 characters or contains invalid characters, it prompts for an alias to be used as an FDR/UPSTREAM backup profile. When you supply the installation with the valid alias, it stores the **%ORACLE_SID%** and the given alias in the **sapalias.dat** file in the FDR/UPSTREAM directory. BACKINT will use that file to substitute the database ID obtained from SAP utilities with its alias each time it invokes FDR/UPSTREAM. Your backup profile name is the alias defined in this file; for example USALIAS1.

The format of **sapalias.dat** file is:

```
/* Computer generated file, DO NOT EDIT!/* Comment lines start with "/*" */
ORACLE_DATABASE_ID&1                /* Original Oracle database ID */
USALIAS1                            /* The name FDR/UPSTREAM will use */
…                                   /* More pairs of NAME - ALIAS */
ORACLE_DATABASE_ID&n                /* Original Oracle database ID */
USALIASn                            /* The name FDR/UPSTREAM will use. */
```

If for any reason you need to edit **sapalias.dat** file, be very careful, because BACKINT doesn't verify information it reads from that file. Wrong values supplied for database ID and alias may cause backups to fail or destroy your previous backups.

36 Errors

36.1. Overview

Communications packages, by their very nature, generate a large number of text messages, return codes, and the like. FDR/UPSTREAM provides superior message handling allowing you to understand and solve whatever problems occur.

Many of the FDR/UPSTREAM messages that are reported are accompanied by TCP/IP return codes, operating system messages an more. If you have purchased a communications product from a vendor other than Innovation Data Processing, you should have their manual available to the system administrator for problem determination.

This section discusses how messages are displayed, how they are stored, and what they mean.

Note that the FDR/UPSTREAM messages are in the next chapter.

36.2. Problem Reporting

Our customers are very important to us. Our goal is always to provide prompt and courteous service.

Should you have any questions regarding the installation, implementation, or use of the FDR/UPSTREAM program product, please feel free to contact Innovation Data Processing Technical Support group listed below.

In the event you are having difficulty with FDR/UPSTREAM, please retain all the error information you can gather and contact the Innovation Data Processing Technical Support group listed below as soon as possible. We will make every effort to resolve the difficulty in the shortest possible time.

Innovation Data Processing, Technical Support
275 Paterson Ave.
Little Falls, NJ 07424

Phone: (973) 890-7300
Fax: (973) 812-7384
FTP: ftp.fdrinnovation.com (register on www.innovationdp.com)

36.3. How Messages are Displayed

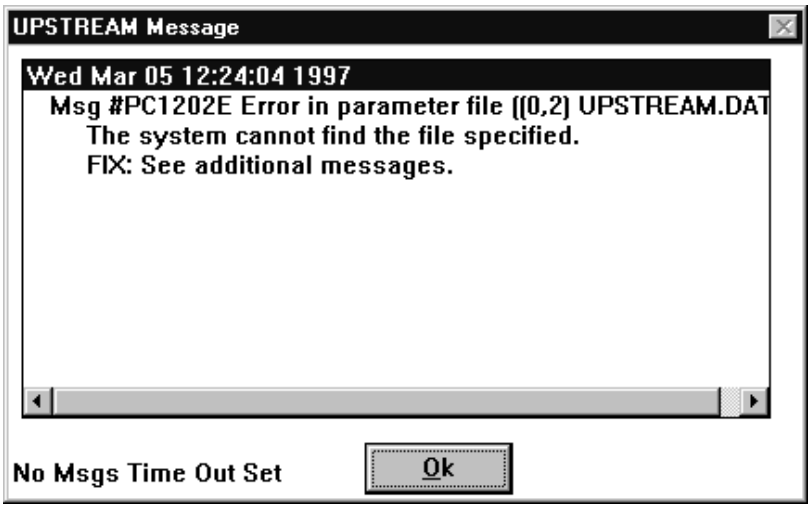
Messages generated in the FDR/UPSTREAM program (US.EXE) and the configurator (USCFG.EXE) are displayed as message dialogs with two buttons, <Ok> and <Hold>. When you press the <Ok> button, the message window goes away, when you press the <Hold> button any messages time-out is ignored and the message remains on the window until you press the <Ok> button.

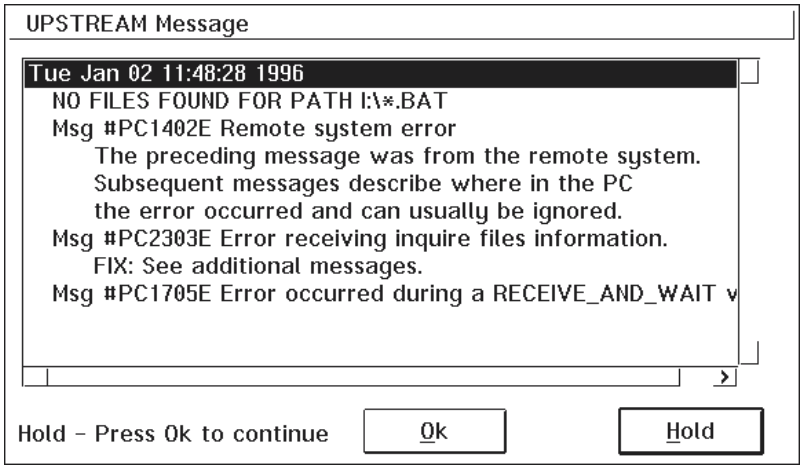
The message dialog can also go away after a given amount of time if you specified a Messages Time Out in the FDR/UPSTREAM configurator. The amount of time remaining is displayed in the lower left corner of the message dialog; if you do not specify a Messages Time Out then *No Msgs Time Out Set* is displayed. You can also disable messages entirely (though this is not recommended - it can be confusing when using in an attended mode) with a Messages Time Out value of -1.

UPSTREAM displays a Messages list box in the status dialog for backups, restores, file transfers and physical disk backups/restores. The standard UPSTREAM Message window is not displayed; messages are written directly to this list box. This allows you to be able to view prior messages while the operation is in progress with very little performance overhead. Thus “Messages Time Out” is much less important during these operations as it’s only used during setup and completion. We still recommend that it be set to a non-zero value (so that message windows get timed out), but it can be higher (for example, 30 seconds). If you are running in attended mode the UPSTREAM log viewer will be automatically displayed if a backup or restore fails.

There is a new parameter in the UPSTREAM Configurator/Advanced options: **Max Status Msg Lines.** Since list boxes in many environments can not contain a very large number of lines, you specify here the maximum number of lines in the list before the oldest messages are removed. You can specify 0 to indicate no limit (not recommended) or -1 to suppress screen logging (which may improve speed slightly). The default is 500 and the configuration parameter is MAXSTATUSMSGLINES.

Messages may come from two different sources: FDR/UPSTREAM locally and FDR/UPSTREAM MVS. Figures below shows a message from FDR/UPSTREAM workstation/server and a message generated by FDR/UPSTREAM MVS and displayed by FDR/UPSTREAM locally. Note that the host message is in upper case and that it is always accompanied by workstation/server message #1402.





Both of the figures above show FDR/UPSTREAM displaying more than one message at a time in a single message window. This allows you to know as much as possible about the environment to assist you in your problem determination.

Messages are truncated to fit in 55 characters for display and transmission to the host. The full message is written to the log.

36.4. The Message Log

The message log is a file where significant system messages are written. These messages may or may not have been written to the screen.

The message log file is a standard text file, and you can display it, print it, edit it or read it with standard text file programs (TYPE, PRINT, EDIT, etc.). The name of the log is configurable in the configurator. The default name and directory is:

```
C:\UPSTREAM\UPSTREAM.LOG
```

The figure below shows an example of messages in the message log.

```
Mon Jun 17 15:25:41 1991
   Msg #PC2050I Backup started
Mon Jun 17 15:26:10 1991
   Msg #PC2051D Backup successful
   5 files 7988 bytes 469 chars/sec
Wed Jun 19 12:08:07 1991
   Msg #PC2150I Restore started
Wed Jun 19 12:08:12 1991
   WORKSTATION NAME FAILED CONFIGURATION VERIFICATION
   Msg #PC1402E Remote system error
        The preceding message was from the remote system.
        Subsequent messages describe where in the PC
        the error occurred and can usually be ignored.
   Msg #PC2102E Error occurred during a restore receive descript
   Msg #PC1705E Error occurred during a RECEIVE_AND_WAIT verb
Wed Jun 19 12:08:42 1991
   Msg #PC2153I Restore failed
```

Sample Message Log (UPSTREAM.LOG)

If there is an error writing to log file during the backup, UPSTREAM will retry for 5 seconds and then write those messages (along with the reason that it couldn't write to the log file) to an alternate log file UPSERR.ERR. This process is repeated for subsequent errors writing to the log file.

If UPSTREAM can't write to UPSERR.ERR, a MessageBox is displayed which shows the message file error number for the location of the failure.

Error and Warning messages are also sent to the host if there is an active conversation. You can also send the detail for reported messages to the host (rather than just the first line) for backups by setting the parameter **SENDHOSTDETAILS** to Y. Additional message text from the message file is not sent. You can set this from the "More..." dialog, by checking **Send message details to host**. The default is not checked.

36.4.1. UPSTREAM Director and Logging

The UPSTREAM Director does not log any errors itself (though it may display message boxes), however you can see errors for the systems you are connected to by pulling down the **View** menu, selecting the **Messages** submenu and the system whose messages you want to view (such as **Current Target**).

If you wish to view the entire log from an UPSTREAM system, in the Target Systems list you can press the **Log** button which will cause the entire log to be transmitted from the remote system. For large logs this may take several seconds.

The UPSTREAM Director has extensive tracing available, by modifying the usdir.bat file. Contact Innovation Tech Support to determine when this is needed, assistance in setting it up and interpreting it.

36.5. USLOGCLR (Clearing the Log)

USLOGCLR is a program distributed with FDR/UPSTREAM which helps you maintain the message log (UPSTREAM.LOG, USSTART.LOG and USNDS.LOG) and the report files. Since the message log and the report files are standard text files, it will grow forever as messages continue to be added. Therefore, Innovation Data Processing distributes a program which shrinks the log and keeps it to a manageable size.

For the default log, you can have it automatically cleared during backups with the **MAXLOGDAYS** parameter. For the active report, you can have it automatically cleared during backups with the **MAXRPTDAYS** parameter. As for USLOGCLR, if you specify a non-zero value for these parameters, UPSTREAM will keep only the specified number of days worth of information. These parameters only applies to the default UPSTREAM log or active report, not any of the other log files which UPSTREAM may maintain on the system (USLN.LOG, MSEXCH.LOG, etc.).

USLOGCLR allows you to reduce the size of the log by the number of days worth of log information that you wish to maintain. You run USLOGCLR from the command line with command line parameters.

The syntax for USLOGCLR is:

```
USLOGCLR <Number of days old> <Log file name>
```

Where:

- **<Number of days old>** is a number from 0 to 32767 which indicates that entries which have been in the log longer than these number of days will be purged.
- **<Log file name>** is an optional parameter which is the name of the log or report file to clean. If you do not specify anything, the default of UPSTREAM.LOG is used.

If you run USLOGCLR.EXE without any parameters it displays a brief description of its calling conventions.

For example, if you wish to clean out all but the last 14 days of information from the default log, you would run USLOGCLR as follows:

```
USLOGCLR 14
```

As USLOGCLR runs, it writes the log entries it wishes to save to a temporary file, and then deletes the original log and renames the temporary file. Therefore, it is required that you have a certain amount of free disk space.

USLOGCLR writes to the screen the number of lines removed and the number of lines remaining. This information can be redirected with standard I/O redirection if you do not wish any display.

(NLM) /a is an optional switch to be used after the parameters above are specified. If specified, the screen group is removed even if there is an error (AutoScreenDestructionMode)

36.6. The Message File

Almost all FDR/UPSTREAM messages for both the configurator (USCFG.EXE) and the FDR/UPSTREAM program (US.EXE) are stored in the message file. The default name for the message file is UPSTREAM.MSG and you can change the name in the advanced configurator.

The message file is a standard DOS text file which can be viewed, printed or edited with standard DOS facilities (TYPE, PRINT, EDLIN, etc.). The format for messages in the log is:

```
[NUMBER][SEVERITY] [TEXT]
   [ADDITIONAL TEXT]
   ...
   [ADDITIONAL TEXT]
{ NEXT MESSAGE }
```

Where:

- **NUMBER:** The message number is a 4 digit number that the programs will look for when they have a particular message to log.
- **SEVERITY:** The severity is a single letter indicating what to do with the message. If the severity is a lower case letter and the message is displayed, then the message will not time out regardless of the Message Time Limit setting. There are several severities which include:
  - I: Informational message. These messages are only written to the log. They are not displayed or sent to the remote system. An example is a message indicating that there was an error during the restore and the message was already displayed.
  - N: Display but don't log. These messages are only displayed on the screen. They are not written to the log or sent to the remote system. Examples are configurator messages which do not need to be written to the log.
  - D: Display and log. These messages are displayed and written to the log but not sent to the remote system. Examples include statistics messages after transfers are complete.
  - W: Warning. These messages indicate that a significant, but not necessarily fatal event, has occurred. These messages are logged, displayed and sent to the remote system. An example would be during a restarted backup, when the backup must restart from the beginning. This is significant, but the operation can continue.
  - E: Error. These messages indicate that an error has occurred. These are usually (but not always) fatal. These messages are logged, displayed and sent to the remote system. Examples would be file errors during a backup.
- **TEXT:** This is text describing the message.
- **ADDITIONAL TEXT:** Any additional lines of text you wish logged or displayed (up to a total for the window of 10 lines). Each line of text must have a character in column 1.

There are several advantages with this scheme:

- You can change the message text. If you wish to customize the messages for your installation you can. This also simplifies foreign language issues.
- You can change the message severity. For example, if you wished that statistics not be displayed to users, you could change the severity from ‘D’ to ‘I’.
- You can find messages in your message file. If you are performing problem determination for a user, you can use your text editor to find the message associated with a message number in your copy of the message file.
- Program size is decreased. FDR/UPSTREAM does not contain the text for these messages in its code.

If the message file is not found, or there is an error reading the message file, the message is handled as if it had severity ‘E’, and you will see a message logged in place of the normal text which can include:

- ☐ Error reading msg file: <error text>

  This means that there was a file error reading through the message file. The file error text describes the DOS error.

- ☐ Message not found.

  The message requested by FDR/UPSTREAM was not found in the message file.

- ☐ Error opening msg file: <error text>

  There was an error when FDR/UPSTREAM attempted to open the file to log a message. The file error text describes the error encountered.

- ☐ Message file not defined

  This means that the message file name was not defined or removed from the advanced configurator.

If you choose to modify the message file, remember the following guidelines:

- Each message can be no more than 56 characters long.
- There can be no more than 10 lines of message text in a message window. The safest route is to not add any more additional message text than exists currently.
- New messages begin with a number in column 1.
- The end of each message’s additional text is denoted with a non-blank in column 1.

36.7. TCP/IP Messages

TCP/IP Messages are displayed as FDR/UPSTREAM messages #4800-4899 - see the next chapter for a listing of these and all other FDR/UPSTREAM messages.

Since each TCP/IP implementation uses different message numbers, FDR/UPSTREAM maps these messages into the UNIX ‘E’ messages and then to FDR/UPSTREAM messages in the above range.

For details about remedies for a specific message you will need to see your TCP/IP documentation. These messages are also briefly described in the *Performance* chapter.

36.8. Operating System Messages

Operating system messages are those messages which the operating system reports when an action is attempted that fails, usually file access. These messages can be reported in two ways.

- US.EXE, USCFG.EXE and ULTRA.EXE will attempt to find the error text associated with the message and display the text as an additional message. If the text is unknown, then the error number itself is displayed.
- USSTART.EXE reports ALL operating system errors with the number alone.

OS/2 operating system numbers can be interpreted by entering from an OS/2 Window or Full screen:

```
HELP SYS<number>
```

Windows NT operating system numbers can be interpreted by entering from a DOS window:

```
NET HELPMSG <number>
```

The meaning of the UNIX operating system message numbers (if not displayed) can be found in the /usr/include/errno.h or /usr/include/sys/errno.h files.

If the text is not displayed or you have questions concerning message interpretation call FDR/UPSTREAM technical support for assistance.

36.9. Novell Errors

Novell return codes are reported when FDR/UPSTREAM attempts to perform some specific Novell function (retrieve or set non-file data, login to a server etc.). FDR/UPSTREAM will specifically denote the return code as a Novell return code.

Novell return codes are reported as hexadecimal values whose meanings are described below (the decimal value is in parens next to the hexadecimal values). In some cases there are more than one meanings for a particular return code. Often the context (the function being performed) will point you to the meaning. Contact Innovation Technical Support for any questions you may have concerning these return codes.

Requester/Shell Errors

Hex.	Dec.	Constant	Desc.
0x8800	0	SHELL_ERROR	
		VLM_ERROR	
		ALREADY_ATTACHED	Attach attempted to server with valid, existing connection
0x8801	1	INVALID_CONNECTION	Request attempted with invalid or nonattached connection handle
0x8802	2	DRIVE_IN_USE	OS/2 only (NOT USED)
0x8803	3	CANT_ADD_CDS	Map drive attempted but unable to add new current directory structure
0x8804	4	BAD_DRIVE_BASE	Map drive attempted with invalid path specification
0x8805	5	NET_READ_ERROR	Attempt to receive from the selected transport failed
		NET_RECV_ERROR	Attempt to receive from the selected transport failed
0x8806	6	UNKNOWN_NET_ERROR	Network send attempted with a nonspecific network error
0x8807	7	SERVER_INVALID_SLOT	Server request attempted with invalid server connection slot
		BAD_SERVER_SLOT	Server request attempted with invalid server connection slot
0x8808	8	NO_SERVER_SLOTS	Attach attempted to server with no connection slots available
0x8809	9	NET_WRITE_ERROR	Attempt to send on the selected transport failed
		NET_SEND_ERROR	Attempt to send on the selected transport failed
		CONNECTION_IN_ERROR_STATE	Client-32
0x880A	10	SERVER_NO_ROUTE	Attempted to find route to server where no route exists
0x880B	11	BAD_LOCAL_TARGET	OS/2 only
0x880C	12	TOO_MANY_REQ_FRAGS	Attempted request with too many request fragments specified

0x880D	13	CONNECT_LIST_OVERFLOW	Too many connections to fit in the list size specified
0x880E	14	BUFFER_OVERFLOW	Attempt to receive more data than the reply buffer had room for
0x880F	15	NO_CONN_TO_SERVER	Attempt to get connection for a server not connected
		NO_CONNECTION_TO_SERVER	Attempt to get connection for a server not connected
0x8810	16	NO_ROUTER_FOUND	OS/2 only
0x8811	17	BAD_FUNC_ERROR	Attempted function to non-existent or illegal function
		INVALID_SHELL_CALL	Attempted function to non-existent or illegal function
0x8812	18	SCAN_COMPLETE	
		LIP_RESIZE_ERROR	Client-32
0x8813	19	UNSUPPORTED_NAME_FORMAT_TYPE	
		INVALID_DIR_HANDLE	Client-32
0x8814	20	HANDLE_ALREADY_LICENSED	
		OUT_OF_CLIENT_MEMORY	Client-32
0x8815	21	HANDLE_ALREADY_UNLICENSED	
		PATH_NOT_OURS	Client-32
0x0816	22	INVALID_NCP_PACKET_LENGTH	
		PATH_IS_PRINT_DEVICE	Client-32
0x8817	23	SETTING_UP_TIMEOUT	
		PATH_IS_EXCLUDED_DEVICE	Client-32
0x8818	24	SETTING_SIGNALS	
		PATH_IS_INVALID	Client-32
0x8819	25	SERVER_CONNECTION_LOST	
		NOT_SAME_DEVICE	Client-32
0x881A	26	OUT_OF_HEAP_SPACE	
0x881B	27	INVALID_SERVICE_REQUEST	
		INVALID_SEARCH_HANDLE	Client-32
0x881C	28	INVALID_TASK_NUMBER	
		INVALID_DEVICE_HANDLE	Client-32
0x881D	29	INVALID_MESSAGE_LENGTH	
		INVALID_SEM_HANDLE	Client-32
0x881E	30	EA_SCAN_DONE	
		INVALID_CFG_HANDLE	Client-32
0x881F	31	BAD_CONNECTION_NUMBER	
		INVALID_MOD_HANDLE	Client-32
0x8820	32	ASYN_FIRST_PASS	
		NWE_MULT_TREES_NOT_SUPPORTED	Attempted to open a connection to a DS tree other than the default tree.
0x8821	33	INVALID_DEVICE_INDEX	

0x8822	34	INVALID_CONN_HANDLE	
0x8823	35	INVALID_QUEUE_ID	
0x8824	36	INVALID_PDEVICE_HANDLE	
0x8825	37	INVALID_JOB_HANDLE	
0x8826	38	INVALID_ELEMENT_ID	
0x8827	39	ALIAS_NOT_FOUND	
0x8828	40	RESOURCE_SUSPENDED	
0x8829	41	INVALID_QUEUE_SPECIFIED	
0x882A	42	DEVICE_ALREADY_OPEN	
0x882B	43	JOB_ALREADY_OPEN	
0x882C	44	QUEUE_NAME_ID_MISMATCH	
0x882D	45	JOB_ALREADY_STARTED	
0x882E	46	SPECT_DAA_TYPE_NOT_SUPPORTED	
0x882F	47	INVALID_ENVIR_HANDLE	
0x8830	48	NOT_SAME_CONNECTION	Internal server request attempted across different server connections
0x8831	49	PRIMARY_CONNECTION_NOT_ SET	Attempt to retrieve default connection with no primary connection set
		NO_PRIMARY_SET	Attempt to retrieve default connection with no primary connection set
0x8832	50	NO_CAPTURE_SET	Capture information requested on port with no capture in progress
		NO_CAPTURE_IN_PROGRESS	Capture information requested on port with no capture in progress
0x8833	51	BAD_BUFFER_LENGTH	len requested on a GetDNC or SetDNC was too large.
		INVALID_BUFFER_LENGTH	len requested on a GetDNC or SetDNC was too large.
0x8834	52	NO_USER_NAME	
0x8835	53	NO_NETWARE_PRINT_SPOOLER	Capture requested without local print spooler installed.
0x8836	54	INVALID_PARAMETER	Attempted function with invalid function parameter specified.
0x8837	55	CONFIG_FILE_OPEN_FAILED	OS/2 only.
0x8838	56	NO_CONFIG_FILE	OS/2 only.
0x8839	57	CONFIG_FILE_READ_FAILED	OS/2 only.
0x883A	58	CONFIG_LINE_TOO_LONG	OS/2 only.
0x883B	59	CONFIG_LINES_IGNORED	OS/2 only.
0x883C	60	NOT_MY_RESOURCE	Attempted request made with a parameter using foreign resource.
0x883D	61	DAEMON_INSTALLED	OS/2 only.
0x883E	62	SPOOLER_INSTALLED	Attempted load of print spooler with print spooler already installed.
0x883F	63	CONN_TABLE_FULL	Tried to alloc a connection handle with no more local connection table entries.

		CONNECTION_TABLE_FULL	Tried to alloc a connection handle with no more local connection table entries.
0x8840	64	CONFIG_SECTION_NOT_FOUND	OS/2 only.
0x8841	65	BAD_TRAN_TYPE	Attempted function on a connection with an invalid transport selected.
0x8841	65	INVALID_TRANSPORT_TYPE	Attempted function on a connection with an invalid transport selected.
0x8842	66	TDS_TAG_IN_USE	OS/2 only.
0x8843	67	TDS_OUT_OF_MEMORY	OS/2 only.
0x8844	68	TDS_INVALID_TAG	Attempted TDS function with invalid tag.
0x8845	69	TDS_WRITE_TRUNCATED	Attempted TDS write with buffer that exceeded buffer.
0x8846	70	NO_DIRECTORY_SERVICE_ CONNECTION	
		SERVICE_BUSY	Attempted request to a busy, partially asynchronous function.
0x8847	71	NO_SERVER_ERROR	Attempted connect failed to find any servers responding.
0x8848	72	BAD_VLM_ERROR	Attempted function to nonexistent or not-loaded overlay.
0x8849	73	NETWORK_DRIVE_IN_USE	Attempted map to network drive already mapped.
0x884A	74	LOCAL_DRIVE_IN_USE	Attempted map to local drive already in use.
0x884B	75	NO_DRIVES_AVAILABLE	Attempted map to next available drive when none available.
0x884C	76	DEVICE_NOT_REDIRECTED	The device is not redirected.
0x884D	77	NO_MORE_SFT_ENTRIES	Maximum number of files was reached.
0x884E	78	UNLOAD_ERROR	Attempted unload failed.
0x884F	79	IN_USE_ERROR	Attempted re-use of already in use connection entry.
0x8850	80	TOO_MANY_REP_FRAGS	Attempted request with too many reply fragments specified.
0x8851	81	TABLE_FULL	Attempted to add a name into the name table after it was full.
0x8852	82	SOCKET_NOT_OPEN	Listen was posted on unopened socket.
0x8853	83	MEM_MGR_ERROR	Attempted enhanced memory operation failed.
0x8854	84	SFT3_ERROR	An SFT III switch occurred mid-transfer.
0x8855	85	PREFERRED_NOT_FOUND	Preferred directory server not established, but another directory server was returned.
0x8856	86	DEVICE_NOT_RECOGNIZED	Determine if the device is not used by VLM application; pass to next redirector, if any.
0x8857	87	BAD_NET_TYPE	The network type (Bindery or Directory Services) does not match the server version.
0x8858	88	ERROR_OPENING_FILE	Generic open failure error, invalid path, access denied, etc.
0x8859	89	NO_PREFERRED_SPECIFIED	No preferred name specified.
0x885A	90	ERROR_OPENING_SOCKET REQUESTER_FAILURE	Error opening a socket. Client-32
0x885B	91	RESOURCE_ACCESS_DENIED	Client-32
0x8861	97	SIGNATURE_LEVEL_CONFLICT	

0x8862	98	NO_LOCK_FOUND	OS/2 - process lock on conn handle failed, process ID not recognized
0x8863	99	LOCK_TABLE_FULL	OS/2 - process lock on conn handle failed, process lock table full
0x8864	100	INVALID_MATCH_DATA	
0x8865	101	MATCH_FAILED	
0x8866	102	NO_MORE_ENTRIES	
0x8867	103	INSUFFICIENT_RESOURCES	
0x8868	104	STRING_TRANSLATION STRING_TRANSLATION_NEEDED	Client-32
0x8869	105	ACCESS_VIOLATION	
0x886A	106	NOT_AUTHENTICATED	
0x886B	107	INVALID_LEVEL	
0x886C	108	RESOURCE_LOCK_ERROR	
0x886D	109	INVALID_NAME_FORMAT	
0x886E	110	OBJECT_EXISTS	
0x886F	111	OBJECT_NOT_FOUND	
0x8870	112	UNSUPPORTED_TRAN_TYPE	
0x8871	113	INVALID_STRING_TYPE	
0x8872	114	INVALID_OWNER	
0x8873	115	UNSUPPORTED_AUTHENTICATOR	
0x8874	116	IO_PENDING	
0x8875	117	INVALID_DRIVE_NUM	
0x8880	128	SVC_ALREADY_REGISTERED	
0x8881	129	SVC_REGISTRY_FULL	
0x8882	130	SVC_NOT_REGISTERED	
0x8883	131	OUT_OF_RESOURCES	
0x8884	132	RESOLVE_SVC_FAILED	
0x8885	133	CONNECT_FAILED	
0x8886	134	PROTOCOL_NOT_BOUND	
0x8887	135	AUTHENTICATION_FAILED	
0x8888	136	INVALID_AUTHEN_HANDLE	
0x8889	137	AUTHEN_HANDLE_ALREADY_EXISTS	
0x8890	144	DIFF_OBJECT_ALREADY_AUTHEN	
0x8891	145	REQUEST_NOT_SERVICEABLE	
0x8892	146	AUTO_RECONNECT_SO_REBUILD	
0x8893	147	AUTO_RECONNECT_RETRY_REQUEST	
0x8894	148	ASYNC_REQUEST_IN_USE	
0x8895	149	ASYNC_REQUEST_CANCELED	
0x8896	150	SESS_SVC_ALREADY_REGISTERED	

0x8897	151	SESS_SVC_NOT_REGISTERED	
0x8899	153	PREVIOUSLY_AUTHENTICATED	
0x889A	154	RESOLVE_SVC_PARTIAL	
0x889B	155	NO_DEFAULT_SPECIFIED	
0x889C	156	HOOK_REQUEST_NOT_HANDLED	
0x889D	157	HOOK_REQUEST_BUSY	
		HOOK_REQUEST_QUEUED	
0x889E	158	AUTO_RECONNECT_SO_IGNORE	
0x889F	159	ASYNC_REQUEST_NOT_IN_USE	
0x88A0	160	AUTO_RECONNECT_FAILURE	
0x88A1	161	NET_ERROR_ABORT_APPLICATION	
0x88A2	162	NET_ERROR_SUSPEND_APPLICATION	
0x88A3	163	NET_ERROR_ABORTED_PROCESS_GROUP	
0x88A5	165	NET_ERROR_PASSWORD_HAS_EXPIRED	
0x88A6	166	NET_ERROR_NETWORK_INACTIVE	
0x88E6	230	REPLY_TRUNCATED	NLM
0x88FF	127	SHELL_FAILURE	Either an unknown error, or the shell is not present.
		VLM_FAILURE	Either an unknown error, or the VLM is not present.

Server Errors

Hex.	Dec.	Constant	Desc.
0x8901	001	ERR_INSUFFICIENT_SPACE	If you are running NetWare v3.11 this error code often indicates that you need to apply service. Otherwise, This is often an internal program error within UPSTREAM. Please contact tech support.
0x8906	006		Bad server name
0x890a	010	NLM_INVALID_CONNECTION	
0x890f	015		Connection aborted
0x8910	016		Connection timeout
0x8914	020	ERR_NO_MORE_ENTRY	
0x8977	119	ERR_BUFFER_TOO_SMALL	
0x8978	120	ERR_VOLUME_FLAG_NOT_SET	The service requested is not available on the selected volume.
0x8979	121	ERR_NO_ITEMS_FOUND	
0x897A	122	ERR_CONN_ALREADY_TEMP	
0x897B	123	ERR_CONN_ALREADY_LOGGED_IN	
0x897C	124	ERR_CONN_NOT_AUTHENTICATED	
0x897D	125	ERR_CONN_NOT_LOGGED_IN	
0x897E	126	NCP_BOUNDARY_CHECK_FAILED	

0x897E	127	ERR_LOCK_WAITING	
0x8980	128	ERR_LOCK_FAIL	
		FILE_IN_USE_ERROR	Attempt to open or create a file already open.
0x8981	129	NO_MORE_FILE_HANDLES	No more file handles available; the network file handle table is full.
0x8982	130	NO_OPEN_PRIVILEGES	Attempt to open a file without the open privilege.
0x8983	131	IO_ERROR_NETWORK_DISK	Hard disk input/output error on a NetWare volume; a bad sector has been encountered and could be fatal.
0x8984	132	NO_CREATE_PRIVILEGES	Attempt to create a file without the create privilege.
0x8985	133	NO_CREATE_DELETE_PRIVILEGES	Attempt to create an already existing file without the create/delete privileges.
0x8986	134	CREATE_FILE_EXISTS_READ_ONLY	Attempt to create a file with the same name as an already existing file with read-only status.
0x8987	135	WILD_CARDS_IN_CREATE_FILE_NAME	Attempt to create a file using an ambiguous filename.
0x8988	136	INVALID_FILE_HANDLE	Attempt to close or perform I/O on a file with an invalid file handle (i.e. trying to read from a file that has been closed).
0x8989	137	NO_SEARCH_PRIVILEGES	Attempt to search a directory without search privileges in that directory.
0x898A	138	NO_DELETE_PRIVILEGES	Attempt to delete a file without file deletion privileges in that file’s directory.
0x898B	139	NO_RENAME_PRIVILEGES	Attempt to rename a file without renaming privileges in that file’s directory.
0x898C	140	NO_MODIFY_PRIVILEGES	Attempt to modify a file without attribute modification privileges in that file’s directory.
0x898D	141	SOME_FILES_AFFECTED_IN_USE	Attempt to delete, rename, or set file attributes using an ambiguous filename while some of the files specified by the filename are in use by another workstation.
0x898E	142	FILE_IN_USE	Attempt to delete, rename, or set file attributes using an ambiguous filename while some of the files specified by the filename are in use by another workstation.
0x898F	143	SOME_FILES_AFFECTED_READ_ONLY	Attempt to delete, rename, or set file attributes using a filename when some of the files specified have read-only status.
0x8990	144	NO_FILES_AFFECTED_READ_ONLY	Attempt to delete, rename, or set file attributes using a filename when all of the files specified have read-only status.
0x8991	145	SOME_FILES_RENAMED_NAME_EXISTS	Attempt to rename files using an ambiguous filename, when one or more files matching the new filename specification already exist.
0x8992	146	NO_FILES_RENAMED_NAME_EXISTS	Attempt to rename a file using a filename, when all of the files matching the new filename specification already exist.
0x8993	147	NO_READ_PRIVILEGES	Attempt to read a file without read privileges to that file.
0x8994	148	NO_WRITE_PRIVILEGES_OR_ READONLY	Attempt to write to a file without write privileges to that file, or if the specified file has read-only status.
0x8995	149	FILE_DETACHED	Attempt to read or write to a detached file.
0x8996	150	SERVER_OUT_OF_MEMORY	Attempt to write to file server which does not currently have enough free dynamic memory to process this request.
		ERR_TARGET_NOT_A_SUBDIRECTORY	

0x8997	151	NO_DISK_SPACE_FOR_SPOOL_FILE	The network operating system has determined that the network disk doesn't have enough space left for spool files.
0x8998	152	VOLUME_DOES_NOT_EXIST	The network operating system has tried to access a volume but cannot find the volume in the system definition files.
0x8999	153	DIRECTORY_FULL	
0x899A	154	RENAMING_ACROSS_VOLUMES	Attempt to rename across volumes; attempt to rename a file and move the renamed file from its current volume into another volume. The rename command may move the file between directories on the same volume; however, using rename to move a file between volumes is not allowed.
0x899B	155	BAD_DIRECTORY_HANDLE	Attempt to use an invalid directory handle. This occurs if the network has been brought down and brought back up without rebooting the workstation.
0x899C	156	INVALID_PATH	
		NO_MORE_TRUSTEES	No more trustees are listed in the directory.
0x899D	157	NO_MORE_DIRECTORY_HANDLES	No more directory handles available; the directory handle table is full. Each user may have up to 255 directory handles.
0x899E	158	INVALID_FILENAME	Attempt to create a file using invalid characters within the name of the file.
0x899F	159	DIRECTORY_ACTIVE	Attempt to delete a directory that is being used by another workstation.
0x89A0	160	DIRECTORY_NOT_EMPTY	
0x89A1	161	DIRECTORY_IO_ERROR	A nonrecoverable I/O error has occurred on the disk in the directory area. This error has occurred in both copies of the directory and is fatal.
0x89A2	162	READ_FILE_WITH_RECORD_LOCKED	Attempt to read a file where data is physically locked.
0x89A3	163	ERR_TRANSACTION_RESTARTED	
0x89A4	164	ERR_RENAME_DIR_INVALID	
0x89A5	165	ERR_INVALID_OPENCREATE_MODE	
0x89A6	166	ERR_ALREADY_IN_USE	
0x89A7	167	ERR_INVALID_RESOURCE_TAG	
0x89A8	168	ERR_ACCESS_DENIED	
0x89BE	190	INVALID_DATA_STREAM	
0x89BF	191	INVALID_NAME_SPACE	
0x89C0	192	NO_ACCOUNTING_PRIVILEGES	
0x89C1	193	LOGIN_DENIED_NO_ACCOUNT_ BALANCE	Attempt to log in by a bindery object without an accounting balance, and accounting is enabled.
0x89C2	194	LOGIN_DENIED_NO_CREDIT	Attempt to log in to account with no credit available.
0x89C3	195	ERR_TOO_MANY_HOLDS	
0x89C4	196	ACCOUNTING_DISABLED	
0x89C5	197	INTRUDER_DETECTION_LOCK	Attempt to log in after the system had locked the account because of intruder detection.
0x89C6	198	NO_CONSOLE_OPERATOR	Attempt to use console without operator privileges.
		NO_CONSOLE_PRIVILEGES	

0x89D0	208	ERR_Q_IO_FAILURE	
0x89D1	209	ERR_NO_QUEUE	
0x89D2	210	ERR_NO_Q_SERVER	
0x89D3	211	ERR_NO_Q_RIGHTS	
0x89D4	212	ERR_Q_FULL	
0x89D5	213	ERR_NO_Q_JOB	
0x89D6	214	ERR_NO_Q_JOB_RIGHTS	
0x89D7	215	ERR_Q_IN_SERVICE	
		PASSWORD_NOT_UNIQUE	Attempt to change password to a previously used password when the unique requirement is specified for the account.
0x89D8	216	ERR_Q_NOT_ACTIVE	
		PASSWORD_TOO_SHORT	Attempt to change password to a password with fewer characters than the required minimum specified for the account.
0x89D9	217	ERR_Q_STN_NOT_SERVER	
		LOGIN_DENIED_NO_CONNECTION	Attempt to log in using an account which has limits on the number of concurrent connections and that number has been reached.
		ERR_MAXIMUM_LOGINS_EXCEEDED	
0x89DA	218	ERR_Q_HALTED	
		UNAUTHORIZED_LOGIN_TIME	
0x89DB	219	UNAUTHORIZED_LOGIN_STATION	Attempt to log in from an unauthorized station using an account with limits to a specific network and/or station.
		ERR_Q_MAX_SERVERS	
0x89DC	220	ACCOUNT_DISABLED	Attempt to log in using an account which has expired or has been disabled by the Supervisor.
0x89DD	221	TALLY_CORRUPT	
0x89DE	222	PASSWORD_HAS_EXPIRED_NO_GRACE	Attempt to log in using an account password which has expired and all grace logins have also expired.
0x89DF	223	PASSWORD_HAS_EXPIRED	Attempt to log in using an expired account password but the login was allowed because the account had a grace login.
0x89E0	224	LOGIN_NO_CONN_AVAIL	
0x89E7	231	E_NO_MORE_USERS	
0x89E8	232	NOT_ITEM_PROPERTY	Attempt to use an item not associated with this property group or an item which has been deleted from this group.
		WRITE_PROPERTY_TO_GROUP	Attempt to write a data segment to a group property using the call to write a property value.
0x89E9	233	MEMBER_ALREADY_EXISTS	Attempt to redundantly add an object to a group property.
0x89EA	234	NO_SUCH_MEMBER	
0x89EB	235	NOT_GROUP_PROPERTY	Attempt to use a non-group property.
0x89EC	236	NO_SUCH_SEGMENT	Attempt to use a nonexistent segment. Note that segments must be written sequentially when a property is first created, but may be read and written in any order after they already exist.

0x89ED	237	PROPERTY_ALREADY_EXISTS	
0x89EE	238	OBJECT_ALREADY_EXISTS	
0x89EF	239	INVALID_NAME	Request made with an object or property name containing illegal characters. Illegal characters in names are control characters, the comma, colon, semicolon, slash, backslash, question mark, asterisk, and tilde.
0x89F0	240	WILD_CARD_NOT_ALLOWED	Attempt to use a wildcard character or wild object type in a call where wildcards are not allowed.
0x89F1	241	INVALID_BINDERY_SECURITY	Attempt to assign a security level of a bindery object or property to be higher than the user's security level. This would make the object or property inaccessible to the user.
0x89F2	242	NO_OBJECT_READ_PRIVILEGE	Attempt to access object information or scan the object's properties by a station without the necessary security to access this information.
0x89F3	243	NO_OBJECT_RENAME_PRIVILEGE	Attempt to rename an object without the necessary security. Only the Supervisor can rename objects. Note that if the station does not have the proper security to see that the object exists, then NCP_NO_SUCH_OBJECT is returned.
0x89F4	244	NO_OBJECT_DELETE_PRIVILEGE	Attempt to delete an object by a station without the necessary security to delete the object. Only the Supervisor can delete objects. Note that if the station does not even have the proper security to see that the object exists, then NCP_NO_SUCH_OBJECT is returned.
0x89F5	245	NO_OBJECT_CREATE_PRIVILEGE	Attempt to create an object by a station without the necessary security to create or change an object. Only Supervisors are allowed to create objects.
0x89F6	246	NO_PROPERTY_DELETE_PRIVILEGE	Attempt to delete a property by a station without the necessary security privilege to delete a property from the give object. Note that if the station does not have the proper security to see that the property exists, then NCP_NO_SUCH_PROPERTY is returned.
		NOT_SAME_LOCAL_DRIVE	
0x89F7	247	NO_PROPERTY_CREATE_PRIVILEGE	Attempt to create a property by a station without the necessary security to create or change a property for the object.
		TARGET_DRIVE_NOT_LOCAL	
0x89F8	248	NO_PROPERTY_WRITE_PRIVILEGE	Attempt to write by a station without the necessary write security to change the property data.
		ALREADY_ATTACHED_TO_SERVER	
		NOT_ATTACHED_TO_SERVER	
0x89F9	249	NO_FREE_CONNECTION_SLOTS	
		NO_PROPERTY_READ_PRIVILEGE	Attempt to read by a station without the necessary read security to access the property data.
0x89FA	250	NO_MORE_SERVER_SLOTS	
		TEMP_REMAP_ERROR	Attempt to use an unknown path.
0x89FB	251	INVALID_PARAMETERS	Attempt to use an invalid parameter (drive number, path, or flag value) during a set drive path call.
		NO_SUCH_PROPERTY	
0x89FC	252	INTERNET_PACKET_REQT_CANCELED	

		UNKNOWN_FILE_SERVER	Attempt to attach to a server using an invalid server name.
		MESSAGE_QUEUE_FULL	
		NO_SUCH_OBJECT	Attempt to use an object which doesn't exist, or the calling station doesn't have the proper security to access the object. Note that the object name and type must both match for the object to be found.
0x89FD	253	LOCK_COLLISION	
		BAD_STATION_NUMBER	Attempt to use a bad (undefined, unavailable, etc.) station number.
		INVALID_PACKET_LENGTH	The requesting packet did not have a 30 byte packet header as the first fragment, or its total length exceeded 576 characters.
		UNKNOWN_REQUEST	
0x89FE	254	BINDERY_LOCKED	Attempt to use a bindery which is temporarily locked by the Supervisor.
		TRUSTEE_NOT_FOUND	
		DIRECTORY_LOCKED	
		INVALID_SEMAPHORE_NAME_LENGTH	Attempt to open a semaphore with an invalid semaphore name length. Semaphores use strings that are from 1 to 127 bytes long.
		PACKET_NOT_DELIVERABLE	Currently unable to deliver packet for any of the following possible reasons: (1) The destination node is on another network, and no router could be found with a path to the destination network, or (2) the destination node address is on the local network, and hardware detects that the destination node address is nonexistent or inactive, or (3) the destination node is the same machine as the source node, and there is no pending list
		SERVER_BINDERY_LOCKED	
		SOCKET_TABLE_FULL	Attempt to open a socket when the socket table already has 50 entries marked as open.
		SPOOL_DIRECTORY_ERROR	
		SUPERVISOR_HAS_DISABLED_LOGIN	Attempt to log in when the Supervisor has disabled logins from the console or the bindery was locked.
		TIMEOUT_FAILURE	Failure caused by the timeout limit expiring before the request was fulfilled.
0x89FF	255	BAD_PRINTER_ERROR	Attempt to use a bad (undefined, unavailable, etc.) printer.
		BAD_RECORD_OFFSET	Attempt to use an invalid offset value during physical locking calls.
		CLOSE_FCB_ERROR	Error closing file.
		FILE_EXTENSION_ERROR	Attempt to use file with a bad (undefined, unavailable, etc.) extension.
		FILE_NAME_ERROR	Attempt to use file with a bad (undefined, unavailable, etc.) name.
		HARDWARE_FAILURE	
		INVALID_DRIVE_NUMBER	
		DOS_INVALID_DRIVE	Attempt to use an invalid (undefined, unavailable, etc.) drive.

INVALID_INITIAL_SEMAPHORE_VALUE	Attempt to open a semaphore with an invalid semaphore value. The semaphore value must be positive, and must be initialized to a value from 0 to 127.
INVALID_SEMAPHORE_HANDLE	Attempt to examine, wait, or signal a semaphore with an invalid semaphore handle. The semaphore handle is obtained through the open a semaphore call.
IO_BOUND_ERROR	Attempt to write beyond the end of file or disk.
NO_FILES_FOUND_ERROR	No files were found that matched the search specification.
NO_RESPONSE_FROM_SERVER	
NO_SUCH_OBJECT_OR_BAD_ PASSWORD	Attempt to use an unfound object, or attempt to use a bad (undefined, unavailable, etc.) password. On a login call, this indicates the password was correct, but it has expired and all grace logins have been used up. On a change password call, it indicates that the old password given was correct, but the account is not allowed to change the password (typical of the GUEST account).
PATH_NOT_LOCATABLE	Attempt to find an unknown path during a get full path call.
QUEUE_FULL_ERROR	Attempt to use a queue with 99 entries in it (99 is the maximum number of entries that can be placed in each print queue).
REQUEST_NOT_OUTSTANDING	
SOCKET_ALREADY_OPEN	Attempt to redundantly open a socket whose specified socket number is already open.
LOCK_ERROR	Attempt to use a locked file.

Directory Services OS Errors

Hex	Dec.	Constant	Desc.
0xFFFFFFFF	-1	EFAILURE	An NLM specific error, indicating that the function failed.
0xFFFFF	-001	DSERR_INSUFFICIENT_SPACE	
0xFFFFFFFB	-005	NIL_NAME_OR_NULL_LENGTH	For login problems this error can be returned if there is no tree name in the context handle or if there is an empty string "\0" specified for the tree. Enable the UPSTREAM environment variable USSETNOTREE to avoid UPSTREAM's setting the default tree.
0xFFF89	-119	DSERR_BUFFER_TOO_SMALL	The data to be passed back is too large for the buffer you have declared.
0xFFF88	-120	DSERR_VOLUME_FLAG_NOT_SET	
0xFFF87	-121	DSERR_NO_ITEMS_FOUND	You made a bindery request for items not found.
0xFFF86	-122	DSERR_CONN_ALREADY_TEMPORARY	Attempted to convert a temporary connection into a temporary connection.
0xFFF85	-123	DSERR_CONN_ALREADY_LOGGED_IN	Attempted to log in to a server you were already logged into.
0xFFF84	-124	DSERR_CONN_NOT_AUTHENTICATED	Attempted connection for call without being authenticated.

0xFFF83	-125	DSERR_CONN_NOT_LOGGED_IN	Attempted to log out of a connection you are not logged into.
0xFFF82	-126	DSERR_NCP_BOUNDARY_CHECK_ FAILED	NCP subfunction size does not match the actual size of data sent.
0xFFF81	-127	DSERR_LOCK_WAITING	Time-out occurred before file was locked.
0xFFF80	-128	DSERR_LOCK_FAIL	Attempted to open or create a file that is already open.
0xFFF7F	-129	DSERR_OUT_OF_HANDLES	No more file handles available; the network file handle table is full.
0xFFF7E	-130	DSERR_NO_OPEN_PRIVILEGE	Attempted to open a file without the open privilege.
0xFFF7D	-131	DSERR_HARD_IO_ERROR	Hard disk input/output error on a NetWare volume; a bad sector has been encountered and could be fatal.
0xFFF7C	-132	DSERR_NO_CREATE_PRIVILEGE	Attempted to create a file without the create privilege.
0xFFF7B	-133	DSERR_NO_CREATE_DELETE_PRIV	Attempted to create an already existing file without the create/delete privileges.
0xFFF7A	-134	DSERR_R_O_CREATE_FILE	Attempted to create a file with the same name as an already existing file with read-only status.
0xFFF79	-135	DSERR_CREATE_FILE_INVALID_NAME	A file name contains invalid characters.
0xFFF78	-136	DSERR_INVALID_FILE_HANDLE	Attempted to close or perform I/O on a file with an invalid file handle (i.e. trying to read from a file that has been closed).
0xFFF77	-137	DSERR_NO_SEARCH_PRIVILEGE	Attempted to search a directory without search privileges in that directory.
0xFFF76	-138	DSERR_NO_DELETE_PRIVILEGE	Attempted to delete a file without file deletion privileges in that file’s directory.
0xFFF75	-139	DSERR_NO_RENAME_PRIVILEGE	Attempted to rename a file without renaming privileges in that file’s directory.
0xFFF74	-140	DSERR_NO_SET_PRIVILEGE	Attempted to modify a file without attribute modification privileges in that file’s directory.
0xFFF73	-141	DSERR_SOME_FILES_IN_USE	Attempted to delete, rename, or set file attributes using an ambiguous filename while some of the files are in use by another workstation.
0xFFF72	-142	DSERR_ALL_FILES_IN_USE	Attempted to delete, rename, or set file attributes using a filename when the file or files are in use by another workstation.
0xFFF71	-143	DSERR_SOME_READ_ONLY	Attempted to open read-only files.
0xFFF70	-144	DSERR_ALL_READ_ONLY	Attempted to delete, rename, or set file attributes using a filename when all of the files specified have read-only status.
0xFFF6F	-145	DSERR_SOME_NAMES_EXIST	Attempted to rename files using an ambiguous filename, when one or more files matching the new filename specification already exist.
0xFFF6E	-146	DSERR_ALL_NAMES_EXIST	Attempted to rename a file using a filename, when all of the files matching the new filename specification already exist.
0xFFF6D	-147	DSERR_NO_READ_PRIVILEGE	Attempted to read a file without read privileges for that file.
0xFFF6C	-148	DSERR_NO_WRITE_PRIVILEGE	Attempt to write to a file without write privileges to that file, or if the specified file has read-only status.
0xFFF6B	-149	DSERR_FILE_DETACHED	Attempt to read or write to a detached file.

0xFFF6A	-150	DSERR_NO_ALLOC_SPACE	Attempt to write to a file server that does not currently have enough free DRAM to process this request.
		DSERR_TARGET_NOT_A_SUBDIR	
0xFFF69	-151	DSERR_NO_SPOOL_SPACE	The network OS has determined that the network disk doesn't have enough space left for spool files.
0xFFF68	-152	DSERR_INVALID_VOLUME	The network OS cannot find the requested volume in the system definition files.
0xFFF67	-153	DSERR_DIRECTORY_FULL	Attempted to write to a volume without available directory space.
0xFFF66	-154	DSERR_RENAME_ACROSS_VOLUME	Attempted to rename a file and move it from its current volume into another volume. The rename command may move the file between directories on the same volume; however, using rename to move a file between volumes is not allowed.
0xFFF65	-155	DSERR_BAD_DIR_HANDLE	Attempted to use an invalid directory handle. This occurs if the network has been brought down and back up without rebooting the workstation.
0xFFF64	-156	DSERR_INVALID_PATH	
0xFFF64	-156	DSERR_NO_SUCH_EXTENSION	No more trustees are listed in the directory.
0xFFF63	-157	DSERR_NO_DIR_HANDLES	No more directory handles available; the directory handle table is full. Each user may have up to 255 directory handles.
0xFFF62	-158	DSERR_BAD_FILE_NAME	Attempted to create a file using invalid file name characters.
0xFFF61	-159	DSERR_DIRECTORY_ACTIVE	Attempted to delete a directory that is being used by another workstation.
0xFFF60	-160	DSERR_DIRECTORY_NOT_EMPTY	Attempted to delete a directory that contains files or other directories.
0xFFF5F	-161	DSERR_DIRECTORY_IO_ERROR	A non-recoverable I/O error has occurred on the disk in the directory area. This error has occurred in both copies of the directory and is fatal.
0xFFF5E	-162	DSERR_IO_LOCKED	Attempt to read a file where data is physically locked.
0xFFF5D	-163	DSERR_TRANSACTION_RESTARTED	
0xFFF5C	-164	DSERR_RENAME_DIR_INVALID	
0xFFF5B	-165	DSERR_INVALID_OPENCREATE_MODE	
0xFFF5A	-166	DSERR_ALREADY_IN_USE	
0xFFF59	-167	DSERR_INVALID_RESOURCE_TAG	
0xFFF58	-168	DSERR_ACCESS_DENIED	
0xFFF42	-190	DSERR_INVALID_DATA_STREAM	
0xFFF41	-191	DSERR_INVALID_NAME_SPACE	
0xFFF40	-192	DSERR_NO_ACCOUNTING_PRIVILEGES	
0xFFF3F	-193	DSERR_NO_ACCOUNT_BALANCE	Attempt to log in by a bindery object without an accounting balance, and accounting is enabled.
0xFFF3E	-194	DSERR_CREDIT_LIMIT_EXCEEDED	Attempt to log in to account with no credit available.
0xFFF3D	-195	DSERR_TOO_MANY_HOLDS	
0xFFF3C	-196	DSERR_ACCOUNTING_DISABLED	
0xFFF3B	-197	DSERR_LOGIN_LOCKOUT	Attempt to log in after the system had locked the account because of intruder detection.

0xFFF3A	-198	DSERR_NO_CONSOLE_RIGHTS	Attempt to use console privileges without operator privileges.
0xFFF30	-208	DSERR_Q_IO_FAILURE	
0xFFF2F	-209	DSERR_NO_QUEUE	
0xFFF2E	-210	DSERR_NO_Q_SERVER	
0xFFF2D	-211	DSERR_NO_Q_RIGHTS	
0xFFF2C	-212	DSERR_Q_FULL	
0xFFF2B	-213	DSERR_NO_Q_JOB	
0xFFF2A	-214	DSERR_NO_Q_JOB_RIGHTS	
		DSERR_UNENCRYPTED_NOT_ALLOWED	
0xFFF29	-215	DSERR_Q_IN_SERVICE	
		DSERR_DUPLICATE_PASSWORD	Attempt to change password to a previously used password when the unique requirement is specified for the account.
0xFFF28	-216	DSERR_Q_NOT_ACTIVE	
		DSERR_PASSWORD_TOO_SHORT	Attempt to change password to a password with less characters than the required minimum specified for the account.
0xFFF27	-217	DSERR_Q_STN_NOT_SERVER	
		DSERR_MAXIMUM_LOGINS_EXCEEDED	Attempt to log in using an account which has limits on the number of concurrent connections and that number has been reached.
0xFFF26	-218	DSERR_Q_HALTED	
		DSERR_BAD_LOGIN_TIME	Attempt to log in during an unauthorized time of day specified for the account.
0xFFF25	-219	DSERR_Q_MAX_SERVERS	
		DSERR_NODE_ADDRESS_VIOLATION	Attempt to log in from an unauthorized station using an account with limits to a specific network and/or station.
0xFFF24	-220	DSERR_LOG_ACCOUNT_EXPIRED	Attempt to log in using an account which has expired or has been disabled by the Supervisor.
0xFFF22	-222	DSERR_BAD_PASSWORD	Attempt to log in using an account password which has expired and all grace logins have also expired.
0xFFF21	-223	DSERR_PASSWORD_EXPIRED	Attempt to log in using an expired account password but the login was allowed because the account had a grace login.
0xFFF20	-224	DSERR_NO_LOGIN_CONN_AVAILABLE	
0xFFF18	-232	DSERR_WRITE_TO_GROUP_PROPERTY	Attempt to write a data segment to a group property using the call to write a property value.
0xFFF17	-233	DSERR_MEMBER_ALREADY_EXISTS	Attempt to redundantly add an object to a group property.
0xFFF16	-234	DSERR_NO_SUCH_MEMBER	Attempt to use an object which is not a member of the defined group property.
0xFFF15	-235	DSERR_PROPERTY_NOT_GROUP	Attempt to use a non-group property.
0xFFF14	-236	DSERR_NO_SUCH_VALUE_SET	Attempt to use a nonexistent segment. Note that segments must be written sequentially when a property is first created, but may be read and written in any order after they already exist.

0xFFF13	-237	DSERR_PROPERTY_ALREADY_EXISTS	
0xFFF12	-238	DSERR_OBJECT_ALREADY_EXISTS	
0xFFF11	-239	DSERR_ILLEGAL_NAME	Request made with an object or property name containing illegal characters. Illegal characters in names are control characters, the comma, colon, semicolon, slash, backslash, question mark, asterisk, and tilde.
0xFFF10	-240	DSERR_ILLEGAL_WILDCARD	Attempt to use a wildcard character or wild object type in a call where wildcards are not allowed.
0xFFF0F	-241	DSERR_BINDERY_SECURITY	Attempt to assign a security level of a bindery object or property to be higher than the user's security level. This would make the object or property inaccessible to the user.
0xFFF0E	-242	DSERR_NO_OBJECT_READ_RIGHTS	Attempt to access object information or scan the object's properties by a station without the necessary security to access this information.
0xFFF0D	-243	DSERR_NO_OBJECT_RENAME_RIGHTS	Attempt to rename an object without the necessary security. Only the Supervisor can rename objects. Note that if the station does not have the proper security to see that the object exists, then NCP_NO_SUCH_OBJECT is returned.
0xFFF0C	-244	DSERR_NO_OBJECT_DELETE_RIGHTS	Attempt to delete an object by a station without the necessary security to delete the object. Only the Supervisor can delete objects. Note that if the station does not even have the proper security to see that the object exists, then NCP_NO_SUCH_OBJECT is returned.
0xFFF0B	-245	DSERR_NO_OBJECT_CREATE_RIGHTS	Attempt to create an object by a station without the necessary security to create or change an object. Only Supervisors are allowed to create objects.
0xFFF0A	-246	DSERR_NO_PROPERTY_DELETE_ RIGHTS	Attempt to delete a property by a station without the necessary security privilege to delete a property from the give object. Note that if the station does not have the proper security to see that the property exists, then NCP_NO_SUCH_PROPERTY is returned.
0xFFF09	-247	DSERR_NO_PROPERTY_CREATE_ RIGHTS	Attempt to create a property by a station without the necessary security to create or change a property for the object.
0xFFF08	-248	DSERR_NO_PROPERTY_WRITE_RIGHTS	
0xFFF07	-249	DSERR_NO_PROPERTY_READ_RIGHTS	Attempt to read by a station without the necessary read security to access the property data.
0xFFF06	-250	DSERR_TEMP_REMAP	Attempt to use an unknown path.
0xFFF05	-251	DSERR_UNKNOWN_REQUEST	Attempt to use an invalid parameter (drive number, path, or flag value) during a set drive path call.
		DSERR_NO_SUCH_PROPERTY	Attempt to use a property which doesn't exist for the specified object.
0xFFF04	-252	DSERR_MESSAGE_QUEUE_FULL	
		DSERR_TARGET_ALREADY_HAS_MSG	
		DSERR_NO_SUCH_OBJECT	Attempt to use an object which doesn't exist, or the calling station doesn't have the proper security to access the object. Note that the object name and type must both match for the object to be found.
0xFFF03	-253	DSERR_BAD_STATION_NUMBER	Attempt to use a bad (undefined, unavailable, etc.) station number.
0xFFF02	-254	DSERR_BINDERY_LOCKED	Attempt to use a bindery which is temporarily locked by the Supervisor.
		DSERR_DIR_LOCKED	

		DSERR_SPOOL_DELETE	
		DSERR_TRUSTEE_NOT_FOUND	
0xFFF01	-255	DSERR_HARD_FAILURE	
		DSERR_FILE_NAME	
		DSERR_FILE_EXISTS	
		DSERR_CLOSE_FCB	
		DSERR_IO_BOUND	Attempt to write beyond the end of file or disk.
		DSERR_NO_SPOOL_FILE	
		DSERR_BAD_SPOOL_PRINTER	Attempt to use a bad (undefined, unavailable, etc.) printer.
		DSERR_BAD_PARAMETER	
		DSERR_NO_FILES_FOUND	No files were found matching the search specification.
		DSERR_NO_TRUSTEE_CHANGE_PRIV	
		DSERR_TARGET_NOT_LOGGED_IN	
		DSERR_TARGET_NOT_ACCEPTING_ MSGS	
		DSERR_MUST_FORCE_DOWN	

Directory Services Client Errors

Hex.	Dec.	Constant	Desc.
0xFFFFFED3	-301	ERR_NOT_ENOUGH_MEMORY	Client workstation does not have memory to allocate.
0xFFFFFED2	-302	ERR_BAD_KEY	Trying to pass a bad key parameter for a context call. See NWDSDC.H for the correct parameter.
0xFFFFFED1	-303	ERR_BAD_CONTEXT	Trying to pass a bad context parameter to a Directory Services function. Call NWDSCreateContext first and use its return value as the context parameter.
0xFFFFFED0	-304	ERR_BUFFER_FULL	Ran out of room trying to add data to an input buffer.
0xFFFFFECF	-305	ERR_LIST_EMPTY	Passed an empty list (a null pointer) to NWDSPutAttrVal for one of the following syntax types: SYN_CI_LIST SYN_OCTET_LIST.
0xFFFFFECE	-306	ERR_BAD_SYNTAX	Tried to pass a bad syntax ID.
0xFFFFFECD	-307	ERR_BUFFER_EMPTY	Tried to get data from an empty buffer.
0xFFFFFECC	-308	ERR_BAD_VERB	Initialized the buffer with a verb not associated with the API call.
0xFFFFFECB	-309	ERR_EXPECTED_IDENTIFIER	The name being parsed is not typed.
0xFFFFFECA	-310	ERR_EXPECTED_EQUALS	An equal sign is expected in the name.
0xFFFFFEC9	-311	ERR_ATTR_TYPE_EXPECTED	The name being parsed is a multi-AVA and must be typed (All AVAs must be either typed or not typed).
0xFFFFFEC8	-312	ERR_ATTR_TYPE_NOT_EXPECTED	The name being parsed is a multi-AVA and must not be typed (All AVAs must be either typed or not typed).
0xFFFFFEC7	-313	ERR_FILTER_TREE_EMPTY	Tried to delete an empty filter.
0xFFFFFEC6	-314	ERR_INVALID_OBJECT_NAME	(1) Tried to pass a NULL string for object name to the API call or (2) Tried to pass a name containing both leading and trailing dots.

0xFFFFFEC5	-315	ERR_EXPECTED_RDN_DELIMITER	An RDN delimiter (.) was expected and not found during the name parse.
0xFFFFFEC4	-316	ERR_TOO_MANY_TOKENS	Too many trailing delimiter dots in name; only three context levels and four trailing dots in name are permitted.
0xFFFFFEC3	-317	ERR_INCONSISTENT_MULTIAVA	AVA type passed in is wrong.
0xFFFFFEC2	-318	ERR_COUNTRY_NAME_TOO_LONG	Country name identifiers are only allowed one character.
0xFFFFFEC1	-319	ERR_SYSTEM_ERROR	Internal error.
0xFFFFFEC0	-320	ERR_CANT_ADD_ROOT	Tried to restore an object at the root.
0xFFFFFEBF	-321	ERR_UNABLE_TO_ATTACH	Could not connect to the specified server.
0xFFFFFEBE	-322	ERR_INVALID_HANDLE	Invalid iteration handle.
0xFFFFFEBD	-323	ERR_BUFFER_ZERO_LENGTH	Tried to call NWDSAllocBuf with a zero-length size.
0xFFFFFEBC	-324	ERR_INVALID_REPLICA_TYPE	Attempted to pass in a replica type that was not a MASTER, SECONDARY, or READONLY
0xFFFFFEBB	-325	ERR_INVALID_ATTR_SYNTAX	Attempted to pass in an invalid attribute syntax ID.
0xFFFFFEBA	-326	ERR_INVALID_FILTER_SYNTAX	Attempted to pass in an invalid filter syntax ID.
0xFFFFFEB8	-328	ERR_CONTEXT_CREATION	Failed to create a context--usually because unicode tables were not loaded.
0xFFFFFEB7	-329	ERR_INVALID_UNION_TAG	The server returned an infotype parameter that did not agree with the infotype you passed in.
0xFFFFFEB6	-330	ERR_INVALID_SERVER_RESPONSE	Returned from NWDSGetSyntaxID.
0xFFFFFEB5	-331	ERR_NULL_POINTER	Entered a NULL pointer, a real pointer was expected.
0xFFFFFEB4	-332	ERR_NO_SERVER_FOUND	
0xFFFFFEB3	-333	ERR_NO_CONNECTION	Internal error--contact Novell Customer Support.
0xFFFFFEB2	-334	ERR_RDN_TOO_LONG	The RDN exceeded 128 characters.
0xFFFFFEB1	-335	ERR_DUPLICATE_TYPE	Multi-AVAs--AVAs cannot contain same type.
0xFFFFFEB0	-336	ERR_DATA_STORE_FAILURE	
0xFFFFFEAF	-337	ERR_NOT_LOGGED_IN	
0xFFFFFEAE	-338	ERR_INVALID_PASSWORD_CHARS	Entered password characters that are invalid.
0xFFFFFEAD	-339	ERR_FAILED_SERVER_AUTHENT	Attempted server authentication failed.
0xFFFFFEAC	-340	ERR_TRANSPORT	Transport failed.
0xFFFFFEAB	-341	ERR_NO_SUCH_SYNTAX	Attempted to use an invalid syntax.
0xFFFFFEAA	-342	ERR_INVALID_DS_NAME	(1) An empty string passed in for a name or (2) a NULL pointer.
0xFFFFFEA9	-343	ERR_ATTR_NAME_TOO_LONG	Attribute name exceeded 32 characters.
0xFFFFFEA8	-344	ERR_INVALID_TDS	Tagged Data Store is either uninitialized or corrupted. Usually, NWDSLogin was not first called.
0xFFFFFEA7	-345	ERR_INVALID_DS_VERSION	
0xFFFFFEA6	-346	ERR_UNICODE_TRANSLATION	A unicode translation error returned from one of three functions: NWDSListPartitions, NWDSSyncPartition, and NWDSSyncSchema.
0xFFFFFEA5	-347	ERR_SCHEMA_NAME_TOO_LONG	Schema name exceeded 32 characters.

0xFFFFFEA4	-348	ERR_UNICODE_FILE_NOT_FOUND	Unicode file could not be found in the defined search algorithm defined in NWInitUnicodeTables.
0xFFFFFEA3	-349	ERR_UNICODE_ALREADY_LOADED	(DOS-only) NWInitUnicodeTables attempted to call unicode tables more than once.
0xFFFFFEA2	-350	ERR_NOT_CONTEXT_OWNER011	
0xFFFFFEA1	-351	ERR_ATTEMPT_TO_AUTHENTICATE_0	
0xFFFFFEA0	-352	ERR_NO_WRITABLE_REPLICAS	Returned by NWDSLogout: On logout, the server logs out of the monitor connection. Subsequently the API call tries to find a writable replica of that monitor connection's partition, but can't.
0xFFFFFE9F	-353	ERR_DN_TOO_LONG	The name passed in exceeded 256 characters.
0xFFFFFE9E	-354	ERR_RENAME_NOT_ALLOWED	Attempt to move an object to the same place in the tree that it was in. See NWDSMoveObject.

Directory Services Agent Errors

Hex.	Dec.	Constant	Desc.
0xFFFFFDA7	-601	ERR_NO_SUCH_ENTRY	Object passed in could not be found. Check context relative to the passed-in name.
0xFFFFFDA6	-602	ERR_NO_SUCH_VALUE	The requested attribute value could not be found.
0xFFFFFDA5	-603	ERR_NO_SUCH_ATTRIBUTE	The requested attribute could not be found.
0xFFFFFDA4	-604	ERR_NO_SUCH_CLASS	The class does not exist.
0xFFFFFDA3	-605	ERR_NO_SUCH_PARTITION	The name of the passed-in partition could not be found.
0xFFFFFDA2	-606	ERR_ENTRY_ALREADY_EXISTS	Attempted to add object at the same level in the tree as a pre-existing object of the same name.
0xFFFFFDA1	-607	ERR_NOT_EFFECTIVE_CLASS	Attempted to create an object of a base class that is not an effective class.
0xFFFFFDA0	-608	ERR_ILLEGAL_ATTRIBUTE	Attempted to add an attribute illegal for that object class.
0xFFFFFD9F	-609	ERR_MISSING_MANDATORY	Attempted to add an object missing a mandatory attribute.
0xFFFFFD9E	-610	ERR_ILLEGAL_DS_NAME	Server found a problem with a name passed in by the client.
0xFFFFFD9D	-611	ERR_ILLEGAL_CONTAINMENT	Attempted to add an object violating the schema's containment roles for that type of object.
0xFFFFFD9C	-612	ERR_CANT_HAVE_MULTIPLE_ VALUES	Attempted to add more than one value to a single-value attribute.
0xFFFFFD9B	-613	ERR_SYNTAX_VIOLATION	
0xFFFFFD9A	-614	ERR_DUPLICATE_VALUE	Attempted to add the same attribute-value combination to an object.
0xFFFFFD99	-615	ERR_ATTRIBUTE_ALREADY_EXISTS	Attempted to add an attribute that already exists.
0xFFFFFD98	-616	ERR_MAXIMUM_ENTRIES_EXIST	The server has reached the maximum entries in its data base.
0xFFFFFD97	-617	ERR_DATABASE_FORMAT	

0xFFFFFD96	-618	ERR_INCONSISTENT_DATABASE	The server has detected an inconsistent database—-usually the number of entries in a container does not match the number stored in the containers entry.
0xFFFFFD95	-619	ERR_INVALID_COMPARISON	Attempted to (1) compare two attributes that are not comparable or (2) use an invalid compare syntax.
0xFFFFFD94	-620	ERR_COMPARISON_FAILED	
0xFFFFFD93	-621	ERR_TRANSACTIONS_DISABLED	
0xFFFFFD92	-622	ERR_INVALID_TRANSPORT	The type of transport passed in to the server is not supported by the server.
0xFFFFFD91	-623	ERR_SYNTAX_INVALID_IN_NAME	
0xFFFFFD90	-624	ERR_REPLICA_ALREADY_EXISTS	Name passed in for replica already exists.
0xFFFFFD8F	-625	ERR_TRANSPORT_FAILURE	
0xFFFFFD8E	-626	ERR_ALL_REFERRALS_FAILED	Server has no objects matching request and has attempted to contact x other servers to find the object. None of those servers respond.
0xFFFFFD8D	-627	ERR_CANT_REMOVE_NAMING_ VALUE	Attempted to delete the naming attribute. Rename the object, then delete the attribute.
0xFFFFFD8C	-628	ERR_OBJECT_CLASS_VIOLATION	
0xFFFFFD8B	-629	ERR_ENTRY_IS_NOT_LEAF	Attempted to delete an entry containing subordinates, which the API call cannot do. First delete the subordinates.
0xFFFFFD8A	-630	ERR_DIFFERENT_TREE	
0xFFFFFD89	-631	ERR_ILLEGAL_REPLICA_TYPE	
0xFFFFFD88	-632	ERR_SYSTEM_FAILURE	
0xFFFFFD87	-633	ERR_INVALID_ENTRY_FOR_ROOT	
0xFFFFFD86	-634	ERR_NO_REFERRALS	Server has no objects that match request and has no referrals on which to search for the object.
0xFFFFFD85	-635	ERR_REMOTE_FAILURE	Attempt to connect to remote server failed.
)xFFFFFD84	-636	ERR_UNREACHABLE_SERVER	
0xFFFFFD83	-637	ERR_PREVIOUS_MOVE_IN_PROGRESS	
0xFFFFFD82	-638	ERR_NO_CHARACTER_MAPPING	
0xFFFFFD81	-639	ERR_INCOMPLETE_AUTHENTICATION	
0xFFFFFD80	-640	ERR_INVALID_CERTIFICATE	
0xFFFFFD7F	-641	ERR_INVALID_REQUEST	Server did not understand request—-for example, verb sent by client could be wrong.
0xFFFFFD7E	-642	ERR_INVALID_ITERATION	Iteration handle passed in by client is wrong.
0xFFFFFD7D	-643	ERR_SCHEMA_IS_NONREMOVABLE	Attempted to delete Novell base schema.
0xFFFFFD7C	-644	ERR_SCHEMA_IS_IN_USE	Attempted to delete a schema entry that still contains an object using that schema entry. Delete that object or attribute, then delete the schema.
0xFFFFFD7B	-645	ERR_CLASS_ALREADY_EXISTS	Attempted to add a class already existing in the schema.
0xFFFFFD7A	-646	ERR_BAD_NAMING_ATTRIBUTES	
0xFFFFFD79	-647	ERR_NOT_ROOT_PARTITION	Attempted a function required on the root partition and (1) client did not pass in the root partition name or (2) client has attempted to do the function somewhere besides the root partition.

0xFFFFFD78	-648	ERR_INSUFFICIENT_STACK	Server ran out of stack.
0xFFFFFD77	-649	ERR_INSUFFICIENT_BUFFER	Server ran out of memory.
0xFFFFFD76	-650	ERR_AMBIGUOUS_CONTAINMENT	Attempted to create a schema definition for a class containing an ambiguous containment rule.
0xFFFFFD75	-651	ERR_AMBIGUOUS_NAMING	Attempted to create a schema definition for a class containing an ambiguous containment name.
0xFFFFFD74	-652	ERR_DUPLICATE_MANDATORY	Attempted to create a schema definition for a class containing a duplicate mandatory name.
0xFFFFFD73	-653	ERR_DUPLICATE_OPTIONAL	Attempted to create a schema definition for a class containing a duplicate optional name.
0xFFFFD72	-654	ERR_PARTITION_BUSY	
0xFFFFFD71	-655	ERR_MULTIPLE_REPLICAS	
0xFFFFFD70	-656	ERR_CRUCIAL_REPLICA	
0xFFFFFD6F	-657	ERR_SCHEMA_SYNC_IN_PROGRESS	Function could not be completed because schema sync was in progress.
0xFFFFFD6E	-658	ERR_SKULK_IN_PROGRESS	Function could not be completed because skulk was in progress.
0xFFFFFD6D	-659	ERR_TIME_NOT_SYNCHRONIZED	Servers are not synchronized.
0xFFFFFD6C	-660	ERR_RECORD_IN_USE	
0xFFFFFD6B	-661	ERR_DS_VOLUME_NOT_MOUNTED	
0xFFFFFD6A	-662	ERR_DS_VOLUME_IO_FAILURE	
0xFFFFFD69	-663	ERR_DS_LOCKED	DS Database is locked; analogous to bindery being locked.
0xFFFFFD68	-664	ERR_OLD_EPOCH	
0xFFFFFD67	-665	ERR_NEW_EPOCH	
0xFFFFFD66	-666	ERR_INCOMPATIBLE_DS_VERSION	
0xFFFFFD65	-667	ERR_PARTITION_ROOT	Attempted a function that cannot be done on the root partition.
0xFFFFFD64	-668	ERR_ENTRY_NOT_CONTAINER	Attempted to do an illegal function on a leaf object.
0xFFFFFD63	-669	ERR_FAILED_AUTHENTICATION	Passed in a bad password.
0xFFFFFD62	-669	ERR_INVALID_CONTEXT	
0xFFFFFD61	-671	ERR_NO_SUCH_PARENT	
0xFFFFFD60	-672	ERR_NO_ACCESS	Client has no rights to do the function returning the error.
0xFFFFFD5F	-673	ERR_REPLICA_NOT_ON	
0xFFFFFD5E	-674	ERR_INVALID_NAME_SERVICE	
0xFFFFFD5D	-675	ERR_INVALID_TASK	
0xFFFFFD5C	-676	ERR_INVALID_CONN_HANDLE	
0xFFFFFD5B	-677	ERR_INVALID_IDENTITY	
0xFFFFFD5A	-678	ERR_DUPLICATE_ACL	
0xFFFFFD59	-679	ERR_PARTITION_ALREADY_EXISTS	
0xFFFFFD58	-680	ERR_TRANSPORT_MODIFIED	
0xFFFFFD57	-681	ERR_ALIAS_OF_AN_ALIAS	Attempted to alias an alias.

0xFFFFFD56	-682	ERR_AUDITING_FAILED	
0xFFFFFD55	-683	ERR_INVALID_API_VERSION	Library passed an invalid API version; for example, client may be using an old library.
0xFFFFFD54	-684	ERR_SECURE_NCP_VIOLATION	
0xFFFFFD53	-685	ERR_MOVE_IN_PROGRESS	
0xFFFFFD52	-686	ERR_NOT_LEAF_PARTITION	
0xFFFFFD51	-687	ERR_CANNOT_ABORT	
0xFFFFFD50	-688	ERR_CACHE_OVERFLOW	
0xFFFFFD4F	-689	ERR_INVALID_SUBORDINATE_COUNT	
0xFFFFFD4E	-690	ERR_INVALID_RDN	
0xFFFFFD4D	-691	ERR_MOD_TIME_NOT_CURRENT	
0xFFFFFD4C	-692	ERR_INCORRECT_BASE_CLASS	
0xFFFFFD4B	-693	ERR_MISSING_REFERENCE	
0xFFFFFD4A	-694	ERR_LOST_ENTRY	
0xFFFFFD49	-695	ERR_AGENT_ALREADY_REGISTERED	
0xFFFFFD48	-696	ERR_DS_LOADER_BUSY	
0xFFFFFD47	-697	ERR_DS_CANNOT_RELOAD	
0xFFFFFD46	-698	ERR_REPLICA_IN_SKULK	
0xFFFFFD45	-699	ERR_FATAL	
0xFFFFFD44	-700	ERR_OBSOLETE_API	
0xFFFFFD43	-701	ERR_SYNCHRONIZATION_DISABLED	
0xFFFFFD42	-702	ERR_INVALID_PARAMETER	

DOS/Windows IPX/SPX errors

Hex.	Dec.	Constant	Desc.
EC	236		Connection terminated. (Windows) SPX terminated poorly.
ED	237		Connection failed. SPX terminated poorly. (Windows) SPX connection terminated.
EE	238		Invalid connection.
EF	239		Connection table full.
F0	240		IPX not installed.
F1	241		(Windows) IPX/SPX not initialized.
F2	242		(Windows) No DOS memory.
F3	243		(Windows) No free ECB.
F4	244		(Windows) Lock failed.
F5	245		(Windows) Over the maximum limit.
F6	246		(Windows) IPX/SPX previously initialized.

F9	249	ECB Cannot be canceled
FA	250	No local target identified.
FC	252	Request canceled. SPX connection closed.
FD	253	Bad packet. Given packet did not have a 30-byte packet header as the first fragment or its total length exceeded 567 bytes. Packet overflow.
FE	254	Socket table full. Packet not deliverable.
FF	255	ECB not in use Socket not open. Socket already open. Hardware failure. (Windows) SPX not installed. (Windows) SPX socket not opened.

IPX/SPX for OS/2

Hex.	Dec.	Constant	Desc.
8001	32769	(-32767)	Socket table full.
8002	32770	(-32766)	Bad packet.
8004	32772	(-32764)	Packet not found.
8006	32774	(-32762)	Receive overflow.
8007	32775	(-32761)	Canceled
9001	36865	(-28671)	IPX timeout
9002	36866	(-28670)	No route
9003	36867	(-28669)	Socket in use.
9004	36868	(-28668)	Socket not open.
A002	40962	(-24574)	Socket table full. Out of resource.
A0FF	41215	(-24321)	SPX ECB in use.
A1F9	41465	(-24071)	Cancel failed.
A1FF	41471	(-24065)	ECB not found.
A2ED	41709	(-23827)	Connection failed.
A2EE	41710	(-23826)	SPX connection not found.
A2FD	41725	(-23811)	Connection failed. Bad packet.
A3EF	41967	(-23569)	Connection table full.
A402	41986	(-23550)	Bad connection status.
A601	42497	(-23039)	Invalid fragment list.

36.9.1. Novell SMS errors:

Code	Constant	Description
0x80000001	SMERR_OUT_OF_MEMORY	Out of memory
0x80000002	SMERR_OUT_OF_SHMEM	Out of shared memory in SMDR
0x80000003	SMERR_INVALID_PARAMETER	Invalid parameter has been passed
0x80000004	SMERR_INVALID_PATHNAME	Invalid pathname
0x80000005	SMERR_INVALID_BUFFER_SIZE	Invalid buffer size
0x80000006	SMERR_INVALID_ADDRESS	Invalid address has been passed
0x80000007	SMERR_INVALID_HANDLE	The handle to the resource is invalid
0x80000008	SMERR_INVALID_CONTEXT	The context of the resource is invalid
0x80000009	SMERR_INVALID_NAME	The name passed to the function is Invalid
0x8000000A	SMERR_INVALID_INSTANCE	Invalid instance
0x8000000B	SMERR_INVALID_TARGET	Target instance is invalid
0x8000000C	SMERR_INVALID_SERVICE	Service instance is invalid
0x8000000D	SMERR_INVALID_PROTOCOL	Protocol instance is invalid
0x8000000E	SMERR_INVALID_STREAM	Communication stream instance is invalid
0x8000000F	SMERR_INVALID_TYPE	Service type is invalid
0x80000010	SMERR_INVALID_SYNTAX	Invalid syntax
0x80000020	SMERR_NAME_TOO_LONG	Name length is out of limits
0x80000021	SMERR_CORRUPTED_STATE	Variable instance is corrupted
0x80000022	SMERR_UNSUPPORTED_FUNCTION	Function is not supported
0x80000023	SMERR_UNKNOWN_ADDRESS	Unknown address
0x80000024	SMERR_UNKNOWN_SERVICE_TYPE	Unknown service type
0x80000025	SMERR_UNKNOWN_ERROR	Unknown error
0x80000026	SMERR_UNKNOWN_COMMAND	Unknown command
0x80000027	SMERR_UNKNOWN_ENCRYPTION	Encryption method unknown
0x80000028	SMERR_REGISTRY_INVALID	Registry is invalid
0x80000029	SMERR_REGISTRY_EMPTY	Registry is empty
0x8000002A	SMERR_REGISTRY_FULL	Registry is full
0x8000002B	SMERR_RESOURCE_LOCKED	Resource is locked
0x8000002C	SMERR_INSTANCE_BUSY	Instance is under use
0x8000002D	SMERR_SHUTDOWN_FAILURE	SMDR shutdown failure

Code	Constant	Description
0x8000002E	SMERR_TIMEOUT	Communication timeout
0x80000030	SMERR_NO_PROTOCOLS	No protocols available
0x80000031	SMERR_NO_SERVICES	No services available
0x80000032	SMERR_NO_DSAPI	NDS APIs not available
0x80000100	SMERR_FILE_NOT_FOUND	Requested file not found
0x80000101	SMERR_CREATE_FAILURE	Failed to create an instance
0x80000102	SMERR_OPEN_FAILURE	Failed to open a resource
0x80000103	SMERR_READ_FAILURE	Failed to read from a resource
0x80000104	SMERR_WRITE_FAILURE	Failed to write to a resource
0x80000105	SMERR_SEEK_FAILURE	Failed to seek within resource
0x80000106	SMERR_CLOSE_FAILURE	Failed to close a resource
0x80000107	SMERR_ACCESS_DENIED	Denied access to a resource
0x80000108	SMERR_DELETE_FAILURE	Failed to delete a resource
0x80000109	SMERR_BAD_CONFIGURATION	Bad SMDR configuration
0x80000110	SMERR_BAD_FILE_HANDLE	Bad file handle
0x8000011a	SMERR_BAD_COMMAND_LINE	Invalid command line arguments
0x8000011b	SMERR_BAD_OPTION	Incorrect option specified
0x8000011c	SMERR_BAD_OPTION_VALUE	Incorrect option value
0x8000011d	SMERR_NO_MECHANISM	No naming mechanism enabled
0x8000011e	SMERR_HELP_OPTION	Specifies help
0x80000200	SMERR_BUFFER_OVERFLOW	Buffer overflow occurred
0x80000201	SMERR_BUFFER_UNDERFLOW	Buffer underflow occurred
0x80000202	SMERR_BUFFER_LOCKED	Buffer is locked
0x80000203	SMERR_ENTRY_NOT_FOUND	Entry not found
0x80000204	SMERR_ENTRY_EXISTS	Duplicate entry exists
0x80000205	SMERR_REMOVING_ENTRY	Removing entry
0x80000206	SMERR_TABLE_OVERFLOW	Table overflow occurred
0x80000207	SMERR_INVALID_INDEX	Invalid index specified
0x80000208	SMERR_PROTOCOL_NOT_FOUND	Unknown protocol
0x80000209	SMERR_SVCTYPE_NOT_FOUND	Unknown service type
0x8000020A	SMERR_SERVICE_NOT_FOUND	Unknown service
0x8000020B	SMERR_NOT_AUTHENTICATED	Authentication necessary to access resource

Code	Constant	Description
0x8000020C	SMERR_INSUFFICIENT_RIGHTS	Insufficient rights to access resource
0x80000300	SMERR_UNKNOWN_HOST	Unknown host specified
0x80000302	SMERR_CONNECT_FAILURE	Failed to connect to resource
0x80000303	SMERR_DISCONNECTED	Resource disconnected
0x80000304	SMERR_DISCONNECT_FAILURE	Resource disconnection failure
0x80000305	SMERR_LISTENER_FAILURE	Listener failure
0x80000306	SMERR_ACCEPT_FAILURE	Accept failure
0x80000307	SMERR_TSP_BIND_FAILURE	Unable to bind to Transport Protocol
0x80000308	SMERR_POLL_FAILURE	Unable to poll
0x80000310	SMERR_LOGIN_FAILURE	Login failure
0x80000311	SMERR_AUTHENTICATION_FAILURE	Authentication failure
0x80000312	SMERR_TRANSPORT_FAILURE	Transport failure
0x80000400	SMERR_SPAWN_FAILURE	Failed to spawn child
0x80000402	SMERR_MODULE_LOAD_FAILURE	Unable to load module
0x80000403	SMERR_MODULE_UNLOAD_FAILURE	Unable to unload module
0x80000404	SMERR_DYNAMIC_BIND_FAILURE	Dynamic bind failure
0x80000405	SMERR_DYNAMIC_UNBIND_FAILURE	Dynamic unbind failure
0x80000406	SMERR_INVALID_DYNAMIC_SYMBOL	Invalid dynamic function symbol
0x80000407	SMERR_INVALID_CONSTRUCTOR	Invalid constructor
0x80000501	SMERR_NO_DATA_FOUND	No data found
0x80000502	SMERR_TARGET_NOT_REGISTERED	Target not registered
0x80000600	SMERR_SAP_FAILED	Unable to advertise through Service Access Protocol
0xFFFDFFB1	NWSMTS_INTERNAL_ERROR	An internal TSA error occurred, see the error log for more details
0xFFFDFFB2	NWSMTS_COMPRESSION_CONFLICT	Attempted to put compressed data on a noncompressed volume
0xFFFDFFB3	NWSMTS_MAX_CONNECTIONS	All available connections to the TSA are in use
0xFFFDFFB4	NWSMTS_REDIRECT_TRANSPORT	Indicates reconnection requirement
0xFFFDFFB5	NWSMTS_WRITE_ERROR	An error occurred while writing to a file
0xFFFDFFB6	NWSMTS_WRITE_ERROR_SHORT	An error occurred while writing to a file. Could not write all of the data of current request
0xFFFDFFB7	NWSMTS_WRITE_EA_ERR	Unable to write the extended attribute information
0xFFFDFFB8	NWSMTS_VALID_PARENT_HANDLE	A valid parent handle was created
0xFFFDFFB9	NWSMTS_UNSUPPORTED_FUNCTION	The requested function is not supported by this TSA

Code	Constant	Description
0xFFFDFFBA	NWSMTS_TSA_NOT_FOUND	Invalid or inactive TSA specified
0xFFFDFFBB	NWSMTS_TRANSPORT_PACKET_SIZE_ER	The read/write request exceeds 128K
0xFFFDFFBC	NWSMTS_TRANSPORT_FAILURE	The transport mechanism failed
0xFFFDFFBD	NWSMTS_SET_FILE_INFO_ERR	Unable to set file information
0xFFFDFFBE	NWSMTS_SELECTION_TYPE_NOT_USED	Selection type is not used
0xFFFDFFBF	NWSMTS_SCAN_TYPE_NOT_USED	Scan type is not used
0xFFFDFFC0	NWSMTS_SCAN_TRUSTEE_ERR	Unable to scan for the trustees information
0xFFFDFFC1	NWSMTS_SCAN_NAME_SPACE_ERR	Unable to scan name-space specific information
0xFFFDFFC2	NWSMTS_SCAN_IN_PROGRESS	Cannot alter the resource list while a scans is in progress
0xFFFDFFC4	NWSMTS_SCAN_ERROR	The scan failed; the probable cause is an invalid path
0xFFFDFFC3	NWSMTS_SCAN_FILE_ENTRY_ERR	Unable to scan file entry information
0xFFFDFFC5	NWSMTS_RESOURCE_NAME_NOT_FOUND	No resource name is found or all resource names have been found
0xFFFDFFC6	NWSMTS_READ_ERROR	Cannot read the file
0xFFFDFFC7	NWSMTS_READ_EA_ERR	Unable to read the extended attributes
0xFFFDFFC8	NWSMTS_OVERFLOW	A UINT64 value overflowed
0xFFFDFFC9	NWSMTS_OUT_OF_MEMORY	The file server is out of memory or the memory allocation failed
0xFFFDFFCA	NWSMTS_OUT_OF_DISK_SPACE	Cannot restore the data, because the target service is out of disk space
0xFFFDFFCB	NWSMTS_OPEN_MODE_TYPE_NOT_USED	The open mode option is not used
0xFFFDFFCC	NWSMTS_OPEN_ERROR	Cannot open a file
0xFFFDFFCD	NWSMTS_OPEN_DATA_STREAM_ERR	Unable to open a data stream
0xFFFDFFCE	NWSMTS_NO_SUCH_PROPERTY	No such property.
0xFFFDFFCF	NWSMTS_NO_SEARCH_PRIVILEGES	No search privilege on the client service
0xFFFDFFD0	NWSMTS_NO_MORE_NAMES	No more entries in the list or name space name Space does not exist
0xFFFDFFD1	NWSMTS_NO_MORE_DATA_SETS	There are no more data sets to scan
0xFFFDFFD2	NWSMTS_NO_MORE_DATA	No more data exists
0xFFFDFFD3	NWSMTS_NO_CONNECTION	The specified connection is invalid or does not exist
0xFFFDFFD4	NWSMTS_NOT_READY	The specified server is unable to service the request at this time
0xFFFDFFD5	NWSMTS_NAME_SP_PATH_NOT_UPDATED	The name space path has not been updated
0xFFFDFFD6	NWSMTS_LOGOUT_ERROR	Unable to logout
0xFFFDFFD7	NWSMTS_LOGIN_DENIED	Login denied

Code	Constant	Description
0xFFFDFFD8	NWSMTS_INVALID_SEQUENCE_NUMBER	The sequence number is invalid
0xFFFDFFD9	NWSMTS_INVALID_SELECTION_TYPE	Invalid selection type. The selection type was either less than zero or greater than thirty one
0xFFFDFFDA	NWSMTS_INVALID_SEL_LIST_ENTRY	An invalid selection list entry was passed
0xFFFDFFDB	NWSMTS_INVALID_SCAN_TYPE	Invalid scan type was used. The scan type was either less than zero or greater than thirty one
0xFFFDFFDC	NWSMTS_INVALID_PATH	An invalid path was used
0xFFFDFFDD	NWSMTS_INVALID_PARAMETER	One or more of the parameters are NULL or invalid
0xFFFDFFDE	NWSMTS_INVALID_OPEN_MODE_TYPE	Invalid open mode option type. The option type is less than zero or greater than 23
0xFFFDFFDF	NWSMTS_INVALID_OBJECT_ID	The object's backed up id and name does not match the current object's id and name
0xFFFDFFE0	NWSMTS_INVALID_NAME_SPACE_TYPE	The name space type does not exist or is invalid
0xFFFDFFE1	NWSMTS_INVALID_MESSAGE_NUMBER	The message number is invalid
0xFFFDFFE2	NWSMTS_INVALID_HANDLE	The handle is tagged invalid or is set to zero
0xFFFDFFE3	NWSMTS_INVALID_DATA_SET_TYPE	Data set type is invalid
0xFFFDFFE4	NWSMTS_INVALID_DATA_SET_NAME	The data set name is invalid
0xFFFDFFE5	NWSMTS_INVALID_DATA_SET_HANDLE	The data set handle is invalid
0xFFFDFFE6	NWSMTS_INVALID_DATA	The data set is invalid
0xFFFDFFE7	NWSMTS_INVALID_CONNECTION_HANDL	An invalid connection handle was passed.
0xFFFDFFE8	NWSMTS_GET_VOL_NAME_SPACE_ERR	Unable to get the name space information that is supported by the volume
0xFFFDFFE9	NWSMTS_GET_SERVER_INFO_ERR	Unable to get the file server's information
0xFFFDFFEA	NWSMTS_GET_NAME_SPACE_SIZE_ERR	Unable to get name space size information
0xFFFDFFEB	NWSMTS_GET_NAME_SPACE_ENTRY_ERR	Unable to get the name space entry name
0xFFFDFFEC	NWSMTS_GET_ENTRY_INDEX_ERR	Unable to get the entry index
0xFFFDFFED	NWSMTS_GET_DATA_STREAM_NAME_ERR	Unable to get the data stream's name
0xFFFDFFEE	NWSMTS_GET_BIND_OBJ_NAME_ERR	Unable to get the name of a bindery object
0xFFFDFFEF	NWSMTS_EXPECTING_TRAILER	Received a Record or Subrecord Trailer, but could not locate the trailer field
0xFFFDFFF0	NWSMTS_EXPECTING_HEADER	Received a Record or Subrecord Header, but could not locate the header field
0xFFFDFFF1	NWSMTS_DELETE_ERR	Cannot delete a data set
0xFFFDFFF2	NWSMTS_DATA_SET_NOT_FOUND	No data sets were found
0xFFFDFFF3	NWSMTS_DATA_SET_IS_OPEN	Attempted to open an already data set or attempted to alter a scan while a data set is open

Code	Constant	Description
0xFFFDFFF4	NWSMTS_DATA_SET_IS_OLDER	The existing data set on the target data set is newer the one on the media, the data set will not be restored
0xFFFDFFF5	NWSMTS_DATA_SET_IN_USE	Data set is currently in use and cannot be accessed
0xFFFDFFF6	NWSMTS_DATA_SET_EXECUTE_ONLY	Can only execute the file
0xFFFDFFF7	NWSMTS_DATA_SET_EXCLUDED	The data set is excluded by the selection list
0xFFFDFFF8	NWSMTS_DATA_SET_ALREADY_EXISTS	The data set name already exists
0xFFFDFFF9	NWSMTS_CREATE_ERROR	Cannot create a file
0xFFFDFFFA	NWSMTS_CREATE_DIR_ENTRY_ERR	Cannot create directory entry
0xFFFDFFFB	NWSMTS_CLOSE_BINDERY_ERROR	Cannot close the bindery
0xFFFDFFFC	NWSMTS_CANT_ALLOC_DIR_HANDLE	Cannot allocate a directory handle
0xFFFDFFFD	NWSMTS_BUFFER_UNDERFLOW	Buffer underflow, unable to get entire field
0xFFFDFFFE	NWSMTS_BINDERY_OBJECT_NAME_ERR	Unable to get bindery object name
0xFFFDFFFF	NWSMTS_ACCESS_DENIED	Invalid user Name or authentication
0xFFFEFFEF	NWSMDR_INVALID_MESSAGE_NUMBER	Invalid message value
0xFFFEFFF1	NWSMDR_NO_MORE_CONNECTIONS	Cannot create another connection handle
0xFFFEFFB8	NWSMDR_PROTOCOL_NOT_FOUND	The specified protocol was not found
0xFFFEFFBD	NWSMDR_ENTRY_NOT_FOUND	The specified entry was not found.
0xFFFEFFFE	NWSMDR_INVALID_PARAMETER	One or more of the parameters is NULL or invalid
0xFFFEFFF6	NWSMDR_NO_SUCH_SMDR	The specified SMDR does not exist
0xFFFEFFFD	NWSMDR_OUT_OF_MEMORY SMDR	SMDR memory allocation failed
0xFFFEFFFF	NWSMDR_INVALID_CONNECTION	An invalid connection handle was passed to the SMDR
0xFFFEFFDF	NWSMDR_UNKNOWN_ADDRESS	The specified address does not exist
0xFFFEFFE8	NWSMDR_INVALID_NAME	The specified name does not exist or is invalid
0xFFFEFFE9	NWSMDR_INVALID_CONTEXT	The specified context is invalid
0xFFFEFFE0	NWSMDR_CORRUPTED_STATE	The data is corrupted
0xFFFEFFF2	NWSMDR_INVALID_PROTOCOL	The specified protocol does not exist

TSANDS errors:

TSANDS error codes from FFFDFEFC to FFFDFEC8 map to NDS error codes 0xFFFF FED3 through 0xFFFF FE9E.

TSANDS error codes from FFFDFEC7 to FFFDFE1B map to NDS error codes 0xFFFF FDA7 through 0xFFFF FCFA.

Code	Constant	Description
FFFDFEFF	NWSMTS_INSUFFICIENT_MEMORY	0xFFFF FF6A NDS Return Values from the Operating System
FFFDFEFE	NWSMTS_REQUEST_UNKNOWN	0xFFFF FF05 NDS Return Values from the Operating System
FFFDFEFD	NWSMTS_OF_SOME_SORT	0xFFFF FF01 NDS Return Values from the Operating System

36.10. NetBIOS Errors

NetBIOS return codes are reported when FDR/UPSTREAM attempts to perform an ULTra function over NetBIOS and it fails. FDR/UPSTREAM will specifically denote the return code as a NetBIOS return code.

NetBIOS return codes are reported as hexadecimal values whose meanings are described below. Contact Innovation Technical Support for any questions you may have concerning these return codes.

- **01:** Invalid buffer length for SEND DATAGRAM, SEND BROADCAST DATAGRAM, ADAPTER STATUS, or SESSION STATUS.
  Cause: A Send Broadcast or Send Datagram command cannot send more than 512 bytes. For ADAPTER STATUS and SESSION STATUS, the buffer length specified was less than the minimum required.
  Action: Specify the correct size for the buffer and try again.

- **03:** Invalid command
  Cause: The command code used was incorrect.
  Action: Reissue the correct command code.

- **05:** Command timed out
  Cause: One of the following
  1. ADAPTER STATUS: The system time-out period has elapsed.
  2. SEND: The time-out period specified for the Call or Listen command has elapsed.
  3. RECEIVE: The time-out period specified for the Call or Listen command has elapsed.
  4. HANG UP: The time-out period has expired for any outstanding Send commands to complete.

  Action: Associate the action number below to the Cause above:
  1. ADAPTER STATUS: Make sure you are using the correct name.
  2. SEND: The session ended abnormally. Establish another session and reissue a Send command.
  3. RECEIVE: Reissue the command.
  4. HANG UP: The session ended abnormally.

- **06:** Message Incomplete
  Cause: Part of a message was not received because the specified buffer length is not large enough to receive the full message.
  Action: Reissue another Receive or Receive Any command to get the rest of the message before the remote node times out under session support. For Adapter Status, Session Status, Receive Datagram, and Receive Broadcast Datagram commands, the remaining data is lost.

- **08:** Invalid local session number
  Cause: The session number specified is not one of the active sessions.
  Action: Specify an active session and reissue the command.

- **09:** No resource available
  Cause: Not enough space available on the node.
  Action: Reissue the command at a later time. This is a temporary condition.

- **0A:** Session closed
  Cause: The session has been closed by either the local or remote node.
  Action: No action is required. For a pending SEND, RECEIVE, or RECEIVE ANY, this is the notification that the session has been closed. For HANG UP, the session was closed by the remote computer.

- **0B:** Command canceled
  Cause: Notification that the command was canceled. If the canceled command is SEND or CHAIN SEND the session is abnormally ended.
  Action: No action is required.

- **0D:** Duplicate name in local name table
  Cause: A name was specified that is already in the local name table.
  Action: Specify another name. For FDR/UPSTREAM ULTra, you can not use the IBM or Microsoft server workstation name as the ULTra name; you must select a different (or slightly modified) name.

- **0E:** Name table full
  Cause: The maximum number of names is in the name table. The maximum number of names depends on the specific NetBIOS implementation

you are using.
Action: Wait until a delete name occurs or deregistration is complete.

- ☐ **0F:** Command completed (name has active sessions and is now deregistered)
  Cause: The name to be deleted is active in a session now, but is deregistered. When the name is marked deregistered and has active sessions, it still occupies a slot in the name table. The name is unusable.
  Action: Close all sessions using that name so the Delete command can complete.

- ☐ **11**: Local session table full
  Cause: No entries are available in the session table. (The number of sessions for a local session table is user-specifiable and has maximum values depending on the specific NetBIOS implementation you are using).
  Action: One of the following
  - Wait until a session has closed.
  - Refer to the Reset command to alter values.

- ☐ **12**: Session open rejected
  Cause: No Listen command is outstanding on the remote node.
  Action: Wait until a Listen command is issued by the remote node.

- ☐ **13:** Invalid name number
  Cause: The name number is invalid
  Action: Use the original name number that was assigned to the name

- ☐ **14:** No answer (cannot find name called)
  Cause: The call name specified cannot be found or did not answer.
  Action: One of the following:
  1. Verify that the call name used is correct.
  2. Retry with the correct or a different call name.
  3. Reissue if the remote node is busy.

- ☐ **15**: Name not found
  Cause: One of the following has occurred:
  - The name specified was not in the name table.
  - An asterisk was specified in the first character position of the name field.
  - Hex 00 was specified in the first character position.
  - The name is deregistered.

  Action: Specify another name.

- ☐ **16**: Name in use on remote node.
  Cause: Unique names may be used only once on the network.
  Action: Specify another name.

- ☐ **17:** Name deleted
  Cause: The name that issued a Receive Datagram, Receive Broadcast Datagram, Listen or Receive Any command has been deleted.
  Action: No action required.

- ☐ **18:** Session ended abnormally
  Cause: One of the following has occurred:
  - The remote node is powered off.
  - The session SEND or CHAIN SEND has timed out.
  - SEND or CHAIN SEND was canceled.
  - HANG UP timed out while waiting for SEND or CHAIN SEND to complete.

  Action:
  - Check the remote node for status.
  - Reestablish the session for a Send, Chain Send, Receive, or Receive Any command.

- ☐ **19:** Name conflict detected
  Cause: Network protocol has detected two or more identical names on the network.
  Action: Every node on the network should delete that name immediately.

- ☐ **21**: Interface busy
  Cause: BIOS was called while executing an uninterruptible process.
  Action: Return from the interrupt level and try again later.

- **22**: Too many commands outstanding
  Cause: The number of outstanding commands is maximum.
  Action:
  - If not at the maximum number, refer to RESET.
  - If at the maximum number, try again later.

- **23:** Invalid number in NCB_LANA_NUM field
  Cause: A number other than hex 00 or hex 01 was specified.
  Action: Correct the number and try again. Specify hex 00 for the first adapter or hex 01 for the second adapter.

- **24**: Command completes while cancel is occurring
  Cause: An attempt was made to cancel a command that already completed.
  Action: No action required

- **26**: Command not valid to cancel
  Cause: An attempt was made to cancel a command tat is invalid to cancel.
  Action: The commands that are not valid to cancel are: ADD NAME, ADD GROUP NAME, DELETE NAME, SEND DATAGRAM, SEND BROADCAST DATAGRAM, SESSION STATUS, RESET, and CANCEL.

- **40:** Adapter malfunction
  Cause: A hardware problem was detected on the adapter.
  Action: Retry or reset the command. If you receive the return code again, perform the node diagnostic tests.

- **50 to F6:** Adapter malfunction
  Cause: A hardware problem was detected on the adapter.
  Action: Retry or reset the command. If you receive the return code again, perform the node diagnostic tests.

- **FF**: Command pending status
  Cause: The command is still pending
  Action: No action is required. See NCP_POST@ and NCB_RETCODE for a description of this return code.

37 FDR/UPSTREAM Messages

This section lists the messages that are contained in the FDR/UPSTREAM message file (UPSTREAM.MSG). Note that FDR/UPSTREAM usually logs several messages simultaneously.

FDR/UPSTREAM messages usually contain:

- A number, starting at 1001.
- A severity letter, described in the prior chapter
- A single line title
- Additional lines of text describing the message
- A FIX, which describes the action that you may take to help resolve the problem.

Many FDR/UPSTREAM messages have a fix which says to “See additional messages”. Often these additional messages will refer you to return codes from the APPC software (listed in the prior chapter), the operating system (again listed earlier in the prior chapter), or some other source (database vendor doc, etc.). When encountering messages of this type, please contact technical support for an interpretation and recommended action in these cases.

Window management errors (Error errors). These are messages which occur when attempting to display a message.

PC1001E Error creating window data
Reason: There was an error allocating data to display the error window.
Action: Free memory and try again.

PC1003E Error setting window time-out timer
Reason: There was an error setting the timer to allow an error message to time-out. Further messages will not time-out.
Action: Contact FDR/UPSTREAM Tech Support.

PC1004E Error loading the error window dialog
Reason: When attempting to display a message, the message display dialog was not found.
Action: Make sure that US.RES is in the same directory as UPSTREAM.

Log file errors (Error errors) These are messages which occur when attempting to display a message.

PC1010E Error writing to the log file
Reason: There was an error writing to the log file.
Action: See additional messages.

PC1011E Error opening the log file
Reason: There was an error opening the log file.
Action: See additional messages.

PC1012E Error obtaining the message file name
Action: Make sure that you have an upstream.cfg file specified and that it contains a MESSAGEFILE statement pointing to upstream.msg

PC1013E Error opening upstream.msg
Action: Verify that the upstream.msg file is accessible.

PC1014E Insufficient memory
Reason: Error messages will not be buffered.
Action: Free memory or close applications.

PC1015E Error reading message file
Action: Verify that upstream.msg is accessible.

PC1016E Message out of range
Action: Contact FDR/UPSTREAM Tech Support.

PC1017E Duplicate message
Reason: There are two or more messages in the message file with the same message number.
Action: Contact FDR/UPSTREAM Tech Support.

PC1018E Action succeeded
Reason: The specified action was performed and completed successfully.
Action: See additional messages.

PC1019E Action failed
Reason: The specified action was performed but failed.
Action: See additional messages.

PC1020E Error allocating data to send error (OS/2)
Reason: There was an error allocating data space to send the given error to the remote system.
Action: Close other programs or free disk space.

PC1021E Insufficient memory
Reason: There was an error allocating memory to hold a pending error message.
Action: Close applications or free memory.

PC1022E Insufficient memory
Reason: There was an error allocating memory to hold the text of a pending error message.
Action: Close applications or free memory.

PC1023E Bad thread for non-fatal error support
Action: Contact FDR/UPSTREAM Tech Support.

PC1024E Error clearing log during %s
Action: See additional messages.

PC1025D File cleared. %lu lines removed %lu lines retained.

PC1026D Clearing: preserving %lu days in file %s

Error messages cannot be displayed when unattended

PC1030D Cannot display messages while unattended
Reason: UPSTREAM could not display the following message title and message while running in an unattended mode.

Informational messages. These are messages that are displayed in message boxes, and are often not fatal.

PC1101D Communications not loaded or not configured
Reason: APPC or TCP/IP is not loaded or UPSTREAM has not been configured.

PC1102N Dial remote now
Reason: Dial the remote system now. Press the OK button when you are polling

Notification messages

PC1111E Cant allocate a data stream
Reason: While attempting to allocate memory for a data stream there was insufficient memory.
Action: Close applications or free memory.

PC1112E Cant allocate a text line
Reason: While attempting to allocate memory for a text line there was insufficient memory.
Action: Close applications or free memory.

PC1113E Last quoted-printable line is continued
Reason: An error occurred while attempting to decode a set of quoted-printable encoded data. The last line ends with a continuation character and must not.
Action: Contact FDR/UPSTREAM Tech Support.

PC1114E Invalid quoted-printable data character
Reason: An error occurred while attempting to decode a set of quoted-printable encoded data. A character was found which is invalid for quoted-printable encoding.
Action: Contact FDR/UPSTREAM Tech Support.

PC1115E Line to be encoded is too short
Reason: An error occurred while attempting to encode a line with quoted-printable or base 64 encodeing. The line is too short.
Action: Contact FDR/UPSTREAM Tech Support.

PC1116E Line for quoted-printable encoding contains CR or LF
Reason: An error occurred while attempting to encode a line with quoted-printable encodeing. The line contains either a carriage return or line feed character.
Action: Contact FDR/UPSTREAM Tech Support.

PC1117E Invalid base 64 buffer length
Reason: An error occurred while attempting to decode a set of base 64 encoded data. The length of the encoded data is not a multiple of 4.
Action: Contact FDR/UPSTREAM Tech Support.

PC1118E Invalid base 64 data character
Reason: An error occurred while attempting to decode a set of base 64 encoded data. A character was found which is invalid for base 64 encoding.
Action: Contact FDR/UPSTREAM Tech Support.

PC1119E Premature end of base 64 buffer
Reason: An error occurred while attempting to decode a set of base 64 encoded data. The base 64 encoded data buffer is too short.
Action: Contact FDR/UPSTREAM Tech Support.

PC1120E Cant allocate a context
Reason: While attempting to allocate memory for a data conversion context there was insufficient memory.
Action: Close applications or free memory.

PC1121E Cant read attachment file
Reason: An error occurred while attempting to read an attachment file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1122E Cant open attachment file
Reason: An error occurred while attempting to open an attachment file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1123E Cant position attachment file
Reason: An error occurred while attempting to set the file pointer for an attachment file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1124E Cant reposition attachment file
Reason: An error occurred while attempting to reset the file pointer for an attachment file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1125E Cant reallocate a context
Reason: While attempting to reallocate memory for a data conversion context there was insufficient memory.
Action: Close applications or free memory.

PC1126E Cant adjust attachment file pointer
Reason: An error occurred while attempting to adjust the file pointer for an attachment file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1127E Invalid EMail data format
Reason: An internal FDR/UPSTREAM parameter error occurred while attempting to send an EMail notification message. The EMail data format is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1128E Invalid EMail data type or subtype
Reason: An internal FDR/UPSTREAM parameter error occurred while attempting to send an EMail notification message. The EMail attachment data type or subtype is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1129E Invalid target parameter
Reason: An invalid parameter was found while reading the specified notification target file.

PC1130E Invalid notification target ID address
Reason: The specified EMail Server or SNMP Manager IP address is invalid and cannot be resolved. Either the IP address is not formatted properly or the DNS name cannot be resolved.
Action: Contact FDR/UPSTREAM Tech Support.

PC1131E Error opening notification target IP socket
Reason: An error occurred while attempting to open an IP socket for the specified EMail Server or SNMP Manager IP address.
Action: Contact FDR/UPSTREAM Tech Support.

PC1132E Error connecting to notification target socket
Reason: An error occurred while attempting to connect to the socket for the specified EMail Server IP address.
Action: Contact FDR/UPSTREAM Tech Support.

PC1133E Error sending a SNMP Trap packet
Reason: An error occurred while attempting to send a SNMP Trap packet.
Action: Contact FDR/UPSTREAM Tech Support.

PC1134E Internal FDR/UPSTREAM parameter error
Reason: An internal FDR/UPSTREAM parameter error occurred while performing the specified operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC1135E Cant allocate a SNMP Trap variable
Reason: While attempting to allocate memory for a SNMP Trap variable there was insufficient memory.
Action: Close applications or free memory.

PC1136E Invalid Trap Object ID
Reason: An internal FDR/UPSTREAM parameter error occurred. The specified SNMP Trap Object ID is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1137E Invalid variable title
Reason: An internal FDR/UPSTREAM parameter error occurred. The specified SNMP Trap variable title is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1138E Invalid variable value
Reason: An internal FDR/UPSTREAM parameter error occurred. The specified SNMP Trap variable value is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1139E Invalid variable type
Reason: An internal FDR/UPSTREAM parameter error occurred. The specified SNMP Trap variable type is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1140W SNMP Trap packet too large
Reason: An attempt was made to add too much information to a SNMP Trap packet. The SNMP Trap packet is full and will be sent without the additional information.
Action: Contact FDR/UPSTREAM Tech Support.

PC1141E Cant allocate a SNMP Trap packet
Reason: While attempting to allocate memory for a SNMP Trap packet there was insufficient memory.
Action: Close applications or free memory.

PC1142E Invalid variable title
Reason: An internal FDR/UPSTREAM parameter error occurred. The specified variable title was not found while. processing a notification message.
Action: Contact FDR/UPSTREAM Tech Support.

PC1143E Cant open notification targets file
Reason: An error occurred while attempting to open the specified notification targets file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1144E Cant read notification target header
Reason: An error occurred while attempting to read the header for a notification target from the specified notification targets file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1145E Cant allocate a notification target
Reason: While attempting to allocate memory for a notification target there was insufficient memory.
Action: Close applications or free memory.

PC1146E Cant read notification target detail
Reason: An error occurred while attempting to read the detail for a notification target from the specified notification targets file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1147E Invalid notification target type
Reason: A notification target was read from the specified notification targets file which has an invalid target type.
Action: Contact FDR/UPSTREAM Tech Support.

PC1148E Notification targets not loaded
Reason: An attempt was made to initialize a notification message without first loading one or more notification targets from a notification targets file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1149E Notification message was not initialized
Reason: An attempt was made to add information to a notification message before the notification message was initialized.
Action: Contact FDR/UPSTREAM Tech Support.

PC1150E Cant allocate a message part
Reason: While attempting to allocate memory for a message part there was insufficient memory.
Action: Close applications or free memory.

PC1151E Invalid attachment file name
Reason: The specified attachment file name is not fully qualified.
Action: Contact FDR/UPSTREAM Tech Support.

PC1152E Cant allocate an attachment
Reason: While attempting to allocate memory for an attachment there was insufficient memory.
Action: Close applications or free memory.

PC1153E Cant allocate a variable
Reason: While attempting to allocate memory for a variable there was insufficient memory.
Action: Close applications or free memory.

Errors during initialization.

PC1201E Error in configuration file
Action: See additional messages.

PC1202E Error in parameter file
Action: See additional messages.

PC1203E Required configuration parameter missing
Reason: A required configuration parameter that was expected is missing.
Action: See additional messages.

PC1204E Required parameter missing
Action: See additional messages.

PC1205E Bad ACTION value
Reason: UPSTREAM can only process in a host request only certain ACTION values including 1 (backup), 0 (restore), 4 (restart backup), 5 (run job), 6 (kill restart), 7 (report), 8 (restart restore), 9 (kill restart restore), 10 (host job), 11 (migrate), 12 (inquire versions), 13 (performance), 14 (SOS restore), 15 (SOS backup), 16 (delete backup), 17 (register target name), 18 (inquire files), 19 (local backup disk report).
Action: Respecify the ACTION value.

PC1206W Restart backup requested and nothing to restart
Reason: The restart only action command was specified and there was not an outstanding backup to restart.

PC1207E Run Job not supported in Windows
Reason: Since Microsoft Windows does not have the concept of a batch or command file, the job function has no meaning.

PC1208D Restart backup action command specified

PC1209E Kill last restart and there wasn't one pending

Return code file errors.

PC1210E Error creating return code file
Reason: There was a file error creating the US.RET file.
Action: Look up the return code in the operating system messages section of the UPSTREAM manual.

PC1211E Error writing return code file
Reason: There was a file error writing the return code in the US.RET file.
Action: Look up the return code in the operating system messages section of the UPSTREAM manual.

PC1212E Error renaming backup file.
Reason: Renaming of a restartable backup file with the current process ID failed.
Action: Check if you have write permissions for the current working directory and upstream.*.bkp files.

PC1213E Error defining main thread
Action: Contact FDR/UPSTREAM Tech Support.

PC1220W Error opening translation table
Reason: There was an error opening the translation table listed below.
Action: See additional messages

PC1221W Error reading translation table
Reason: There was an error reading an entry from the translation table listed below.
Action: Verify that you have one line per entry. You must have a total of 256 lines. See additional messages.

PC1225I Using translation table
Reason: The following translation table is now in use:

PC1229W Mismatch between RESTARTVERSIONDATE and PROFILE.

PC1230W Restart restore requested and nothing to restart
Reason: The restart only action command was specified and there was not an outstanding restore to restart.

PC1231D Restart restore action command specified

PC1232E Kill restart restore and there wasn't one pending

PC1233W Restartable backup has been killed

PC1234W Restartable restore has been killed

PC1235D Running pre-process job:

PC1236D Running post-process job:

PC1237E Pre-process job failed

PC1238E Post-process job failed

PC1239E (OS/2) Error setting specified max handles
Reason: The following OS/2 error occurred when attempting to use the USMAXFILEHANDLES environment variable.

PC1240E Error allocating version date structure
Reason: The following version date will not be added to the return code file. In most cases this is not a problem.
Action: Free memory.

PC1241E Error writing version date to return code file
Reason: The following version date will not be added to the return code file. In most cases this is not a problem.
Action: See additional messages.

PC1242D Running failed process job:

PC1243E Post-process job failed

PC1244E (UNIX) Error installing signal
Reason: The following signal could not be installed
Action: See additional messages.

PC1245E (UNIX) Error opening PID file
Reason: There was a file system error opening the file that UPSTREAM will use to store the process ID.
Action: See additional messages.

PC1246E (UNIX) Error writing PID file
Reason: There was a file system error writing the file that UPSTRAM will use to store the process ID.
Action: See additional messages.

Errors during normal operation.

PC1250E Error creating internal message list
Reason: There was an error creating the internal message list. This may cause the flow of screens to operate incorrectly.
Action: Free memory and try again.

PC1251E Stack overflow
Reason: There is a shortage of stack space for temporary memory. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1252I Windows message queue depth changed
Reason: The environment variable was specified to change the UPSTREAM message queue depth. The value specified may be reduced due to Windows memory considerations

PC1253E (Win32) Program Exception (%s at %p)
Reason: UPSTREAM experienced a program exception of some type.
Action: Send the UPSTREAM.LOG file to FDR/UPSTREAM Tech Support.

Enter/exit UPSTREAM normal messages

PC1264I UPSTREAM orphaned due to USTPServ termination
Reason: US.exe was started by USTPServ.exe or by USAttMgr.exe which was started by USTPServ.exe and USTPServ.exe was terminated without first sending a KILL request to US.exe via USCntl.exe. US.exe will continue to run as an orphaned process running in the context of a service.

PC1265E UPSTREAM terminating forcefully
Reason: US.exe attempted to terminate itself gracefully but failed to do so within a reasonable amount of time. US.exe will now forcefully termininate itself.

PC1266W UPSTREAM terminating due to USTPServ termination
Reason: US.exe was started by USTPServ.exe or by USAttMgr.exe which was started by USTPServ.exe and USTPServ.exe was terminated without first sending a KILL request to US.exe via USCntl.exe. US.exe will now terminate itself so as not to be left as an orphaned process running in the context of a service.

PC1267W UPSTREAM received a KILL request
Reason: US.exe received a KILL request and is starting its abnormal termination processing.

PC1268E (UNIX) Signal caught: %s
Reason: The signal above was caught by UPSTREAM. This is a fatal error and UPSTREAM will be terminated.
Action: Contact FDR/UPSTREAM Tech Support.

PC1269E Error cleaning up a work directory
Reason: An error occurred during multi-user initialization which prevents US.exe from cleaning up a previously created work directory. The work directory and the operating system error code follow.
Action: Contact FDR/UPSTREAM Tech Support.

PC1270E Error creating a new work directory
Reason: An error occurred during multi-user initialization which prevents US.exe from creating a new work work directory. The work directory and the operating system error code follow.
Action: Contact FDR/UPSTREAM Tech Support.

PC1271D User termination
Reason: User requested termination of UPSTREAM.

PC1272E External kill
Reason: UPSTREAM will now terminate due to an external termination request.

PC1273I Switching log files
Reason: The log file name is being switched to the log file name that follows. All further messages will be written to the new log file.

PC1274E Multiple User mode has been disabled
Reason: Multiple user mode requires a user name and a computer name and this information could not be obtained from the operating system. Multiple user mode is therefore disabled.

PC1275I Entering UPSTREAM v%s (%s) %s

PC1276I Exiting UPSTREAM

PC1277E Error setting termination timer
Reason: UPSTREAM can't set the termination timer. It will terminate anyway but may be unstable in Windows.

PC1278E Error resetting termination timer
Reason: UPSTREAM can't reset the termination timer. It will terminate anyway but may be unstable in Windows.

PC1279E Termination process took too long
Reason: UPSTREAM waited 60 seconds for pending remote allocate requests to terminate. UPSTREAM will terminate anyway but may be unstable in Windows.

Errors in USModify

PC1280I Entering USModify

PC1281I Exiting USModify

PC1282E USModify parameter error
Reason: Multiple file spec parameters were specified.

PC1283E USModify parameter error
Reason: Multiple override file parameters were specified.

PC1284N Please enter a value for the following parameter(s)
Reason: Press the Esc key to enter a blank value.

PC1285E USModify parameter error
Reason: No configuration or parameter file specifications were specified.

PC1286W USModify found no files
Reason: No files matching the following file specification were found.

PC1287E USModify error modifying configuration file
Action: See additional messages.

PC1288E USModify error modifying parameter file
Action: See additional messages.

PC1289I USModify successfully modified file
Reason: The following file was successfully modified.

Session management errors

PC1301E Unknown session state
Reason: Unexpected session state. Internal failure.
Action: Contact FDR/UPSTREAM Tech Support.

PC1302E Session state did not change
Reason: The session state must always change. Internal failure.
Action: Contact FDR/UPSTREAM Tech Support.

PC1303E Error displaying session status
Reason: There was an error in obtaining session status information from APPC.
Action: See additional messages and lookup return codes.

PC1304D Activate DLC failure
Reason: If you are using AdaptSNA, this indicates that the link timer has timed out. The link will be continually retried until you press CANCEL or the link becomes active.

Log exits

PC1310I LU Log Exit
Reason: The following type and subtype describe some error reported by APPC/PC concerning the LU.
Action: Can usually be ignored. See UPSTREAM manual for the meaning of the type and subtype.

PC1311D PU Log Exit
Reason: The following type and subtype describe some error reported by APPC/PC concerning the PU.
Action: A TYPE of 17 with a SUBTYPE of 0 is normal Other TYPEs and SUBTYPEs should be looked up in the Log Exits codes in the UPSTREAM User's Guide.

Session state locations.

PC1325E Error occurred at the session start point

PC1326E Error occurred during ATTACH_PU verb

PC1327E Error occurred during ATTACH_LU verb

PC1328E Error occurred during ACTIVATE_DLC verb

PC1329E Error occurred during "dial remote" prompt

PC1330E Error occurred during session activation

PC1331E Error occurred while waiting for session start

PC1332E Error occurred at session active location

PC1333E Error occurred during session deactivation

PC1334E Error occurred during DETACH_LU verb

PC1335E Error occurred during DETACH_PU verb

PC1336E Error occurred after session was stopped W2KFiles errors

PC1340E Insufficient memory for a W2KFiles entry
Reason: While attempting to allocate memory for a W2KFiles entry, there was insufficient memory.
Action: Close applications or free memory.

PC1341E Can't determine the TLS installation status
Reason: An error occurred while attempting to determine if the Terminal Services Licensing Server is installed or not.
Action: Contact FDR/UPSTREAM Tech Support.

PC1342E Can't backup the TLS database
Reason: An error occurred while attempting to backup the Terminal Services Licensing Server database.
Action: See additional messages.

PC1343E Can't restore the TLS database
Reason: An error occurred while attempting to restore the Terminal Services Licensing Server database.
Action: See additional messages.

PC1344E Can't determine the IIS installation status
Reason: An error occurred while attempting to determine if the Internet Information Service is installed or not.
Action: Contact FDR/UPSTREAM Tech Support.

PC1345E Can't backup the IIS metabase
Reason: An error occurred while attempting to backup the Internet Information Service metabase.
Action: See additional messages.

PC1346E Can't restore the IIS metabase
Reason: An error occurred while attempting to restore the Internet Information Service metabase.
Action: See additional messages.

PC1347E Can't determine the WMI installation status
Reason: An error occurred while attempting to determine if the Windows Management Instrumentation is installed or not.
Action: Contact FDR/UPSTREAM Tech Support.

PC1348E Can't backup the WMI repository
Reason: An error occurred while attempting to backup the Windows Management Instrumentation repository.
Action: See additional messages.

PC1349E Can't restore the WMI repository
Reason: An error occurred while attempting to restore the Windows Management Instrumentation repository.
Action: See additional messages.

PC1350E Can't determine the RSM installation status
Reason: An error occurred while attempting to determine if the Removable Storage Manager is installed or not.
Action: Contact FDR/UPSTREAM Tech Support.

PC1351E Can't backup the RSM database
Reason: An error occurred while attempting to backup the Removable Storage Manager database.
Action: See additional messages.

PC1352E Can't restore the RSM database
Reason: An error occurred while attempting to restore the Removable Storage Manager database.
Action: See additional messages.

General APPC errors

PC1401E Unknown APPC function
Reason: A request was made for an APPC function that was unknown. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1402E Remote system error
Reason: The preceding message was from the remote system. Subsequent messages describe where in the PC the error occurred and can usually be ignored.
Action: See the host log (available through Host Reporting) for more details.

PC1403I Allocation failure - retry
Reason: There was a retryable allocation error. UPSTREAM will retry this verb up to 10 times before reporting this as a fatal error.

PC1404E Illegal force to send
Reason: The remote requested a force to send state illegally. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1405E An APPC Startup error occurred
Reason: An attempt to initialize an APPC interface failed. The name of the APPC interface and the error code follow.
Action: Ensure that your APPC software is properly configured.

Windows NT/2000 errors

PC1469I (NT) Setting read-only attribute for %s
Reason: This message simply notifies you of read-only files on your system.

PC1470E (NT) Access denied for USW2KAgt pipe
Reason: An access denied error occurred while attempting to communicate with the FDR/UPSTREAM Windows 2000 Agent service's named pipe. This is probably caused by running FDR/UPSTREAM (US.exe) under a user account that is not a member of the Administrators group. A number of other errors may also be reported depending on what you are attempting to backup or restore. The backup or restore may or may not be successful.
Action: Ensure that FDR/UPSTREAM is run under an account that is a member of the Administrators group either directly or indirectly.

PC1471E (NT) Can't open USW2KAgt pipe to get a volume name
Reason: An error occurred while attempting to open the USW2KAgt named pipe to get the volume name for a drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC1472E (NT) Can't open a key to be merged
Reason: An error occurred while attempting to open a registry key for the purposes of finding its subkeys for a merge operation.
Action: See additional messages.

PC1473E (NT) Can't enumerate a key to be merged
Reason: An error occurred while attempting to enumerate the subkeys of a registry key in order to perform a merge operation.
Action: See additional messages.

PC1474E (NT) Can't open an active subkey to be merged
Reason: An error occurred while attempting to open a registry key to merge this key's start value with that of its counterpart in the registry to be restored.
Action: See additional messages.

PC1475E (NT) Can't query the Start value of an active key

Reason: An error occurred while attempting to read the Start value of a registry key to merge this value with the counterpart key from the registry to be restored.
Action: See additional messages.

PC1476E (NT) Can't open a restore subkey to be merged
Reason: An error occurred while attempting to open a registry key in the registry to be restored to merge this key's Start value with that of its counter part in the active registry.
Action: See additional messages.

PC1477E (NT) Can't query the Start value of a restore key
Reason: An error occurred while attempting to read the Start value of a registry key in the registry to be restored to merge this value with the counterpart key from the active registry.
Action: See additional messages.

PC1478E (NT) Can't query the Start value of a restore key
Reason: An error occurred while attempting to write the Start value of a registry key in the registry to be restored during a merge operation.
Action: See additional messages.

PC1479E (NT) Can't open the AsrKeysNotToRestore key
Reason: An error occurred while attempting to open the AsrKeysNotToRestore key in the active registry.
Action: See additional messages.

PC1480E (NT) Can't read a KeyNotToRestore value
Reason: An error occurred while attempting to read a value from the KeysNotToRestore key in the registry of the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1481E (NT) Can't read the CurrentVersion value
Reason: An error occurred while attempting to read the CurrentVersion value in the registry of the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1482E (NT) Can't open USW2KAgt pipe for ASR Files
Reason: An error occurred while attempting to open the USW2KAgt named pipe to create the ASR files.
Action: Contact FDR/UPSTREAM Tech Support.

PC1483E (NT) Can't open HKEY_LOCAL_MACHINE key
Reason: An error occurred while attempting to open the HKEY_LOCAL_MACHINE key in the registry of the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1484E (NT) Can't open CurrentVersion key
Reason: An error occurred while attempting to open the SOFTWARE\Microsoft\Windows NT\CurrentVersion key in the registry of the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1485E (NT) Can't read the SystemRoot value
Reason: An error occurred while attempting to read the SystemRoot value in the registry of the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1486E (NT) Can't copy the ASR.sif file
Reason: An error occurred while attempting to copy the ASR.sif file from the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1487E (NT) Can't copy the ASRPNP.sif file
Reason: An error occurred while attempting to copy the ASRPNP.sif file from the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1488E (NT) Can't copy the Setup.log file
Reason: An error occurred while attempting to copy the Setup.log file from the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1489E (NT) Can't copy the USASR.key file
Reason: An error occurred while attempting to copy the USASR.key file from the following machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1490D (NT) Error %d in SfcIsFileProtected test of %s

PC1491D (NT) Error %d loading SfcIsFileProtected function for system protected file check

PC1492D (NT) Error %d loading SFC.DLL library for system protected file check

PC1493I (NT) System protected file (%s)

PC1494E (NT) Can't open USW2KAgt pipe for SPF List
Reason: An error occurred while attempting to open the USW2KAgt named pipe to get the list of system protected files.
Action: Contact FDR/UPSTREAM Tech Support.

PC1495E (NT) Can't open USW2KAgt pipe for Rep Dirs
Reason: An error occurred while attempting to open the USW2KAgt named pipe to get the list of replicated directories.
Action: Contact FDR/UPSTREAM Tech Support.

PC1496E (NT) Can't open USW2KAgt pipe to restore rep dir
Reason: An error occurred while attempting to open the USW2KAgt named pipe to restore a replicated directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC1497E (NT) Can't open USW2KAgt pipe to backup COM DB
Reason: An error occurred while attempting to open the USW2KAgt named pipe to backup the COM+ registration database.
Action: Contact FDR/UPSTREAM Tech Support.

PC1498E (NT) Can't open USW2KAgt pipe to restore COM DB
Reason: An error occurred while attempting to open the USW2KAgt named pipe to restore the COM+ registration database.
Action: Contact FDR/UPSTREAM Tech Support.

PC1499E (NT) Insufficient memory for operation entry
Reason: While attempting to allocate memory for a operation entry there was insufficient memory.
Action: Close applications or free memory.

PC1500E (NT) Insufficient memory for registry file entry
Reason: While attempting to allocate memory for a registry file entry there was insufficient memory.
Action: Close applications or free memory.

PC1501E (NT) Can't create the ASR directory
Reason: An error occurred while attempting to create the ASR subdirectory of the work path.
Action: See additional messages.

PC1502E (NT) Can't create the ASR machine directory
Reason: An error occurred while attempting to create the ASR\machinename subdirectory of the work path for the following machine name.
Action: See additional messages.

PC1503E (NT) Can't write to the scheduled operation file
Reason: An error occurred while attempting to write a scheduled operation to the scheduled operation file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1504E (NT) Can't create the scheduled operation file
Reason: An error occurred while attempting to create a new scheduled operations file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1505E (NT) Can't open the scheduled operation file
Reason: An error occurred while attempting to open a scheduled operation file to read from it.
Action: Contact FDR/UPSTREAM Tech Support.

PC1506E (NT) Can't read the scheduled operation file
Reason: An error occurred while attempting to read a scheduled operation from the scheduled operation file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1507E (NT) Can't find registry for operation
Reason: An error occurred while attempting to find the registry entry for a scheduled operation read from the scheduled operations file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1508E (NT) Can't append to the scheduled operation file

Reason: An error occurred while attempting to open a scheduled operation file to append to it.
Action: Contact FDR/UPSTREAM Tech Support.

PC1509E (NT) Can't start the replicated directories restore
Reason: An error occurred while attempting to start a restore of the replicated directories on the following computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC1510E (NT) Can't restore COM+ registry database
Reason: An error occurred while restoring the COM+ registry database.
Action: See additional messages.

PC1511E (NT) Can't backup COM+ registry database
Reason: An error occurred while backing up the COM+ registry database.
Action: See additional messages.

PC1512E (NT) Insufficient memory for replicated directory
Reason: While attempting to allocate memory for a replicated directory, there was insufficient memory.
Action: Close applications or free memory.

PC1513E (NT) Invalid USW2KAgt pipe record received
Reason: An invalid record was received from the FDR/UPSTREAM Windows 2000 Agent service on the following server.
Action: Contact FDR/UPSTREAM Tech Support.

PC1514E (NT) Can't write to USW2KAgt pipe
Reason: An error occurred while attempting to write data to the USW2KAgt named pipe.
Action: Contact FDR/UPSTREAM Tech Support.

PC1515E (NT) A USW2KAgt pipe buffer is too small
Reason: While attempting to read data from the USW2KAgt named pipe, the buffer was found to be too small.
Action: Contact FDR/UPSTREAM Tech Support.

PC1516E (NT) Can't read from USW2KAgt pipe
Reason: An error occurred while attempting to read data from the USW2KAgt named pipe.
Action: Contact FDR/UPSTREAM Tech Support.

PC1517E (NT) Invalid USW2KAgt server challange record
Reason: During the verification process between US.exe and the USW2KAgt service on a remote machine, the server challange record received from USW2KAgt was found to be invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1518E (NT) Invalid USW2KAgt server challange ID
Reason: During the verification process between US.exe and the USW2KAgt service on a remote machine, the server challange record received from USW2KAgt was found to contain an invalid identification.
Action: Contact FDR/UPSTREAM Tech Support.

PC1519E (NT) Invalid USW2KAgt acknowledgement record
Reason: During the verification process between US.exe and the USW2KAgt service on a remote machine, the acknowledgement record received from USW2KAgt was found to be invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC1520I (Unix) The directory above was not found
Reason: If this is a restore, UPSTREAM will create the directory with it's default owner/group. You may need to manually modify these settings.

PC1521E (NT) Can't validate USW2KAgt server
Reason: The USW2KAgt service could not be properly validated.
Action: Contact FDR/UPSTREAM Tech Support.

PC1522E Error renaming a file.
Reason: The file name logged with this message is the source file.
Action: See additional messages.

PC1523W (NT) Can't get exclude file specs for share
Reason: An error occurred while attempting to get the exclude file specs for a share name.
Action: Contact FDR/UPSTREAM Tech Support.

PC1524W (NT) The local system is not Windows 2000
Reason: You are attempting to backup from or restore to a target system which is Windows 2000, but the local system is not Windows 2000. FDR/UPSTREAM running on a non-Windows 2000 system may encounter problems dealing with a Windows 2000 system.
Action: Backup and restore your Windows 2000 system only from another Windows 2000 system.

PC1525W (NT) The USW2KAgt service is unavailable
Reason: The FDR/UPSTREAM Windows 2000 Agent service on the following system is either not working correctly or is a back-level version and cannot be (re)installed either because of some error or by parameter specification.
Action: Make sure the INSTALLWIN2KAGENT parameter is set properly.

PC1526W (NT) Can't get max system protected file name size
Reason: An error occurred while attempting to get the maximum size of a system protected file name from the following system.
Action: Contact FDR/UPSTREAM Tech Support.

PC1527W (NT) Can't get number of system protected files
Reason: An error occurred while attempting to get the number of system protected files from the following system.
Action: Contact FDR/UPSTREAM Tech Support.

PC1528W (NT) Insufficient memory for SP file array
Reason: While attempting to allocate memory for an array of system protected file names, there was insufficient memory.
Action: Close applications or free memory.

PC1529W (NT) Can't get system protected file names
Reason: An error occurred while attempting to get the system protected file names from the following system.
Action: Contact FDR/UPSTREAM Tech Support.

PC1530W (NT) A registry value will not be preserved
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered a value which exists in the active registry, but cannot be created in the restore registry because the value's key also does not exist in the restore registry. The name of the value follows.
Action: Contact FDR/UPSTREAM Tech Support.

PC1531E (NT) Can't create a not-to-restore restore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error creating a key in the restore registry.
Action: See additional messages.

PC1532E (NT) Can't delete not-to-restore restore key value
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error deleting a value in the restore registry which does not exist in the active registry.
Action: See additional messages.

PC1533E (NT) Can't delete a not-to-restore restore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error deleting a key in the restore registry which does not exist in the active registry.
Action: See additional messages.

PC1534E (NT) Can't grant full control of registry key
Reason: An error occurred while attempting to grant the current Windows NT user account full control over a registry key in the SYSTEM hive file to be restored.
Action: See additional messages.

PC1535E (NT) Can't preserve active registry keys
Reason: An error occurred while attempting to copy the not-to-be-restored registry keys from the active SYSTEM registry hive to the backup copy of the SYSTEM registry hive. As a result the keys that are not to be restored will be restored anyway.
Action: See additional messages.

PC1536E (NT) Can't open the KeysNotToRestore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error opening the KeysNotToRestore key in the active registry. This key contains values that list the registry keys and values that are not to be restored.
Action: See additional messages.

PC1537E (NT) Can't enum the KeysNotToRestore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error enumerating the list of registry keys and values that are not to be restored.
Action: See additional messages.

PC1538E (NT) Can't open a not-to-restore active key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error opening a key in the active registry.
Action: See additional messages.

PC1539E (NT) Can't get a not-to-restore active value length
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error getting the length of the data for a value in the active registry.
Action: See additional messages.

PC1540E (NT) Can't allocate storage for active value data
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error allocating storage for the data for a value in the active registry.
Action: See additional messages.

PC1541E (NT) Can't read a not-to-restore active value
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error reading the data for a value in the active registry.
Action: See additional messages.

PC1542E (NT) Can't save a not-to-restore active key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error saving a key in the active registry.
Action: See additional messages.

PC1543E (NT) Can't open a not-to-restore restore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error opening a key in the restore registry.
Action: See additional messages.

PC1544E (NT) Can't write a not-to-restore restore value
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error writing the data for a value in the restore registry.
Action: See additional messages.

PC1545E (NT) Can't restore a not-to-restore restore key
Reason: In order for UPSTREAM to correctly restore the registry SYSTEM hive, it must determine which keys and values should not be included in the restore and then copy these keys and values from the currently active registry SYSTEM hive to the registry SYSTEM hive that is being restored before the restore is committed. UPSTREAM encountered an error restoring a key in the restore registry.
Action: See additional messages.

PC1546E File too large
Reason: UPSTREAM attempted to perform direct file I/O on a file which is larger than 2GB in an environment which does not support this.
Action: Contact FDR/UPSTREAM Tech Support.

PC1547I A previously unencrypted file is now encrypted
Reason: A file that was on the backup in an unencrypted state is now encrypted on the disk after a restore. This is most likely the result of the unencrypted file being restored into a directory that is encrypted. Since this happened during an UPSTREAM restore, the file was encrypted by the user account under which UPSTREAM was running at the time. The name of the file and the user account under which UPSTREAM was running follow.
Action: Attempt to decrypt the file if required using the same user account that UPSTREAM was running under. If you need furhter help, call FDR/UPSTREAM Tech Support.

PC1548E Special handling required for encrypted file/dir
Reason: An encrypted file or directory was encounted that requires special handling. On a Windows 2000 system you must use the Windows 2000 Encryption PlugIn (WinCrypt.dll) to backup and restore encrypted files or directories.

PC1549E File is too large for file system
Reason: A sparse file on the backup has a size that is larger than what can be supported by the file system.
Action: See additional messages.

PC1550E Can't allocate a sparse zero block
Reason: There was an error allocating memory for a sparse zero data buffer.
Action: Free memory and try again.

PC1551E Can't write sparse data past last range
Reason: There was an attempt to write data past the end of the last allocated range of a sparse file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1552E (LANWS) Can't restore sparse file
Reason: A sparse file exists on the backup which cannot be properly restored because ULTra does not have support for sparse files. The file may created, but its data will be altered from the file that was backed up.
Action: See additional messages.

PC1553W (NT) Compressed files not supported
Reason: A compressed file on the backup cannot be compressed during the restore because the file system does not support compressed files.

PC1554W (NT) Sparse files not supported
Reason: A sparse file on the backup cannot be made sparse during the restore because either the operating system or the file system does not support sparse files.

PC1555E (NT) Can't get file size
Reason: An error occurred while attempting to get the size of a sparse file.
Action: See additional messages.

PC1556E (NT) Can't get single range

Reason: An error occurred while attempting to get a single allocated range for a sparse file.
Action: See additional messages.

PC1557E (NT) Can't allocate range buffer
Reason: There was an error allocating memory for an allocated range buffer for a sparse file.
Action: Free memory and try again.

PC1558E (NT) Can't get all ranges
Reason: An error occurred while attempting to get all of the allocated ranges for a sparse file.
Action: See additional messages.

PC1559E (NT) Can't set sparse
Reason: An error occurred while attempting to make a file sparse.
Action: See additional messages.

PC1560E (NT) Can't zero data
Reason: An error occurred while attempting to initialize a sparse file to all zeroes.
Action: See additional messages.

PC1561E (NT) Can't allocate sparse information
Reason: There was an error allocating memroy for the sparse information for a file.
Action: Free memory and try again.

PC1562E (NT) Can't set compression
Reason: An error occurred while attempting to set the compression format for a file.
Action: See additional messages.

PC1563E (NT) Can't get compression
Reason: An error occurred while attempting to get the compression format for a file.
Action: See additional messages.

PC1564E (NT) Can't allocate compression information
Reason: There was an error allocating memroy for the compression information for a file.
Action: Free memory and try again.

PC1565E Fatal file system error
Reason: Access to the device has been lost. The remainder of your operation (backup/restore) will fail.
Action: Repair access to the device

PC1566E Error flushing written data to disk
Action: See additional messages.

PC1567W (NT) File has Extended Attribute or ACL Stream
Reason: ID header that is unrecognized by this version of Windows NT. This non-file data stream will be skipped without preventing any of the other non- file data streams from being restored.
Action: See additional messages.

PC1568W (NT) File has Extended Attribute or ACL Stream
Reason: data that is unrecognized by this version of Windows NT. This non-file data stream will be skipped without preventing any of the other non- file data streams from being restored.
Action: See additional messages.

PC1569I (NT) Renaming locked file after reboot
Reason: Following this message are the names of two files. The first is an old file and the second is a new file. On the next reboot the old file will be deleted and the new file will be renamed to the old file name.

PC1570E (NT) Too many file rename operations
Reason: The number of restored temporary files to be renamed the next time the system boots is too many for the operating system to handle. Therefore, the following file name will not be renamed.
Action: Contact FDR/UPSTREAM Tech Support.

PC1571E File exists after delete
Reason: This is an operating system error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1572E (NT) Can't copy operations to new SYSTEM hive
Reason: An error occurred while attempting to copy the PendingFileRenameOperations value from the current SYSTEM registry hive to the SYSTEM registry hive file that is to be restored. As a result any pending file renames or deletes will not be performed during the next system boot.
Action: See additional messages.

PC1573E (NT) Can't create a temporary SYSTEM key
Reason: An error occurred while attempting to create a temporary HKLM\HARDWARE\SYSTEM key in the registry. This key is needed in order to copy the PendingFileRenameOperations value from the current SYSTEM registry hive to the SYSTEM registry hive file that is to be restored.
Action: See additional messages.

PC1574E (NT) Can't create a key, it already exists
Reason: An error occurred while attempting to create a temporary HKLM\HARDWARE\SYSTEM key in the registry because this key already exists and should not. This key is needed in order to copy the PendingFileRenameOperations value from the current SYSTEM registry hive to the SYSTEM registry hive file that is to be restored.
Action: See additional messages.

PC1575E (NT) Can't load the SYSTEM registry hive file
Reason: An error occurred while attempting to load the SYSTEM registry hive file from the backup into the HKLM\HARDWARE\SYSTEM key in the registry. This is needed in order to copy the PendingFileRenameOperations value from the current SYSTEM registry hive to the SYSTEM registry hive file that is to be restored.
Action: See additional messages.

PC1576E (NT) Can't open the Select key
Reason: An error occurred while attempting to open the HKLM\HARDWARE\SYSTEM\Select key in the registry. This is needed in order to determine to which key, in the backup SYSTEM registry hive file, the PendingFileRenameOperations value from the current SYSTEM registry hive is to be copied.
Action: See additional messages.

PC1577W (NT) Can't create a registry cleanup file
Reason: An error occurred while attempting to create a registry cleanup file. This file is needed to delete the temporary HKLM\HARDWARE\SYSTEM key after the SYSTEM registry hive file to be restored has been modified. This is ok since the HKLM\HARDWARE\SYSTEM key will be deleted the next time the system is rebooted, but subsequent steps in the restore process may also encounter errors.
Action: See additional messages.

PC1578E (NT) Can't query the Select key Current value
Reason: An error occurred while attempting to query the Current value of the HKLM\HARDWARE\SYSTEM\Select key. This is needed in order to determine to which key, in the backup SYSTEM registry hive file, the PendingFileRenameOperations value from the current SYSTEM registry hive is to be copied.
Action: See additional messages.

PC1579E (NT) Can't open the Session Manager key
Reason: An error occurred while attempting to open the "HKLM\HARDWARE\SYSTEM\ControlSet###\Control\Session Manager" key in the registry. This is the key to which the PendingFileRenameOperations value from the current SYSTEM registry hive is to be copied.
Action: See additional messages.

PC1580E (NT) Can't copy PendingFileRenameOperation value
Reason: An error occurred while attempting to copy the PendingFileRenameOperations value from the current SYSTEM registry hive to the "HKLM\HARDWARE\SYSTEM\ControlSet###\Control\Session Manager" key in the registry. This is needed so that the HKLM\HARDWARE\SYSTEM key can be saved to the temporary SYSTEM registry hive file that will be restored.
Action: See additional messages.

PC1581E (NT) Can't save the temporary SYSTEM hive file
Reason: An error occurred while attempting to save the "HKLM\HARDWARE\SYSTEM\ControlSet###\Control\Session Manager" key in the registry to the temporary SYSTEM SYSTEM registry hive file that will be restored.
Action: See additional messages.

PC1582W (NT) Can't cleanup the temporary SYSTEM key
Reason: An error occurred while attempting to destroy the subkeys and values of the HKLM\HARDWARE\SYSTEM key in the registry. This is ok since the HKLM\HARDWARE\SYSTEM key will be deleted the next

time the system is rebooted, but subsequent steps in the restore process may also encounter errors.
Action: See additional messages.

PC1583W (NT) Can't delete the temporary SYSTEM key
Reason: An error occurred while attempting to delete the HKLM\HARDWARE\SYSTEM key in the registry. This is ok since the HKLM\HARDWARE\SYSTEM key will be deleted the next time the system is rebooted, but subsequent steps in the restore process may also encounter errors.
Action: See additional messages.

PC1584E (NT) Can't alloc PendingFileRenameOperations buffer
Reason: An error occurred while attempting to allocate a buffer to be used for modifying the PendingFileRenameOperations value in the registry.
Action: See additional messages.

PC1585E (NT) Can't open the Session Manager key
Reason: An error occurred while attempting to open the HKLM\SYSTEM\ControlSet###\Control\Session Manager key in the registry. This key contains the PendingFileRenameOperations value which controls the system's file rename and delete operations the next time that it boots.
Action: See additional messages.

PC1586E (NT) Can't query PendingFileRenameOperations value
Reason: An error occurred while attempting to query the PendingFileRenameOperations value which controls the system's file rename and delete operations the next time that it boots.
Action: See additional messages.

PC1587E (NT) Can't set PendingFileRenameOperations value
Reason: An error occurred while attempting to set the PendingFileRenameOperations value which controls the system's file rename and delete operations the next time that it boots. Therefore, all files restored to temporary file names will not be renamed.
Action: See additional messages.

PC1588E (NT) Can't schedule Windows 9x file rename/delete
Reason: An error occurred while attempting to write the file rename and delete operations to the WININIT.INI file of a Windows 95 or Windows 98 system. WININIT.INI controls Windows 9x's rename and delete operations the next time that it boots. Therefore, all files restored to temporary file names will not be renamed.

PC1589E (NT) Can't schedule file rename operation
Reason: An error occurred while attempting to schedule a file rename operation. This is an UPSTREAM internal error. The name of the file to be renamed follows:
Action: Contact FDR/UPSTREAM Tech Support.

PC1590E (NT) Source file name for a rename is invalid
Reason: An error occurred while attempting to schedule a file rename operation because the source file name of the file to be renamed is invalid. The source file name follows. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1591E (NT) Target file name for a rename is invalid
Reason: An error occurred while attempting to schedule a file rename operation because the target file name of the file to be renamed is invalid. The target file name follows. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1592E (NT) Can't alloc file rename operation buffer
Reason: An error occurred while attempting to allocate a buffer to be used for scheduling a file rename operation. The name of the file to be renamed follows:
Action: See additional messages.

PC1593E (NT) Error renaming locked file
Reason: There was an error renaming the temporary file to the final file name.
Action: See additional messages.

PC1594W (NT) Error renaming locked file
Reason: You requested that locked files be renamed or replaced and there was an error during the process.
Action: See additional messages.

PC1595I (NT) Renaming locked file
Reason: Following this message are the names of two files. The first is an old file and the second is a new file. The old file is locked during the restore. The backup file will be restored to the new file.

PC1596I (NT) Renamed locked file after restore
Reason: Following this message are the names of two files. The first is an old file and the second is a new file. The old file is locked during the restore. The names of the old and new files have been swapped. The old file (now having the name of the new file) will be deleted on the next reboot.

PC1597E (NT) Error reading regular data stream header
Action: See additional messages.

PC1598E (NT) Error reading regular data stream data
Action: See additional messages.

PC1599E Error writing pending data
Reason: In a situation where data writes must be blocked into even multiples, there was an error writing pending data.
Action: See additional messages.

PC1600E (UNIX) Error in lseek call
Reason: While attempting to use lseek to seek, there was a system error.
Action: See additional messages.

PC1601E Error creating file structure
Reason: There was an error creating the internal file storage structure.
Action: Free memory and try again.

PC1602E Error setting drive for directory create
Reason: There was an error during a file open when the directory was attempting to be created, setting the default drive to the requested value.
Action: Be sure that the drive is ready then try again.

PC1603E Error getting directory for directory create
Reason: There was an error during a file open when the directory was attempting to be created, getting the current default directory for the specified drive.
Action: Be sure that the drive is ready then try again.

PC1604E Error creating directory
Reason: There was an error during a file open when the directory was attempting to be created.
Action: See additional messages.

PC1605E Error setting directory after directory create
Reason: There was an error during a file open when the directory was created setting the default directory to the directory successfully created.
Action: See additional messages.

PC1606E Error opening file
Action: See additional messages.

PC1607E Error removing old EOF marker in a text file
Reason: There was an error removing an old end-of-file marker in a text file when a file was opened for append.
Action: See additional messages.

PC1608E Error reading old EOF marker in a text file
Reason: There was an error reading the last byte of a text file opened for append.
Action: See additional messages.

PC1609E Error seeking old EOF marker in a text file
Reason: There was an error seeking to the last byte of a text file opened for append.
Action: See additional messages.

PC1610E Error seeking for block read
Reason: There was an error seeking for a location in a file for a block read.
Action: See additional messages.

PC1611E Error reading a block
Reason: There was an error reading a block of a file randomly.
Action: See additional messages.

PC1612E Not enough data (unexpected EOF)
Reason: During a block read, a block of a specific size was expected and the file did not contain enough data.

Action: The file has been corrupted. Delete the file and retry (if possible).

PC1613E Error writing a string
Reason: There was an error writing a string sequentially.
Action: See additional messages.

PC1614E Error writing a string EOL
Reason: There was an error writing the CR/LF combination after writing a string successfully.
Action: See additional messages.

PC1615E Error seeking for block write
Reason: There was an error setting the location for a block write.
Action: See additional messages.

PC1616E Error writing a block of data
Action: See additional messages.

PC1617E Error deleting a file
Action: See additional messages.

PC1618E Error seeking to the end of a file
Action: See additional messages.

PC1619E Access of a LAN file
Reason: The file to be opened is a LAN file.
Action: Purchase the LAN version of UPSTREAM.

PC1620E Error searching a directory (FindFirst OS2)
Reason: There was an error searching the directory.
Action: See additional messages.

PC1621E Error searching a directory (FindNext OS2)
Reason: There was an error searching the directory.
Action: See additional messages.

PC1622E Error searching a directory (FindFirstFile WinNT)
Reason: There was an error searching the directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC1623W Ignoring file with size over 4G (WinNT)
Reason: File found while searching the directory.
Action: Exclude this file.

PC1624W Invalid date and time for file (WinNT)
Reason: File found while searching the directory. Assuming date and time of 01/01/1980 12:00:00a.

PC1625E Error removing a directory
Action: See additional messages.

PC1626E (NT) Error getting file time
Action: See additional messages.

PC1627E (NT) Error setting file time
Action: See additional messages.

PC1628E (NT) Error reading Extended Attribute or ACL
Reason: stream header
Action: See additional messages.

PC1629E (NT) Error reading Extended Attribute or ACL
Reason: stream data
Action: See additional messages.

PC1630E (NT) Error writing Extended Attribute or ACL
Reason: Stream ID header
Action: See additional messages.

PC1631E (NT) Error writing Extended Attribute or ACL
Reason: Stream data
Action: See additional messages.

PC1632E (NT) Error skipping Extended Attribute or ACL
Reason: Stream data
Action: See additional messages.

PC1633W (NT) Error Extended Attribute stream too long
Reason: An extended attribute stream for a file has a size greater than 4G and cannot be backed up.
Action: Exclude this file.

PC1634E (NT) Error restoring non-file data
Reason: The non-file data for a file or directory could not be restored because the “Restore files and directories” privilege could not be enabled.
Action: Ensure your account has the appropriate rights.

PC1635E (NT) Error backing up directory non-file data
Reason: The non-file data for a directory could not be backed up because the directory could not be opened.
Action: See additional messages.

PC1636E (NT) Error restoring directory non-file data
Reason: The non-file data for a directory could not be restored because the directory could not be opened.
Action: See additional messages.

PC1637E Error allocating extra data buffer
Reason: There was an error allocating the buffer to hold multi-file extra data.
Action: Reduce the number of duplicate files or free memory.

PC1638E Extra data position too large
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1639E (NT) Error restoring invalid non-file data
Reason: The non-file data for a file or directory could not be restored because it is not formatted properly.
Action: Contact FDR/UPSTREAM Tech Support.

PC1640E Non-file data for one or more file not restored
Reason: The non-file data for one or more files was not restored, probably because it was backed up from a different operating system than the one it is being restored for.
Action: Contact FDR/UPSTREAM Tech Support.

PC1641E Error allocating file find buffer
Reason: There was an error allocating a buffer needed to perform a file search operation.
Action: Free memory and try again.

PC1642E An attempt was made to read past the end of file
Reason: There was an attempt to read past the end of a file during a backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC1643E Error remapping file view
Reason: There was an error remapping a view for a memory mapped file.
Action: Contact FDR/UPSTREAM Tech Support.

PC1644E Cannot determine pipe file size
Reason: A UNC pipe file spec was provided for a backup without a DASDOVERRIDE parameter. The only way for UPSTREAM to determine the amount of data that might be read from a pipe is for the user to inform UPSTREAM via a DASDOVERRIDE parameter. The DASDOVERRIDE parameter was either not provided or did not specify an absolute number. UPSTREAM cannot backup the data from the pipe.
Action: Supply a DASDOVERRIDE parameter with an absolute number of bytes as a value.

PC1645E (UNIX) Error in stat or lstat call
Reason: While searching for files in a directory, there was a system error.
Action: See additional messages.

PC1646E (UNIX) Error in getcwd call
Reason: While searching for files in a directory, there was a system error.
Action: See additional messages.

PC1647E (UNIX) Error in getcwd call
Reason: While searching for files in a directory, there was a system error.
Action: See additional messages.

PC1648E (UNIX) Error in getcwd call
Reason: While searching for files in a directory, there was a system error.
Action: See additional messages.

PC1649E (UNIX) Error in opendir call
Reason: While searching for files in a directory, there was a system error.
Action: See additional messages.

PC1650E (UNIX) Error in llseek call
Reason: While attempting to use llseek to seek, there was a system error.
Action: See additional messages.

PC1651E (NT) Can't modify the SYSTEM hive backup file
Reason: The restoration of the SYSTEM registry hive was either canceled by the user or an error occurred while attempting to modify the SYSTEM backup registry hive file that was restored to disk. The original backup file was not modified and was not applied to the registry. The name of the original SYSTEM backup registry hive file follows.
Action: See additional messages.

PC1652E (NT) Can't allocate memory for a value name

PC1653E (NT) Can't allocate memory for value data

PC1654E (NT) Can't allocate memory for a value item

PC1655E (NT) Can't open a key

PC1656E (NT) Can't allocate memory for a key name

PC1657E (NT) Can't allocate memory for a temp class name

PC1658E (NT) Can't allocate memory for a temp key name

PC1659E (NT) Can't allocate memory for a temp value name

PC1660E (NT) Can't allocate memory for temp value data

PC1661E (NT) Can't get a key's information

PC1662E (NT) Can't allocate memory for a class name

PC1663E (NT) Can't allocate memory for security info

PC1664E (NT) Can't get a key's security info

PC1665E (NT) Can't allocate memory for a key item

PC1666E (NT) Can't enumerate a key's subkeys

PC1667E (NT) Can't enumerate a key's values

PC1668E (NT) Can't allocate memory for a matched value ref

PC1669E (NT) Can't allocate memory for a new value ref

PC1670E (NT) Can't allocate memory for a matched key ref

PC1671E (NT) Can't allocate memory for a new key ref

PC1672E (NT) Can't create a temporary SYSTEM key

PC1673E (NT) Can't create a key, it already exists

PC1674E (NT) Can't create a value

PC1675E (NT) Can't set a key's security

PC1676E (NT) Can't create a work key

PC1677E (NT) Can't create a work key, it already exists

PC1678E (NT) Can't load a registry backup file

PC1679E (NT) Can't find the backup registry Select key

PC1680E (NT) Can't find a backup reg ControlSetnnn key

PC1681E (NT) Can't find the active registry Select key

PC1682E (NT) Can't find a active reg ControlSetnnn key

PC1683E (NT) Can't allocate memory for a new class name

PC1684E (NT) Can't allocate memory for a NewSecurity

PC1685E (NT) Can't save the modified registry backup file

PC1686E (NT) Can't save the cleanup file

PC1687E (NT) Can't load the cleanup file

PC1688E (NT) Can't delete a key

PC1689E (NT) Can't delete the cleanup file

PC1690E (NT) Can't save value status

PC1691E (NT) Invalid value status

PC1692E (NT) Can't save key status

PC1693E (NT) Invalid key status

PC1694E (NT) Can't change value status

PC1695E (NT) Can't chang key status

PC1696E (NT) Can't add value to key tree

PC1697E (NT) Can't add key to key tree

PC1698E (NT) Can't create key tree

PC1699E (NT) Can't create key tree image list

PC1700E (NT) Can't load bitmap

Mid-level conversation errors.

PC1701E Error occurred during a TP_STARTED verb
Reason: If you are running OS/2 or Windows, a return code of 00010000 usually means a mismatch between the local LU alias and the communications manager local LU alias.

PC1702E Error occurred during a TP_ENDED verb

PC1703E Error occurred during an ALLOCATE verb

PC1704E Error occurred during a SEND_DATA verb

PC1705E Error occurred during a RECEIVE_AND_WAIT verb

PC1706E Error occurred during a CONFIRM verb

PC1707E Error occurred during a CONFIRMED verb

PC1708E Error occurred during a DEALLOCATE verb

PC1709E Error occurred during a GET ALLOCATE verb
Reason: There was an error checking for a remote request of UPSTREAM functions.
Action: (OS/2 or Windows) Verify that you have configured for remotely attachable programs correctly.

PC1710E Error occurred during a TP_VALID verb

PC1711E Conversation type mismatch
Reason: UPSTREAM received a remote allocate that was invalid.
Action: Allocate probably not destined for this node.

PC1712E Bad sync level
Reason: UPSTREAM received a remote allocate that was invalid.
Action: Allocate probably not destined for this node.

PC1713E TPN not recognized
Reason: UPSTREAM received a remote allocate that was invalid.
Action: Allocate probably not destined for this node.

PC1714E Error testing remote allocate
Reason: There was an error testing for remote allocates before beginning a local allocate.
Action: See additional messages

PC1715E Expected data (state %d)
Reason: UPSTREAM received a state change when data was expected. This is an internal FDR/UPSTREAM error.

Action: Contact FDR/UPSTREAM Tech Support.

PC1716E Error allocating test conversation
Action: See additional messages.

PC1717E Error deallocating test conversation
Action: See additional messages.

PC1718I Remote allocate support disabled
Reason: UPSTREAM was started by the UPSTREAM Attach Manager to handle UPSTREAM user interface requests, you specified the environment variable USNORMT which intentionally disabled support for host initiates, or you are running UPSTREAM with multiple user support enabled.

PC1719E Remote allocate checks are taking too long
Reason: The internal UPSTREAM timer checks for remote requests of UPSTREAM functions every 5 seconds. The last check took more than 5 seconds so UPSTREAM is disabling this check.
Action: You should adjust your APPC software so that Remote Allocate checks return as quickly as possible (usually a value of 1).

PC1720E Remote allocate checks seem locked
Reason: UPSTREAM has has waited more than 1 minute for a remote allocate check to return. This indicates that your communications software has locked.
Action: A reboot would be suggested.

PC1721D Remote allocate support was disabled
Reason: UPSTREAM has disabled the support for host initiates due to a previous condition.
Action: Check the log to determine why host initiates were disabled.

PC1725E Bad send state
Reason: The conversation can not support the send request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1726E Bad receive state
Reason: The conversation can not support the receive request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1727E Bad confirm state
Reason: The conversation can not support the confirm request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1728E Bad confirmed state
Reason: The conversation can not support the confirmed request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1729E Bad flush state
Reason: The conversation can not support the flush request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1730E Bad send error state
Reason: The conversation can not support the send error request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1731E Incomplete received
Reason: A receive and wait buffer was too small. Often this indicates a communications error either locally or on the host.
Action: Check the host log.

PC1732E Bad flush send state
Reason: The conversation can not support the flush request made. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1733E NULL receive buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1734E Broken connection
Reason: During a CONFIRMED operation, the connection was broken from the remote.
Action: See host log.

PC1740E Cannot start a conversation
Reason: A communications conversation cannot be started because neither APPC or TCP/IP is installed.

PC1750E Can't allocate data to flush receives (OS/2)
Reason: There was an error allocating data space to flush received data.
Action: Close other programs or free disk space.

PC1751E Can't allocate data to flush receives (OS/2)
Reason: There was an error allocating data space to flush received data to perform a confirmed.
Action: Close other programs or free disk space.

PC1752E Can't allocate data to flush receives (OS/2)
Reason: There was an error allocating data space to flush received data to completely end a conversation.
Action: Close other programs or free disk space.

PC1753E Can't allocate record packing record
Action: Disable record packing or free memory.

PC1754E Record packing error
Reason: A data record was larger than the entire buffer received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1755E Invalid packing type
Reason: The remote specified a packing type not allowed.
Action: Contact FDR/UPSTREAM Tech Support.

PC1756E Invalid packing type (standard)
Reason: The remote specified a packing type not allowed.
Action: Contact FDR/UPSTREAM Tech Support.

PC1757E Invalid packing type (fixed)
Reason: The remote specified a packing type not allowed.
Action: Contact FDR/UPSTREAM Tech Support.

PC1758E Invalid packing type (variable)
Reason: The remote specified a packing type not allowed.
Action: Contact FDR/UPSTREAM Tech Support.

PC1759E Length mismatch (rcvd %ld, data %ld)
Reason: The length received does not match the length in the first two bytes of data. Internal protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1760E Receive too small (%ld)
Reason: All receives must be 2 bytes or more. Internal protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1761E Packed receive too small
Action: Retry your restore disabling record packing.

PC1762E (OS/2) Error allocating send tracking buffer
Action: Free memory or close applications.

PC1763E External receive data too large (%u %u)
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1765E Too many conversations
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1766E Invalid conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1767E Invalid converation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1768E No conversation ID set
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1769E No conversation in progress
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1770E Invalid record packing conversation
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1771E Set bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1772E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1773E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1774E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1775E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1776E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1777E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1778E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1779E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1780E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1781E Bad conversation number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1782E Not a packing conversation for receiving
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1783E Not a packing conversation for sending
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1784E Occurred during a get allocate

PC1785E Occurred during test for remote allocate

PC1786E Occurred during free conversation

PC1787E Conversation lost.
Reason: The CONV=WAIT or CONV=KEEP batch job conversation was lost and USRETRYWAIT was not set, so a new conversation is not started.

PC1788E Prior error - see client upstream.log file

PC1789E Prior error - see client upstream.log file

PC1790E Prior error - see client upstream.log file

Abort messages. These are informational messages that are displayed in message boxes and allow the user to press ABORT.

PC1799N Starting session
Reason: You can press CANCEL to abort the session start function. This message will go away if there is an error or the session has started successfully.

PC1800N Waiting for session to activate
Reason: You can press CANCEL to abort waiting for the session to start automatically. This message will go away if there is an error or the session has started successfully.

Backup file access errors.

PC1801E Error writing description to the backup file
Reason: There was an error writing the backup description record (record #1) to the internal backup file.
Action: See additional messages.

PC1802E Error writing the specs to the backup file
Reason: There was an error writing a file specification to the internal backup file.
Action: See additional messages.

PC1803E Error writing file info to the backup file
Reason: There was an error writing a file information record to the internal backup file.
Action: See additional messages.

PC1804E Error writing description to the backup file
Reason: There was an error writing the backup description record (record #1) to the internal backup file when the file information was completely written.
Action: See additional messages.

PC1805E Error deleting backup file
Reason: There was an error deleting the internal backup file.
Action: See additional messages.

PC1806E Error creating the backup file
Reason: There was an error creating the internal backup file.
Action: See additional messages.

PC1807E Error writing parameters to the backup file
Reason: There was an error writing the non-repeating parameters to the internal backup file during its creation.
Action: See additional messages.

PC1808D File spec specifies no files
Reason: The following backup file spec specifies a drive or mount point where no files could be found to be backed up. This usually occurs when a drive or mount point has been lost or is unavailable.
Action: Validate the drive or mount point connection.

PC1809E No valid files to back up
Reason: There are no valid files in any of your file specs to backup. The backup will not be performed. Usually this occurs when one or more connections to drives or mount points have been lost.
Action: Validate the drive or mount point connection.

PC1810W Backup specification not found
Reason: The backup specification directory was not found on the specified drive.
Action: Check your file set specification.

PC1811I Error getting extended attribute size (OS/2)
Reason: There was an error getting the size of the extended attributes. Extended attributes (if any) will not be backed up (but an attempt will be made to backup the data).
Action: The file may be in use - try later, or this may be a system file which can not be backed up.

PC1812W File name too long %s (%d)
Reason: The FDR/UPSTREAM host verstion 3.1.4 or later can support up to 255 characters; earlier versions up to 230 characters.

PC1813E Error creating backup parameter file
Reason: There was an error creating the parameter file which is associated with a backup file.

Action: See additional messages

PC1814E Error reading backup file to delete
Reason: There was an error reading the backup file for the purpose of deleting the parameter file attached to it. There will be a file left on disk.
Action: See additional messages

PC1815E Error deleting param file attached to backup
Reason: There was an error deleting the parameter file attached to the backup file. There will be a file left on disk.
Action: See additional messages

PC1816E Error searching for file spec (OS/2 dirs above)
Reason: There was an error searching the file spec requested
Action: See return code.

PC1817E Error searching for file spec (OS/2 files)
Reason: There was an error searching the file spec requested
Action: See return code.

PC1818E Error searching for file spec (OS/2 dir)
Reason: There was an error searching the file spec requested
Action: See return code.

PC1819I Directory too long
Reason: The directory below is too long for reliable DOS access. The files in it will be skipped.
Action: Reduce the directory path length.

PC1820E Error saving backup parameters
Reason: There was an error saving the original backup parameters temporarily so that modified parameters can be used.
Action: See additional messages.

PC1821E Error recovering backup parameters
Reason: There was an error retrieving the parameters that you originally specified. The parameters (as displayed) are now incorrect.
Action: See additional messages.

PC1822E Error adding a file spec
Reason: There was an error setting the current file spec after adding an existing one.
Action: See additional messages.

PC1823E Error copying to new file spec
Reason: When creating a new file spec, there was an error copying parameters from an existing file spec.
Action: See additional messages.

Backup file validity errors.

PC1825W Old backup file
Reason: The backup file detected on disk is not usable because it hold a version which does not match the version of the software. The backup will begin from the beginning.

PC1826W Backup file not completed
Reason: The backup file detected on disk is not usable because it did not complete. The backup file will be regenerated and the backup will start from the beginning.

PC1827E File specification is not valid for LAN WS
Reason: The file specification has a Universal Naming Convention (UNC) prefix which is not allowed when a ULTra LAN Workstation is also specified.
Action: Correct the file specification and try again.

PC1828E File specification has invalid network name
Reason: The file specification has a Universal Naming Convention (UNC) prefix which contains an invalid network name.
Action: Correct the file specification and try again.

PC1829E Invalid UNC name
Reason: The file specification contains an invalid UNC name.
Action: Respecify.

PC1830E Duplicate repository file name too long (%s)
Reason: When backing up to USTDUPFL, you can only back up files whose file name length (not including the path) is 30 bytes or less. This file will be automatically excluded.

PC1831E Error opening a file to calculate DASD size
Reason: There was an error opening a file to calculate the size of the sequential disk file to be created for this back up on MVS.
Action: See additional messages.

PC1832E Error accessing non-file data for DASD calc
Reason: There was an error accessing non-file data so as to be able to calculate the total number of bytes that will be used to create the Sequential Disk file on MVS for this backup. In most cases this won't be a problem but if you have alot of these errors the file may be too small or go into secondary extents.
Action: See additional messages.

PC1833E Error accessing non-file data for DASD calc
Reason: There was an error accessing non-file data so as to be able to calculate the total number of bytes that will be used to create the Sequential Disk file on MVS for this backup. In most cases this won't be a problem but if you have alot of these errors the file may be too small or go into secondary extents.
Action: See additional messages.

PC1834E Error creating new file spec
Reason: There was an error allocating memory for a file specification during the backup file build.
Action: Free memory and retry or specify fewer file specifications.

PC1835E Error creating a directory level
Reason: There was an error allocating memory for a directory level during the backup file build.
Action: Free memory and retry or specify the subdirectories explicitly.

PC1836E Insufficient memory.
Reason: There was an error allocating memory for a subdirectory entry during the backup file build.
Action: Free memory and retry or specify the subdirectories explicitly.

PC1840E Volume doesn't support last access date
Reason: You requested a restricted backup based on last access date. The volume you are backing up does not support this field. The files to be backed up must reside on an HPFS volume, NTFS volume or Novell volume to use this facility.
Action: Respecify.

PC1841E Only valid for full merge backups
Reason: You can only specify a migration or retention of deleted files when performing a full merge backup.
Action: Respecify.

PC1842W Can't migrate changed file
Reason: The following file has changed, yet it was specified for migration. This file will not be deleted.

PC1843E Error opening incremental file
Reason: There was an error opening to read the required last backup file used for incrementals.
Action: See additional messages. You must perform a full before performing incrementals. You must move the incremental file if you are changing your WORKPATH.

PC1844E Error opening incremental file
Reason: There was an error opening to write the required last backup file used for incrementals.
Action: See additional messages.

PC1845E Error reading incremental file
Reason: There was an error reading the required incremental file.
Action: See additional messages.

PC1846E Error writing incremental file
Reason: There was an error writing the required incremental file.
Action: See additional messages.

PC1847E Parameter inconsistancy
Reason: You specified DATELIMIT but did not specify both a LATESTDATE and a LATESTTIME.
Action: Respecify.

PC1848E Latest date incorrect
Reason: The format must be YY:MM:DD.
Action: Respecify.

PC1849E Latest time incorrect
Reason: The format must be HH:MM:SS.
Action: Respecify.

PC1850E Not AIX journaled file system
Reason: The file specification (below) is not part of the normal AIX journaled file system. Only JFS files may be backed up with UPSTREAM.
Action: Respecify.

PC1851D Skipping non journaled file system
Reason: The following directory was included in the file specification, but is not a journaled file system and thus will not be included in the backup.

PC1852W Skipping files not owned by the effective User
Reason: You must be running with root user authority to backup files you do not own.

PC1853D Error opening incremental file
Reason: There was an error opening to read the required last backup file used for incrementals. It will be assumed that a full backup has not been done before. All files will thus be marked has having NOT been changed and the host will request all files not matching previous backups or in USTDUPFL.

PC1854E Error allocating memory
Reason: There was an error allocating memory for the backup restore file.
Action: Free memory or disk and retry.

PC1855E Unexpected EOF
Reason: Unexpected end of file reading the backup/restore file. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1856I Backup not completely started
Reason: This backup can not be restarted.

PC1857I Restore not completely started
Reason: This backup can not be restarted.

PC1858W Path name too long
Reason: The following path name is too long and its subdirectories will not be traversed. The file name below has more characters than the UPSTREAM software can support.
Action: The FDR/UPSTREAM host verstion 3.1.4 can support up to 255 characters; earlier versions up to 230 characters. The client size can be set using the MAXFILENAMESIZE environment variable.

PC1859E ioctl failed for raw device
Reason: The ioctl used to get raw device information failed.

PC1860E Open failed for raw device
Reason: Could not get raw device information.

PC1861E Raw device too large
Reason: Can not back up devices over 2gig on AIX 3.2.

PC1863E Not local UFS or Veritas file system
Reason: The file specification (below) is not part of a local Solaris UFS or Veritas file system. Only files in a local file system may be backed up with UPSTREAM.
Action: Respecify.

PC1864D Skipping non UFS or Veritas file system
Reason: The following directory was included in the file specification, but is not a Solaris UFS or Veritas file system and thus will not be included in the backup. This is a normal message for automounted local directories as they are backed up by their actual directory location.

PC1865E read_vtoc failed for raw partition
Reason: Could not get partition info for raw device.

PC1866D File exceeds maximum size
Reason: The following file exceeds the MaxKFileSize specified.

PC1867E Not local HFS or VxFS file system
Reason: The file specification (below) is not part of a local HPUX HFS or VxFS file system. Only files in a local file system may be backed up with UPSTREAM.
Action: Respecify.

PC1868D Skipping non HFS or VxFS file system
Reason: The following directory was included in the file specification, but is not a HPUX HFS or VxFS file system and thus will not be included in the backup.

PC1869E Unexpected EOF
Reason: Unexpected end of file reading the backup/restore incremental date file. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1870W Backup file corrupt
Reason: The existing backup file is not usable. It will be deleted and any prior restarts will not be serviced.

PC1871E Bad UNC file specification
Reason: A UNC file specification must consist of three components: \\MACHINE\SHARE\FILE_SPEC. One or more of these components are missing.
Action: Respecify

PC1872E Not HFS file system
Reason: The file specification (below) is not part of the normal HFS file system. Only HFS files may be backed up with UPSTREAM.
Action: Respecify.

PC1873D Skipping non HFS file system
Reason: The following directory was included in the file specification, but is not a HFS file system and thus will not be included in the backup.

PC1874E Unable to obtain file system type
Reason: An error occurred obtaining the file system type for the file specification (below). This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1875D Skipping directory from unknown file system type
Reason: An error occurred obtaining the file system type for the following directory and thus will not be included in the backup.

PC1876E Not local UFS or AdvFS file system
Reason: The file specification (below) is not part of a local Tru64 UNIX UFS or AdvFS file system. Only files in a local file system may be backed up with UPSTREAM.
Action: Respecify.

PC1877D Skipping non UFS or AdvFS file system
Reason: The following directory was included in the file specification, but is not a Tru64 UNIX UFS or AdvFS file system and thus will not be included in the backup.

PC1878D Skipping zero length Tru64 UNIX partition
Reason: The following raw device was included in the file specification which refers to a zero length or unallocated disk partition.

PC1879D Skipping partition on unlabeled disk
Reason: The following raw device was included in the file specification which refers to a partition other than c on an unlabeled disk. Only the c partition can be backed up on an unlabeled disk.

PC1880E Exceeded maximum backup size
Reason: Your backup exceeded the maximum size that your administrator has allowed for you.
Action: Contact your FDR/UPSTREAM administrator.

PC1881E (Novell Migration) Need Long Name Space
Reason: You specified a Novell Migration with the add extension option enabled. This requires that the LONG name space be loaded on the NetWare partition.
Action: Add the LONG name space to the partition.

PC1882E Error flushing backup file to disk
Action: See additional messages.

PC1883E Error adding entry to sort list
Reason: This is usually a memory error.
Action: Free memory or close programs.

PC1884E Error creating sort file
Action: See additional messages.

PC1885E Error starting sort
Reason: This is generally a memory shortage.
Action: Close applications or free memory.

PC1886E Error deleting sort file
Action: See additional messages.

PC1887E Empty sort tree
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1888E Error writing sort file
Action: See additional messages.

PC1889E Error reading sort file
Action: See additional messages.

Exclude errors.

PC1890E Unable to allocate exclude file spec storage
Action: Close some other applications and try the UPSTREAM function again.

PC1891E Invalid exclude file spec
Reason: An exclude file spec must be a UNC file spec (\\server\share or !:\server\share) or a fully qualified non-UNC file spec that contains a drive letter followed by “:\”.
Action: Fix the exclude file spec and try the UPSTREAM function again.

PC1892W Unable to open exclude file
Reason: Exclude file (the file name as specified follows) can not be opened and will not be processed.
Action: Check if the file exists and you have read access to it.

Intercomputer structure build/parse errors.

PC1900E Build structure overflow
Reason: When building a record for transmission, the data overflowed the structure passed in.
Action: Specify a larger record size.

PC1901E Unexpected received data type
Reason: A data record was received which contained data which was unexpected. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1902E Parse structure overflow
Reason: When extracting received data, the data overflowed the buffer available.
Action: Specify a larger record size.

PC1903E Field size overflow
Reason: When extracting received data, the data overflowed the field available. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1904E Field not exact size
Reason: When parsing received data, a data record was not the size expected. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1905E Received length too large
Reason: When parsing received data, a data field was larger than the buffer to hold it.
Action: Specify a larger record size.

PC1906E Received data area not created
Reason: The received data buffer was not created before a request to parse data was received. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1907E Build structure overflow during fold
Reason: When building a record for transmission, when attempting to fold lower case to upper case, the data overflowed the structure passed in.
Action: Specify a larger record size.

PC1908E Invalid date format
Reason: When converting a date from normal to Julian format, the date was not in the correct format (MM-DD-YY). This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1909E (UNIX) Received invalid flag length field
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1910E (UNIX) Received invalid flag length field
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1911E (UNIX) Received invalid flag length field
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1912E (UNIX) Internal invalid flag length field
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1913E (Status) Received bad opcode
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1914E (Backup Build) Position out of range
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC1915D Registered name too long (%s)
Reason: Registered names are restricted to 16 bytes. This name will be truncated.
Action: Wait for the name to age out or call technical support.

Backup state errors.

PC1971E Machine alias too long (%s)
Reason: UPSTREAM requires that the machine alias be no longer than the original machine name.
Action: Respecify

PC1972E (SMS) No resources found
Reason: For the server name below, there were no resources to be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC1973E (SMS) Can’t mix full system
Reason: You can’t mix a full system backup with ULTra or file transfer.
Action: Respecify

PC1974E (SMS) Invalid spec type for full system
Reason: You can only specify include and exclude file specs in a full system backup. Migrations are disallowed.
Action: Respecify.

PC1975E (SMS) Full system can’t include NDS or plugin
Reason: You must specify a full system backup without an NDS or plugin (the GW plugin is allowed).
Action: Respecify

PC1976E (SMS) Error adding param to full system
Reason: While building the full system backup, there was an error adding one of the required parameters.
Action: See prior messages.

PC1977E (SMS) Error creating a file spec.
Reason: While building the full system backup, there was an error creating one of the file specs.
Action: See prior messages.

PC1978I (Backup) The BACKUPREPARSEFILES parameter was changed

Reason: The BACKUPREPARSEFILES parameter was changed to a value of 1 for the following file spec. This was done to ensure that the REPARSE data for the files are backed up.

PC1979I (Backup) An ASR diskette was created
Reason: An ASR diskette was created for the specified computer. Label the diskette with the two lines that follow this message. Keep this ASR diskette in a safe place so that you have access to it if and when you need to recover this computer.

PC1980W (Backup) There is no diskette in drive A:
Reason: You requested that an ASR diskette be created during the backup, but there is no diskette in the A: drive.
Action: Insert a blank diskette in the A: drive and run the backup again.

PC1981W (Backup) Can't copy file to diskette
Reason: You requested that an ASR diskette be created during the backup, but an error occurred while attempting to copy one or more ASR files to the diskette.
Action: Examine the NT error number to determine why the file could not be copied to the diskette.

PC1982W (Backup) The diskette is not blank
Reason: You requested that an ASR diskette be created during the backup, but the diskette in the A: drive is not blank.
Action: Insert a blank diskette in the A: drive and run the backup again.

PC1983W (Backup) Too many ASR capable machines
Reason: You requested that an ASR diskette be created during the backup, but the backup targeted more than one ASR capable machine.
Action: To create an ASR diskette the backup must target only one ASR capable machine.

PC1984W (Backup) No ASR capable machines
Reason: You requested that an ASR diskette be created during the backup, but the backup did not target any ASR capable machines.
Action: To create an ASR diskette the backup must target only one ASR capable machine.

PC1985E (Backup) Can't set ASR restore parameters
Reason: An error occurred while attempting to set the parameters needed to perform the ASR restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC1986E (Backup) Can't copy US.ser file
Reason: An error occurred while attempting to copy the US.ser file from the main UPSTREAM directory to the following ASR directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC1987E (Backup) Can't copy USASR.dat file
Reason: An error occurred while attempting to copy the USASR.dat file from the main UPSTREAM directory to the following ASR directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC1988E (Backup) Can't copy USASR.exe file
Reason: An error occurred while attempting to copy the USASR.exe file from the main UPSTREAM directory to the following ASR directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC1989E (Backup) No accessable disks were found
Reason: A full system file spec was encountered for which no accessable disk drives could be found. You may be running UPSTREAM as a service under the LocalSystem account and have the USUSEUNCFULLSYSTEM environment variable set. If this is the case either run the UPSTREAM service under a user account or stop using the USUSEUNCFULLSYSTEM environment variable.
Action: Contact FDR/UPSTREAM Tech Support if the scenario described above is not true.

PC1990E (Backup) Can't modify the disk list
Reason: An error occurred while attempting to check the cluster status of a machine or modifying the list of disk drives for the machine.
Action: Contact FDR/UPSTREAM Tech Support.

PC1991E (Backup) The SysState PlugIn is not loaded
Reason: You are attempting to backup a complete Windows 2000 computer which requires the use of the SysState PlugIn which was not loaded. Perhaps you are attemting to backup the Windows 2000 computer from a Windows NT computer which is not supported.
Action: Do not attempt to backup a Windows 2000 computer from a Windows NT computer or determine why the SysState PlugIn could not be loaded.

PC1992W (Backup) The WinQuota PlugIn is not loaded
Reason: You are attempting to backup a complete Windows 2000 computer which would include the disk quota information for each Windows 2000 disk, but the WinQuota PlugIn is not loaded. You may decide to not use the WinQuota PlugIn to backup the disk quota information by not installing the PlugIn in the PlugIn subdirectory of your UPSTREAM directory. But for completeness, you should install the WinQuota PlugIn to allow the backup of the disk quota information.
Action: Do not attempt to backup a Windows 2000 computer from a Windows NT computer or determine why the WinQuota PlugIn was not be loaded.

PC1993E (Backup) Can't create a full system file spec
Reason: An internal UPSTREAM error occurred which prevents the addition of one or more dynamic file specs needed to backup or restore a complete computer system.
Action: Contact FDR/UPSTREAM Tech Support.

PC1994E (Backup) Can't modify a full system file spec
Reason: An internal UPSTREAM error occurred which prevents the modification of one or more dynamic file specs needed to backup or restore a complete computer system.
Action: Contact FDR/UPSTREAM Tech Support.

PC1995E (Backup) Invalid intermixing of file specs
Reason: You have one or more full system file specs specified with one or more non-full system file specs. Such a combination is not supported.
Action: Your include file specs should be of the full system file spec variety only if you want to backup the full system state of one or more computers.

PC1996E (Backup) Invalid full system file spec parameters
Reason: You specified one or more full system file specs with conflicting parameter.
Action: Make sure you full system file specs do not reference an ULTra workstation name, a Novell Profile, a remote request or a file transfer.

PC1997E (Backup) Can't save original parameters
Reason: An internal UPSTREAM error occurred which prevents the saving of your original parameters before the creation of one or more dynamic full system file specs.
Action: Contact FDR/UPSTREAM Tech Support.

PC1998E (Backup) Can't enumerate disk drives
Reason: An operating system error occurred which prevents the enumeration of the disk drives for the following computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC1999E (Backup) Can't restore original parameters
Reason: An internal UPSTREAM error occurred which prevents the restoration of your original parameters after the creation of one or more dynamic full system file specs.
Action: Contact FDR/UPSTREAM Tech Support.

PC2000E Error occurred during a backup build file

PC2001E Error occurred during a backup start conv

PC2002E Error occurred during a backup send description

PC2003E Error occurred during a backup received started

PC2004E Error occurred during a backup send file info

PC2005E Error occurred during a backup send file data

PC2006E Error occurred during a backup confirm

PC2007E Error occurred during a backup end conversation

PC2008E Error occurred at the end of a backup

PC2010E Error occurred during a restart read file

PC2011E Error occurred during a restart start conv

PC2012E Error occurred during a restart send restart

PC2013E Error occurred during a restart receive desc

PC2014E Error occurred while deleting files

PC2015E Error occurred during the host merge

PC2020E Unwritten record unexpected
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2021E Error reading backup file
Reason: While attempting to reset the archive bits for duplicate files at the end of the backup there was an error reading the backup file.
Action: See I/O messages.

PC2022W Switching to tape (%ld MB = %ld MB)
Reason: The specified SWITCHTOTAPEMB value was exceeded and the backup will now go to tape.

PC2023E Skip backup scan requires DASDOVERRIDE
Reason: If you skip the backup scan and are performing a disk or UPSTREAM/SOS local backup disk backup, you must specify a DASD override.
Action: Respecify.

PC2024E Skip backup scan can't use CALCDASDSIZE
Reason: The SKIPBACKUPSCAN and CALCDASDSIZE parameters cannot be specified together.
Action: Respecify.

PC2025E Unknown backup state
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2026E Error allocating record data
Reason: Memory was not available to allocate the record for the backup.
Action: Either specify a smaller record size or turn off compression.

PC2027E Compression error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2028E Error reading file attributes
Reason: This error may affect resetting the archive bit but the file will be included in backup/restore.
Action: See additional messages.

PC2029W Error setting file attributes
Action: See additional messages.

PC2030E Backup file unusable for restarted backup
Reason: The backup never started. It must be rerun.

PC2031I File name too long: %s (%d)
Reason: The file name above has more characters than the UPSTREAM software can support.
Action: The FDR/UPSTREAM host verstion 3.1.4 can support up to 255 characters; earlier versions up to 230 characters. The client size can be set using the MAXFILENAMESIZE environment variable.

PC2032E Restarted backup mismatch
Reason: The remote version date does not match the version date in the version file. The backup is not restartable.

PC2033E Error recovering parameters during restart
Reason: There was an error recovering the original parameters specified at backup time.
Action: See additional messages

PC2034E Error using backup file specifications
Reason: There was an error using the file specifications stored in the backup file. The backup is not restartable.

PC2035E Error saving parameters during restart
Reason: There was an error saving the current parameters to restore the parameters at the backup time.
Action: See additional messages

PC2036E Error creating the specification hold area
Reason: Memory ran short while attempting to create a structure to hold file specifications.
Action: Free memory, specify a smaller record size or turn off compression.

PC2037D Error retrieving original transfer specs
Reason: There was an error retrieving the transfer specifications that were in place before the restarted backup was attempted. This should not affect the success or failure of the transfer.

PC2038E Error retrieving original transfer parms
Reason: There was an error retrieving the transfer parameters that were in place before the restarted backup was attempted. This should not affect the success or failure of the transfer.

PC2039E Remote saw transfer as completed
Reason: The remote did not recognize that the backup had failed even though the PC thinks that it did. The backup is thus not restartable.

PC2041E File open error aborted the backup
Reason: The backup aborted because a file to be backed up was not available for open.

PC2043E File read error aborted the backup
Reason: The backup aborted because a file to be backed up was not available for read.

PC2044W Error creating backup timer
Reason: There was an error creating the backup timer. The backup should continue normally, however you will not be able to suspend the backup.

PC2045E Extended attribute sizes not equal (OS/2)
Reason: The extended attributes of the file has changed since the backup file information was created.
Action: Retry the backup.

PC2046E Can't allocate extended attribute buffer (OS/2)
Reason: There was an error allocating the data space for the extended attribute buffer.
Action: Free memory by unloading other programs or by freeing additional disk space.

PC2047E Error getting extended attributes length (OS/2)
Reason: There was an error getting the length of the extended attributes for the file.
Action: Verify that the file still exists.

PC2048E Error getting extended attribute name (OS/2)
Reason: There was an error extracting the name of the extended attribute.
Action: Verify that the file has not been opened by another application.

PC2049E Error getting extended attributes (OS/2)
Reason: There was an error extracting the extended attributes.
Action: Verify that the file has not been opened by another application.

PC2050I Backup started (%s)

PC2051D Backup successful

PC2052D Backup complete with some ignored failures

PC2053D Backup failed

PC2054I Restarted backup started

PC2055W Backup suspended

PC2056I File transfer send started

PC2057D File transfer successful

PC2058D File transfer complete with some ignored failures

PC2059D File transfer failed

PC2060W File transfer suspended

PC2061E Suspend for specified percent complete (%ld)

PC2062E Suspend because time limit exceeded (%ld)

PC2063D Failed due to bad file specification

PC2064W Backup canceled

PC2065W Non-communications perf. test complete

PC2070E Backup/Restore comm terminated fatal server error
Reason: The communications with the host was terminated due to a fatal LAN error with the server that was being backed up from or restored to. The name of the server follows.
Action: Restore the LAN connection to the server and restart the failed backup or restore.

PC2071E Backup/Restore comm terminated fatal ULTra error
Reason: The communications with the host was terminated due to a fatal ULTra workstation error with the server that was being backed up from or restored to. The name of the server follows.
Action: Restore the LAN connection to the ULTra workstation and restart the failed backup or restore.

PC2072E Backup/Restore comm terminated reason unknown
Reason: The communications with the host was terminated for some unknown reason. The backup or restore failed. name of the server follows.
Action: Other messages contain the exact reason for the failure. Correct the problem and restart the failed backup or restore.

PC2073E Backup file inconsistancy read %lu, of %lu
Reason: Internal error.
Action: Report the complete error with the subsequent messages to UPSTREAM technical support.

PC2074W Position out of range (%lu larger than %lu)
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2075E Original backup not completely started
Reason: None of the files from the original backup ever reached the host.
Action: Restart the backup.

PC2076D PC and/or Server time adjusted to MVS time

PC2077E Error creating the delta file
Reason: There was an error creating the file containing the time change. This will affect the USSTART program if it is currently running.
Action: See additional messages. If USSTART is running, stop and restart.

PC2078E Restart not specified
Reason: There was a backup file, but the original backup was not specified as restartable.

PC2079E Past restart point
Reason: The backup has passed the point that a restart can be attempted.
Action: The backup has been committed “as is”. Future backups will pick up any data that was not included in this one.

PC2080D Automatic delete to begin

PC2081D Automatic file deletion complete

PC2082E Error starting backup open file thread
Reason: There was an error starting the backup open file thread.
Action: Contact FDR/UPSTREAM Tech Support.

PC2083E Timeout waiting for file open thread
Reason: There was a timeout waiting for the file open thread to open the file.
Action: Contact FDR/UPSTREAM Tech Support.

PC2084E (OS/2) Error allocating memory
Reason: There was an error allocating memory to hold information for file open threads.
Action: Specify a smaller number (NUMBACKUPTHREADS) or free memory or disk space.

PC2085D A previous backup dataset was unavailable
Reason: When performing the merge, the host attempted to dynamically allocate a dataset from a previous backup and it failed. Files which were on this backup will be requested from the PC.
Action: See the host log.

PC2086E One of your file specs is empty
Action: Enter a file specification in every file spec.

PC2087E Backup profile name invalid
Reason: The backup profile name you specified can not be used to create a file name on the host and is thus invalid.
Action: Make sure the length is less than or equal to 8 and that the first character is an alphabetic character or a ‘$’, ‘#’ or ‘@’.

PC2088E NDS file specs must be first
Reason: You must specify all NetWare Directory Services file specs before non-NDS specs.
Action: Respecify

PC2089D Dummy profile specified
Reason: FDR/UPSTREAM will back up the file information only; no file data will be backed up and restores are prohibited. These profiles are only for testing.

PC2090E Unknown duplicate flags
Reason: FDR/UPSTREAM MVS sent duplicate flags to your machine which were unrecognized.
Action: Upgrade FDR/UPSTREAM on your machine.

PC2091W Skipped %ld files

PC2092E Error saving parameters to add migration specs
Action: See additional messages.

PC2093D Received bad position number
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2094E Error creating backup open file event
Reason: There was an error creating one of the synchronization events for the backup open file thread.
Action: Contact FDR/UPSTREAM Tech Support.

PC2095E A migration only backup was specified
Reason: You specified a migration only backup and there were no migrated files.
Action: Respecify.

PC2096E Storage type not allowed
Reason: You may not specify a keyed or archived type backup for a migration backup.
Action: Specify a sequential disk or tape storage type.

PC2097E Error reading backup description file
Reason: This is not a restartable backup. The backup will be removed.

PC2098D Directories will not be deleted
Reason: The USNODIRDELETE environment variable was specified which suppresses directory deletes.

PC2099E Insufficient memory
Reason: There was insufficient memory allocating space for backup verification.
Action: Close applications.

Restore state errors.

PC2100E Error occurred during a restore start conv

PC2101E Error occurred during a restore send description

PC2102E Error occurred during a restore receive descript

PC2103E Error occurred during a restore receive file

PC2104I File excluded from the restore
Reason: The following file was excluded from the restore because of a exclude file spec that was either explicitely defined, contained in a global exclude list file or was found in the FilesNotToBackup registry key of the Windows 2000 system to which it was to be restored.

PC2105E Error occurred during a restore confirmed data

PC2106E Error occurred during a restore end conversation

PC2107E Error occurred during the completion of the rest

PC2108E Error occurred during a restore restart

PC2109D The local computer is shutting down
Reason: A restore specification requested that the local computer be shut down after a successful restore. The local computer is shutting down.

PC2120E Dest specification is not valid for LAN WS
Reason: The destination file specification has a Universal Naming Convention (UNC) prefix which is not allowed when a ULTra LAN Workstation is also specified.
Action: Correct the destination file specification and try again.

PC2121E Dest specification has invalid network name
Reason: The destination file specification has a Universal Naming Convention (UNC) prefix which contains an invalid network name. For the NLM version this happens when you don't specify a Novell Profile.
Action: Correct the destination file specification and try again or (NLM) use a Novell Profile.

PC2122E Packing Size smaller than record size
Reason: A file received has a larger record size than the packing size specified (PACKRECSIZE).
Action: Either increase the packing size or disable packing all together.

PC2123I Unknown PlugIn file information
Reason: The PlugIn which backed up the received file is not the same PlugIn that is referenced by the user file specification. Make sure that the file being restored is not coming from the Duplicate File Repository on the host.
Action: Contact FDR/UPSTREAM Tech Support.

PC2124E PC text files disallowed with ULTra
Action: Do not specify an ULTra restore with PC text files.

PC2125E Unknown state during restore
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2126W Error creating restore timer
Reason: There was an error creating the restore timer. The restore should continue normally, however you will not be able to cancel the restore.

PC2127E Error allocating data space
Reason: There was insufficient memory to allocate the received data area.
Action: Free memory, or specify a smaller record size.

PC2128E Error matching file info with specification
Reason: Error matching the received file information with the user file specification. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2129W Error opening existing file
Reason: There was an error opening the existing file before the restore could be tried.
Action: Retry later.

PC2130E Received data without information
Reason: Restore data was received without an open file to write to. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2131E Unexpected received data type
Reason: During a restore a record type other than data or information was received. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2132E Error creating directory
Action: See additional messages.

PC2133E Error allocating extended attribute buffer (OS/2)
Reason: There was an error allocating a buffer to hold the received extended attributes.
Action: Close other programs or free disk

PC2134E Extended attribute overflow (OS/2)
Reason: An extended attribute was larger than UPSTREAM can manage (32767 bytes for version 1.1).
Action: Reduce the size of the extended attributes

PC2135E Error setting file extended attribute (OS/2)
Reason: There was an error setting an extended attribute for a file.
Action: Verify that the file has not been opened by another application.

PC2136W File restore errors logged on PC
Reason: Earlier file restore errors were logged by the PC. This message is to inform the mainframe that the restore was not completely successful.
Action: See PC log entries above.

PC2137E Error restoring current parameters
Reason: There was an error restoring the current parameters after a restore operation was processed.
Action: See additional messages.

PC2138E Error saving parameters
Reason: There was an error saving the original, user- specified parameters.
Action: See additional messages.

PC2141E Error reallocating data for merge
Reason: A file was received which uses a larger record size than the previous file and the data space can't be allocated.
Action: Free memory and retry.

PC2142E Error in fast de-compression
Reason: Error in decompressing data that was compressed using fast compression. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2143E Dummy profile disallowed
Reason: Dummy profiles are for testing backups only; data generated can not be used for a restore.

PC2144E Error writing Extended Attributes
Reason: You are trying to restore file with OS/2 EA to a non-OS/2 ULTra workstation.
Action: If you really want to restore files/directories to a non-OS/2 workstation and loose there extended attributes, uncheck all of the OS/2 EA checkboxes in the 'More...' dialog.

PC2145E Exceeded maximum duplicate files
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2146E Duplicate file transferred and integrity failure
Reason: The file information for a duplicate file received had internal errors (it really should never have been a duplicate).
Action: Exclude this file from the restore.

PC2147E Error saving restart parameters
Reason: There was a file error saving the restart parameters.
Action: See additional messages.

PC2148E Error saving restart description
Reason: There was a file error saving the restart parameters.
Action: See additional messages.

PC2149E Error recovering restore parameters
Reason: During a restarted restore, there was an error recovering the original UPSTREAM parameters.
Action: See additional messages.

PC2150I Restore started

PC2151D Restore successful

PC2152D Restore completed with some failures

PC2153D Restore failed

PC2154E Restore suspended by user

PC2155I Restore restarted

PC2156D Restore failed but restartable

PC2157I File transfer receive started

PC2158D File transfer receive successful

PC2159D File transfer completed with failures

PC2160D File transfer failed

PC2161E File transfer canceled by user

PC2162E Suspend because time limit exceeded (%ld)

PC2163E Error restoring sparse file.
Reason: Set file position after skipping an empty block failed.

PC2164E Error advancing file position.
Reason: Advancing file position over skipped block while writing file sparse failed.

PC2165E No files restored
Reason: No files were found to restore. This results in a failed restore. This may be because of a bad specification or because of overwrite options.

PC2166E All files failed
Reason: All of the files that UPSTREAM tried to restore resulted in file errors and no files were successful - UPSTREAM fails the restore.
Action: See prior messages for reasons which would cause UPSTREAM to be unable to write all of the files such as an invalid destination.

PC2167E Backup not found for version: %s, profile: %s
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2168E Expected CONFIRM on wrap - state: %d
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2169E Error occurred in a CONFIRMED at the wrap
Reason: The communications error above occurred while UPSTREAM was notifying the host that it had processed all of the data in the local backup disk and was requesting that the host resume writing to the disk at the top.
Action: See messages above.

PC2170E Confirm received with incomplete pending
Reason: When performing a restore through the local backup disk, UPSTREAM received an end of restore indicator when there was pending data to be processed. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2171E DASDOVERRIDE invalid format for restore (%s)
Reason: A DASDOVERRIDE can only be an absolute value or a subtracted value.
Action: Respecify.

PC2172E Single file system restore inquiry failed
Reason: When you request a single file system restore, UPSTREAM performs an inquiry to ascertain the file specs which need to be generated to exclude files from other file systems. This inquiry failed to find any prior backups.

PC2173I Single file system restore excluding: %s
Reason: The spec above will be excluded as it was stored in a separate file system in the original backups.

PC2175E Restore wildcard mismatch
Reason: You specified a source and destination with incompatible wildcards.
Action: Respecify; if there's a wildcard in the source, then there must be a wildcard in the destination.

PC2180E Raw device too large
Reason: Can not restore to devices over 2gig on AIX 3.2.

PC2181E Destination is not a raw disk or partition
Reason: A character special device other than a raw disk or partition was specified for the destination.

PC2182E ioctl failed for raw device
Reason: Could not get IOCINFO for raw device.

PC2183E Open failed for raw device
Reason: Could not get IOCINFO for raw device.

PC2184E Backup is not a raw disk or partition
Reason: Can not restore a regular file to a raw disk or partition.

PC2185E Destination and backup are not the same type
Reason: The destination for the restore is a raw disk and the backup is from a raw partition, or the destination is a raw partition and the backup is from a raw disk.

PC2186E Destination not same size as backup
Reason: Can not restore a backup of a raw device to a raw device of a different size.

PC2187E Destination and backup blocksizes different
Reason: Can not restore a backup of a raw device to a raw device with a different blocksize.

PC2188E Not root user
Reason: You must be the root user to restore to a raw disk or partition.

PC2189E Raw device does not exist
Reason: A raw device must exist prior to restore.

PC2190E Restore can't restart
Reason: You attempted to restart a non-restartable restore.
Action: Restart the restore manually.

PC2191E Version not found
Reason: During personalization destination checking the requested version date was not found.
Action: Specify a valid version date.

PC2192E Drive not found
Reason: During personalization destination checking the requested drive was not found or had been remapped.
Action: Specify a valid, non-remapped drive.

PC2193E read_vtoc failed for raw device
Reason: Could not get partition info for raw device.

PC2196D File skipped - larger than MAXKFILESIZE

PC2197E Error restoring a registry hive file
Reason: An error occurred while restoring one or more registry hive files.
Action: See preceeding messages and check the ULTra log if applicable.

PC2198E Error dynamically adding a file spec
Reason: There was an error adding a "directories above" file spec to the restore specification. This is an internal FDR/UPSTREAM error.
Action: See additional messages.

PC2199E Error copying a file spec
Reason: To add the "directories above" restore specifications, there was an error copying from the existing entry.
Action: See additional messages.

Inquire version errors.

PC2200E Error opening version information temporary file
Action: See additional messages

PC2201E Error allocating inquire version memory
Reason: There was not enough memory to allocate space to inquire versions.
Action: Free memory

PC2202E Error building start conversation record
Reason: There was an error building the start conversation record to send to the remote.
Action: See additional messages.

PC2203E Error sending start conversation for inq ver
Reason: There was an error sending the start conversation record for an inquire versions request.
Action: See additional messages.

PC2204E Error sending inquire versions record
Action: See additional messages.

PC2205E Error receiving inquire versions information
Reason: There was an error receiving the non-repeating backup description from the remote.
Action: See additional messages.

PC2206E Error sending inquire versions confirmed
Reason: There was an error acknowledging receipt of all the version information.
Action: See additional messages.

PC2207E Error ending the inquire versions conversation
Action: See additional messages.

PC2208E Error deleting inquire versions temp file
Action: See additional messages.

PC2209E Error ending the inquire versions conversation
Action: See additional messages.

PC2210E Error writing to inquire versions temp file
Reason: There was an error writing to the inquire versions temporary file.
Action: See additional messages.

PC2211E Error receiving inquire versions repeated info
Reason: There was an error receiving the repeated backup description information.
Action: See additional messages.

PC2212E Error writing inquire version repeated info
Reason: There was an error writing the repeated backup description information to the temporary file.
Action: See additional messages.

PC2213E Error reading temporary inquire versions file
Reason: There was an error reading the inquire versions temporary file for non-repeated backup description information.
Action: See additional messages.

PC2214E Error reading temporary inquire versions file
Reason: There was an error reading the inquire versions temporary file non-repeated information when searching for repeated information.
Action: See additional messages.

PC2215E Error reading temporary inquire versions file
Reason: There was an error reading the inquire versions temporary file repeated information.
Action: See additional messages.

PC2216D Expected more file descriptions
Reason: There was an unexpected end of data or non- repeated structure when receiving version information.
Action: Contact FDR/UPSTREAM Tech Support.

PC2217E Can't delete inquire versions file
Reason: There was an error deleting the inquire versions information file (USVER.BKP).
Action: See additional messages.

PC2218E Error receiving inquire versions profile name
Reason: There was an error receiving the profile name for the profile management information request.
Action: See additional messages.

PC2219D No versions stored for this profile
Reason: Specify a different backup profile.

PC2220E Unexpected EOF reading version file
Reason: Error reading non-repeated section. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2221E Unexpected EOF reading version file
Reason: Error reading repeated section. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2222E Unexpected EOF reading version file
Reason: Error reading non-repeated section to read repeated section. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2223E Bad translation tables
Reason: The files to be processed require UTF-8 capable, one-to-one translation tables and your translation tables are not one-to-one.
Action: Specify ANS2ATOE.TAB and ANS2ETOA.TAB translation tables.

PC2224I UTF-8 enabled
Reason: UTF-8 unicode translation was enabled in a prior backup so it has been enabled now.

PC2225I UTF-8 disabled
Reason: UTF-8 unicode translation was disabled in a prior backup so it has been disabled now.

PC2226E UTF-8 not supported
Reason: A UTF-8 backup was received and it is not supported by this version of UPSTREAM.

PC2227I Version inquiry succeeded

PC2228E Version inquiry failed

Restore messages(continued).

PC2250E (UNIX) Error restoring APF extended attribute
Action: If the errno is 139 (Operation not permitted), the user does not have read access to the BPX.FILEATTR.APF FACILITY class. If errno is not 139, Contact FDR/UPSTREAM Tech Support.

PC2251E (UNIX) Error restoring PROGCTL extended attribute
Action: If the errno is 139 (Operation not permitted), the user does not have read access to the BPX.FILEATTR.PROGCTL FACILITY class. If errno is not 139, Contact FDR/UPSTREAM Tech Support.

PC2252D (UNIX) USS external link
Reason: UNIX Systems Services external links are skipped on non-UNIX Systems Services operating systems.

PC2253W SMS Novell Profile and non-SMS file
Reason: This occurs when the file is backed up without using Novell's SMS.
Action: Restore this file without using SMS

PC2254W Non-SMS restore and an SMS file
Reason: This occurs when the file is backed up using Novell's SMS and the restore is performed using a SMS Novell Profile.
Action: Restore this file using SMS.

PC2255E Zero length Tru64 UNIX partition
Reason: The destination raw device for restore refers to a zero length or unallocated disk partition.
Action: Specify or define a valid partition.

PC2256E Invalid partition on unlabeled disk
Reason: The destination raw device for restore refers to a partition other than c on an unlabeled disk.
Action: Specifiy the c partition or label the disk.

PC2257I Error deleting old auto-recall stub
Reason: There was a file system error deleting the old Novell auto-recall stub file.
Action: See additional messages.

PC2258E Volume mount point directory not restored
Reason: The directory on the backup is a volume mount point directory and you have specified with the RESTOREMOUNTPOINTS parameter that all volume mount point directory restores should be failed.

PC2259E Target directory has different volume mounted
Reason: The target directory is a volume mount point directory for a volume that is different than the volume that was mounted on the volume mount point directory on the backup.

PC2260E Volume mount point not reestablished
Reason: The directory on the backup is a volume mount point directory, the target directory exists and is not a volume mount point directory and you have specified with the RESTOREMOUNTPOINTS parameter that volume mount point directory restores should be failed if the target directory is not a volume mount point directory.

PC2261E Error creating a volume mount point directory
Reason: The directory on the backup is a volume mount point directory, an error occurred while creating the target directory and you have specified with the RESTOREMOUNTPOINTS parameter that volume mount point directory restores should be failed if the target directory cannot be created.

PC2262E Volume mount point directory not created
Reason: The directory on the backup is a volume mount point directory, the target directory does not exist and you have specified with the RESTOREMOUNTPOINTS parameter that mount point directory restores should be failed if the target directory is not already a volume mount point.

PC2263E Directory not restored to volume mount point
Reason: The directory on the backup is not a volume mount point directory, the target directory is a volume mount point directory and you have specified with the RESTOREMOUNTPOINTS parameter that the mount point directory restores should be failed outright or be failed if the volume mount point does not exist or cannot be created.

PC2264E Error creating a volume mount point
Reason: The directory on the backup is a volume mount point directory, an error occurred while creating the volume mount point for the target directory, failed and you have specified with the RESTOREMOUNTPOINTS parameter that volume mount point directory restores should be failed only if the volume mount point cannot be created.

PC2265E Can't restore volume mount point to ULTra
Reason: The directory on the backup is a volume mount point directory, the creation of the volume mount point for the target directory cannot be performed because the restore is targeted to ULTra and you have specified with the RESTOREMOUNTPOINTS parameter that mount point directory restores should be failed if the volume point cannot be created.

PC2266E Can't restore volume mount point on non-Win2K system
Reason: The directory on the backup is a volume mount point directory, the creation of the volume mount point for the target directory cannot be performed because this is a non-Windows 2000 system and you have specified with the RESTOREMOUNTPOINTS parameter that mount point directory restores should be failed if the volume point cannot be created.

PC2267I Skipping files for failed mount point directory
Reason: The restore of a directory has failed due to a condition involving volume mount points. The restore of all of the files and subdirectories in that directory and its subdirectories will be skipped.

PC2268I Volume replaced on mount point directory
Reason: The directory on the backup is a volume mount point directory for the volume shown below. During the restore the target directory was found to be a mount point directory for a different volume. This is not an error since you specified with the RESTOREMOUNTPOINTS parameter that mount point directory restores should continue even if the target directory has a different volume mounted on it.

PC2269I Volume removed from mount point directory
Reason: The directory on the backup is a volume mount point directory for the volume shown below. During the restore the target directory was found to not have a volume mounted on it. This is not an error since you specified with the RESTOREMOUNTPOINTS parameter that mount point directory restores should continue even if the target directory no longer has a volume mounted on it.

PC2270I Volume mounted on mount point directory
Reason: The directory on the backup is a not volume mount point directory. During the restore the target directory was found to be a mount point for a volume. This is not an error since you specified with the RESTOREMOUNTPOINTS parameter that non-mount point directory restores should continue even if the target directory has a volume mounted on it.

PC2271E A UID for the user name is not defined
Reason: One or more files restored with the UID of the current user.
Action: Add a definition for the user name using the appropriate utility for your system.

PC2272E A GID for the group name is not defined
Reason: One or more files restored with the current GID.
Action: Add a definition for the group name using the appropriate utility for your system.

PC2273E A UID for the user name is not defined
Reason: One or more files restored with the UID of the file at the time of backup.
Action: Add a definition for the user name using the appropriate utility for your system.

PC2274E A GID for the group name is not defined
Reason: One or more files restored with the GID of the file at the time of backup.
Action: Add a definition for the group name using the appropriate utility for your system.

PC2275E Broken connection
Reason: During the restore the connection was lost to the host.
Action: See host log.

PC2276E Unexpected conversation state: %d
Action: Contact FDR/UPSTREAM Tech Support.

PC2277I Device file skipped
Reason: Device files are only restored when performing a disaster recovery restore.

PC2278E (Restore) Invalid intermixing of file specs
Reason: You have one or more full system file specs specified with one or more non-full system or exclude file specs or one of your full system file specs specifies a destination. Such a combination is not supported.
Action: Your include file specs should be of the full system file spec variety only and not specify a destination if you want to restore the full system state of one or more computers.

PC2281E (Restore) Only one ASR restore file spec is allowed
Reason: An ASR restore with more thatn one file spec has been specified. This is not supported.
Action: Specify only one file spec for an ASR restore.

PC2282E (Restore) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC2283E (Restore) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC2284E (Restore) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC2285E (Restore) Can't save original parameters
Reason: An internal UPSTREAM error occurred which prevents the saving of your original parameters before the creation of one or more dynamic full system file specs.
Action: Contact FDR/UPSTREAM Tech Support.

PC2286E (Restore) Insufficient memory for computer names
Reason: While attempting to allocate memory for an array of computer names, there was insufficient memory.
Action: Close applications or free memory.

PC2287E (Restore) An error occurred reading a file spec
Reason: An internal UPSTREAM error occurred while reading the file spec information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC2288E (Restore) Can't restore original parameters
Reason: An internal UPSTREAM error occurred which prevents the restoration of your original parameters after the creation of one or more dynamic full system file specs.

Action: Contact FDR/UPSTREAM Tech Support.

PC2289E (Restore) Can't create a full system file spec
Reason: An internal UPSTREAM error occurred which prevents the addition of one or more dynamic file specs needed to restore a complete computer system.
Action: Contact FDR/UPSTREAM Tech Support.

PC2290E (Restore) Can't modify a full system file spec
Reason: An internal UPSTREAM error occurred which prevents the modification of one or more dynamic file specs needed to restore a complete computer system.
Action: Contact FDR/UPSTREAM Tech Support.

PC2291E (Restore) A required PlugIn is not loaded
Reason: You are attempting to restore a complete computer system which requires the use of a PlugIn which was not loaded. The name of the required PlugIn follows:
Action: Determine why the PlugIn could not be loaded.

Inquire files errors.

PC2300E Error starting inquire files conversation
Action: See additional messages.

PC2301E Error sending start conversation for inquire file
Action: See additional messages.

PC2302E Error sending inquire files request
Action: See additional messages.

PC2303E Error receiving inquire files information
Action: See additional messages.

PC2304N Receiving backed-up file information
Reason: A remote inquire files process is in progress. You can press CANCEL to abort process. This message will go away if there is an error or the information has been completely received.

PC2305E Can't create inquire files temp file
Reason: There was an error creating the inquire files temporary file. Inquire files will not function until this is fixed.
Action: See additional messages.

PC2306E Can't write to inquire files temp file
Reason: There was an error writing to the inquire files temporary file. Inquire files will not function until this is fixed.
Action: See additional messages.

PC2307E Can't reopen inquire files temp file
Reason: There was an error reopening the inquire files temporary file to fill the list box. Inquire files will not function until this is fixed.
Action: See additional messages.

PC2308E Can't read inquire files temp file
Reason: There was an error reading the file information from the inquire files temporary file. Inquire files will not function until this is fixed.
Action: See additional messages.

PC2309E Unexpected end of file - inquire files temp
Reason: End of file was reached on the inquire files temporary file. This is a system error and inquire files will not function until this is fixed.
Action: Contact FDR/UPSTREAM Tech Support.

PC2310E Can't allocate data to inquire files (OS/2)
Reason: There was an error allocating data space to perform the inquire files function.
Action: Close other programs or free disk space.

PC2313E User requested cancel of inquire files

PC2314E Error sending delete file request
Action: See communications return codes.

PC2315E Error confirming delete file request
Action: Additional messages.

PC2316E Internal date format error
Action: Contact FDR/UPSTREAM Tech Support.

Help system errors.

PC2400E Error opening help file
Action: See additional messages.

PC2401E Error reading help file
Action: See additional messages.

Novell errors.

PC2468W (Novell login) Can't reset default directory
Action: See additional messages

PC2469E (Novell Login) Not logged on.
Reason: A request to get the current server was made, which requires a prior Novell Profile logon.
Action: Specify a Novell Profile.

PC2470I (Novell Login) Logging in as specified user:

PC2471D (Novell Login) Error setting context
Reason: There was an error setting the default NDS flags.
Action: The Novell return code which follows may indicate the real problem for a later error.

PC2472D (Novell Login) Error setting context
Reason: There was an error setting the default NDS tree.
Action: The Novell return code which follows may indicate the real problem for a later error.

PC2473W (Novell) Error renaming file
Reason: Usually used to properly case a long file name.
Action: See Novell return code.

PC2474W (Novell) Error converting to DOS name space
Reason: The following file may report other errors and certain Novell features may not work.
Action: See following Novell return code.

PC2475W (Novell) File already migrated
Reason: The following file has already been migrated.

PC2476E (Novell) Extension makes name too long
Reason: By adding the file extension, the name would be too long. The file has been backed up, but will not be deleted locally.
Action: Delete this file manually.

PC2477E (Novell) Error setting volume restrictions
Action: Look up the return code in the UPSTREAM manual.

PC2478E (Novell) Error getting volume restrictions
Action: Look up the return code in the UPSTREAM manual.

PC2479E (Novell) Error getting volume number
Reason: During a search for volume restrictions, the volume number could not be obtained.
Action: Look up the return code in the UPSTREAM manual.

PC2480E (Novell) Error getting volume information
Reason: During a search for volume restrictions, the volume name could not be obtained.
Action: Look up the return code in the UPSTREAM manual.

PC2481E (Novell) Server expected and not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2482E (Novell) Server expected and not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2483E (Novell) Server expected and not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2484E (Novell) Server expected and not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2485E (Novell) Server expected and not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2486E (Novell) Insufficient memory
Reason: There was a memory shortage allocating memory for a server record.
Action: Free memory or close programs.

PC2487E (Novell) Error attaching to server
Reason: There was an error attaching to the specified server using a UNC name.
Action: Look up the Novell return code in the UPSTREAM manual.

PC2488E (Novell) Insufficient memory
Reason: There was a memory shortage allocating memory for a volume record.
Action: Free memory or close programs.

PC2489E (Novell) Error attaching volume
Reason: When using a UNC name there was a Novell error attaching the specified volume.
Action: Look up the Novell return code in the UPSTREAM manual.

PC2490E (Novell) Error attaching to server
Reason: When using a UNC name there was a Novell error attaching to the specified server.
Action: Look up the Novell return code in the UPSTREAM manual.

PC2491I (Novell) Error setting file/dir info
Reason: There was a Novell error setting the file or directory information.
Action: Look up the following return code in the UPSTREAM manual.

PC2492E (Novell) Error allocating a dir handle
Reason: There was a Novell error allocating a temporary name space directory handle.
Action: See additional messages.

PC2493E (Novell) Bad file name
Reason: A file name was expected to have a '/','\' or ':'. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2494E (Novell) Not a Novell drive
Reason: You requested Novell migration of a non-Novell drive. The files will not be deleted. You will not see any more error messages.
Action: Set NOVELLMIGRATE to N

PC2495I (Novell) USNOVWAITTOSET defined and set to:

PC2496E (Novell) Error unhiding directory
Reason: There was an error unhiding a directory that was hidden so that Novell directory information can be set.
Action: See additional messages.

PC2497E (Novell) Error unhiding directory
Reason: There was an error unhiding a directory that was hidden so that Novell directory information can be extracted.
Action: See additional messages.

PC2498E (Novell NT) Error setting bindery attributes
Reason: Error setting the bindery attributes immediately after a bindery close.
Action: See additional messages.

PC2499E (Novell NT) Error setting bindery attributes
Reason: Error setting the bindery attributes immediately before a bindery open.
Action: See additional messages.

PC2500E Error closing the bindery
Reason: There was an error closing the Novell bindery.
Action: Verify that the server is still up and that there are no other programs accessing the bindery.

PC2501E Error retrieving directory restrictions
Reason: There was an error retrieving the directory size restrictions value.
Action: Contact FDR/UPSTREAM Tech Support.

PC2502E Error allocating a temporary directory handle
Reason: Certain Novell access calls require the existence of a temporary directory handle. You must have a free, NetWare accessible drive letter.
Action: Free a drive letter with the map command.

PC2503E Error accessing trustee information
Reason: There was an error accessing trustee information for a file or directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC2504E Error retrieving directory information
Reason: There was an error retrieving the directory information values.
Action: Contact FDR/UPSTREAM Tech Support.

PC2505E Error retrieving file information
Reason: There was an error retrieving the file information values.
Action: Contact FDR/UPSTREAM Tech Support.

PC2506E Error retrieving file information for a write
Reason: There was an error retrieving the file information to write the received file information.
Action: Contact FDR/UPSTREAM Tech Support.

PC2507E Error writing file or directory information
Reason: There was an error writing the file or directory values.
Action: Contact FDR/UPSTREAM Tech Support.

PC2508E Error setting the directory restrictions
Reason: There was an error setting the directory size restrictions value.
Action: Contact FDR/UPSTREAM Tech Support.

PC2509E Error setting trustees
Reason: There was an error setting file or directory trustee rights.
Action: Contact FDR/UPSTREAM Tech Support.

PC2510E Error converting to a Novell name
Reason: There was an error converting the specified name to a NetWare specific name.
Action: Contact FDR/UPSTREAM Tech Support.

PC2511E Error setting directory information
Reason: There was an error setting directory information values.
Action: Contact FDR/UPSTREAM Tech Support.

PC2512E Error reopening the bindery
Reason: There was an error reopening the bindery. This is a serious error, as no bindery activities can happen (logins, print access, etc).
Action: From the system console, using monitor, clear the connection for the UPSTREAM PC. Restore the bindery.

PC2513E Error setting file attributes
Reason: There was an error setting a file's attributes.
Action: Contact FDR/UPSTREAM Tech Support.

PC2514E Error creating save info buffer
Reason: There was an error creating the buffer to save the novell file or directory attributes in.
Action: Free memory

PC2515E Error (re)setting Novell information
Reason: Error setting the archive date or resetting the last access date. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2516E Error getting your object ID
Reason: There was an error getting the object ID to reset the archiver ID for the file or directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC2517E Error setting the server date/time
Action: See additional messages.

PC2518E Error building NetWare name
Reason: There was an error with one of the following names. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2519E Write directory entry size error
Reason: Unexpected size received during write directory entry. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2520E Write file entry size error
Reason: Unexpected size received during write file entry. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2521E Error scanning files
Reason: There was a Novell error scanning the drive.
Action: See additional messages.

PC2522E Novell information not saved previously
Reason: UPSTREAM attempted to write Novell information out and it was not saved previously.
Action: Contact FDR/UPSTREAM Tech Support.

PC2523E Error reopening the bindery
Reason: There was an error reopening the bindery during set of archive bit and/or archive date. This is a serious error, as no bindery activities can happen (logins, print access, etc).
Action: From the system console, using monitor, clear the connection for the UPSTREAM PC. Restore the bindery.

PC2524E Error allocating memory
Reason: There was an error allocating memory for the LRU retrieval of object IDs
Action: Free memory and retry.

PC2525E (Novell) Error loading NetWare API
Reason: There was an error loading the API module
Action: See additional messages.

PC2526E (Novell) Error loading function
Reason: There was an error loading a particular NetWare function.
Action: See additional messages.

PC2527E (Novell) Error loading NetWare DLLs
Reason: A complete set of NetWare DLLs could not be found and loaded. The NetWare DLLs are required to provide the necessary NetWare API functions used by UPSTREAM.
Action: Reinstall the NetWare client software for the environment in which UPSTREAM is to run.

PC2530E (Novell NDS) NDS backups not configured
Reason: You should check “NDS Backups performed internally” in the SETNOV program if you are using the NLM version. If you are running from a Windows or OS/2 machine you need to load USNDS.NLM.
Action: Modify your SETNOV configuration (NLM) or Load USNDS.NLM and retry (Windows or OS/2).

PC2531E (Novell NDS) Error accessing NLM
Reason: There was a Novell error accessing the USNDS.NLM.
Action: See additional messages.

PC2532E (Novell NDS) USNDS reported an error
Reason: The following text came from USNDS.NLM:

PC2533E (Novell NDS) Error accessing NLM
Reason: There was a Novell error accessing the USNDS.NLM during a Read NDS request.
Action: See additional messages.

PC2534E (Novell NDS) USNDS reported an error
Reason: The following text came from USNDS.NLM:

PC2535E (Novell NDS) Error accessing NLM
Reason: There was a Novell error accessing the USNDS.NLM during a Write NDS request.
Action: See additional messages.

PC2536E (Novell NDS) USNDS reported an error
Reason: The following text came from USNDS.NLM:

PC2537E (Novell NDS) USNDS reported an error
Reason: The following text came from USNDS.NLM:

PC2538E (Novell NDS) Error accessing NLM
Reason: There was a Novell error accessing the USNDS.NLM during a Start request.
Action: See additional messages.

PC2539E (Novell NDS) Error accessing NDS
Action: See additional messages.

PC2540I (Novell) Error getting object ID (DS)
Reason: When attempting to set Novell values, there was an error getting the object ID. Operations will continue.
Action: See additional messages.

PC2541I (Novell) Error getting object ID
Reason: When attempting to set Novell values, there was an error getting the object ID. Operations will continue.
Action: See additional messages.

PC2542I (Novell) Error getting object name (DS)
Reason: When attempting to set Novell values, there was an error getting the object name. Operations will continue.
Action: See additional messages.

PC2543I (Novell) Error getting object name
Reason: When attempting to set Novell values, there was an error getting the object name. Operations will continue.
Action: See additional messages.

PC2544I (Novell) Error canonicalizing name
Reason: When attempting to set Novell values, there was an error converting the retrieved name to the standard format. Operations will continue.
Action: See additional messages.

PC2545E (Novell) Expected buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2546I (Novell) Error abbreviating name
Reason: When attempting to set Novell values, there was an error converting the standard name to abbreviated format. Operations will continue.
Action: See additional messages.

PC2547W (Novell) [Supervisor] not predefined
Reason: The predefined number for the [Supervisor] object does not match what was found on the server. There will be additional messages.
Action: Contact FDR/UPSTREAM Tech Support.

PC2548W (Novell) [Public] not predefined
Reason: The predefined number for the [Public] object does not match what was found on the server. There will be additional messages.
Action: Contact FDR/UPSTREAM Tech Support.

PC2549E (Novell and LAN WS) LAN WS Name and
Reason: Novell Profile specify mutually exclusive sources/destinations of data.
Action: Delete undesired specification.

PC2550E (Novell Login) No profiles found
Action: Run SETNOV to create a NetWare profile.

PC2551E (Novell Login) Profile version mismatch
Action: Run SETNOV to re-create your profile.

PC2552E (Novell Login) Memory shortage
Reason: There was a memory shortage while attempting to read the profile file.
Action: Free memory and retry.

PC2553E (Novell Login) Profile read error
Reason: There was an error reading the NetWare profile.
Action: Run SETNOV and regenerate the profiles.

PC2554E (Novell Login) Old version volume error
Reason: There was an error converting the old profile information to the new format.
Action: Run SETNOV and upgrade.

PC2555E (Novell Login) Memory shortage
Reason: There was a memory shortage reading the data from the old profile.

Action: Run SETNOV and upgrade.

PC2556E (Novell Login) Definition error
Reason: There was a definition error in the old profile information.
Action: Run SETNOV and upgrade.

PC2557E (Novell Login) Profile not found
Reason: The profile that you specified is not one defined in SETNOV.
Action: Respecify in UPSTREAM or SETNOV.

PC2558E (Novell Login) Error attaching to server
Reason: There was a Novell error attaching to the specified server.
Action: Contact FDR/UPSTREAM Tech Support.

PC2559E (Novell Login) Error getting UPSTREAM path
Reason: There was a Novell error retrieving the current UPSTREAM path defintion.
Action: Contact FDR/UPSTREAM Tech Support.

PC2560E (Novell Login) Memory shortage
Reason: There was an error allocating the memory required to hold the NetWare status information
Action: Free memory and retry.

PC2561E (Novell Login) NetWare not loaded
Reason: A request to load a NetWare profile was made but NetWare is not loaded.
Action: Load NetWare or don't request a profile.

PC2562E (Novell Login) NetWare not loaded
Reason: There are no defined NetWare connection IDs. This usually means that NetWare is not loaded.
Action: Load NetWare

PC2563E (Novell Login) Error retrieving path
Reason: There was a Novell error determining the original path on a drive to be mapped.
Action: Contact FDR/UPSTREAM Tech Support.

PC2564E (Novell Login) Path conflicts
Reason: The path that you specified and the UPSTREAM path on the same drive conflict.
Action: Either change the SETNOV definition for the drive, run UPSTREAM on a local drive, or remap the UPSTREAM directory.

PC2565E (Novell Login) NetWare error logging in
Reason: There was an error logging into the selected server.
Action: Verify that the password is correct. Contact FDR/UPSTREAM Tech Support with the error number that follows.

PC2566E (Novell Login) Can't establish UPSTREAM path
Reason: There was a Novell error reestablishing that path definition for the drive UPSTREAM is running from.
Action: Contact FDR/UPSTREAM Tech Support.

PC2567E (Novell Login) Can't map target drive
Reason: There was a NetWare error mapping the target drive path.
Action: Contact FDR/UPSTREAM Tech Support.

PC2568E (Novell Login) Can't login logout user name
Reason: There was a NetWare error logging into the server with the logout name (defined in SETNOV).
Action: Contact FDR/UPSTREAM Tech Support.

PC2569E (Novell Login) Can't establish UPSTREAM path
Reason: There was a Novell error reestablishing that path definition for the drive UPSTREAM is running from during a logout operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC2570E (Novell Login) Can't logout UPSTREAM drive
Reason: You can't detach from the drive that you were running UPSTREAM from.
Action: Remap the UPSTREAM drive or change your SETNOV mappings for this profile.

PC2571E (Novell Login) Can't run from server
Reason: In OS/2 you cannot run UPSTREAM from a server that you're backing up.
Action: Run UPSTREAM from the local drive.

PC2572E (Novell Login) Can't save drive mappings
Reason: There was an error allocating the memory to save the drive mappings. UPSTREAM will continue, but when the backup is done the drive mappings for the server may be lost.
Action: Free memory.

PC2573E (Novell Login) Can't save drive mappings
Reason: There was a NetWare error retrieving the existing drive mappings for a given server.
Action: Contact FDR/UPSTREAM Tech Support.

PC2574E (Novell Login) Can't restore drive mappings
Reason: There was a NetWare error restoring the preexisting drive mappings for a given server.
Action: Contact FDR/UPSTREAM Tech Support.

PC2575E (Novell Login) Can't get connection status
Reason: There was a NetWare error getting the connection status used to determine if we should login using bindery or directory services.
Action: Contact FDR/UPSTREAM Tech Support.

PC2576E (Novell Login) Can't get locale
Reason: There was a NetWare error getting the locale information necessary to login using directory services.
Action: Verify that the directory with the Unicode tables is in the search path.

PC2577E (Novell Login) Can't initialize unicode tables
Reason: There was a NetWare error initializing the unicode tables necessary to login using directory services.
Action: Verify that the directory with the Unicode tables is in the search path.

PC2578E (Novell Login) Can't create context
Reason: There was a NetWare error creating the context necessary to login using directory services.
Action: Verify that directory service support is enabled in your requestor.

PC2579D (Novell Login) Can't login
Reason: There was a NetWare error logging in using directory services.
Action: Verify that the user name and password for this profile are correct and that you don't have any login restrictions on the user.

PC2580E (Novell Login) Can't authenticate login
Reason: There was a NetWare error authenticating the login using directory services.
Action: Verify that the user name and password for this profile are correct.

PC2581E (Novell Login) Can't login logout user name
Reason: There was a NetWare error logging into the server with the logout name (defined in SETNOV) using directory services.
Action: Verify that the user name and password for this profile are correct.

PC2582E (Novell Login) Can't authenticate logout user name
Reason: There was a NetWare error authenticating the logout user name (defined in SETNOV) using directory services.
Action: Verify that the user name and password for this profile are correct.

PC2583E (Novell Login) Directory services required
Reason: Novell directory services support is not loaded but is required to login to this server.
Action: Install directory services support on this PC.

PC2584E (Novell Login) Error allocating dir handle
Reason: There was an error allocating a new directory handle preparitory to mapping the new drive.
Action: See additional messages.

PC2585E (Novell Login) Can't set locale
Reason: There was a NetWare error setting the locale information necessary to login using directory services.
Action: Verify that the directory with the Unicode tables is in the search path.

PC2586E (Novell Login) Can't get connection name
Reason: There was a NetWare error getting the server's connection type.
Action: Contact FDR/UPSTREAM Tech Support.

PC2587I (Novell Login) Can't set tree

Reason: There was a NetWare error setting the preferred directory services tree.
Action: Contact FDR/UPSTREAM Tech Support.

PC2588E (Novell Login) Server not NDS
Reason: The server you specified does not use NetWare Directory Services.
Action: Specify a different server or use a bindery login name.

PC2589D (Novell Login) Error logging out (DS)
Reason: There was an error logging out from the server. Ususally this message can be ignored.

PC2590D (Novell Login) Error logging out
Reason: There was an error logging out from the server. Ususally this message can be ignored.

PC2591I (Novell Login) Detaching from server:

PC2592W (Novell Login) Error detaching from server
Reason: There was a Novell error detaching from a server that UPSTREAM attached to.
Action: Look up the Novell error number in the UPSTREAM manual.

PC2593I (Novell Login DS) Detaching from server:

PC2594W (Novell Login DS) Error detaching from server
Reason: There was a Novell error detaching from a server that UPSTREAM attached to.
Action: Look up the Novell error number in the UPSTREAM manual.

PC2595D Retrying attach (%u times, %u sec. interval)
Reason: In many circumstances the Novell Profile login will work if a complete disconnect and reconnect is attempted. Thus, you may see the same error messages repeated.

PC2596E (Novell Login) Drive not mapped
Reason: UPSTREAM got a good return code from the drive mapping but when it checked the drive status, it reported the following error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2597E (Novell Login) Drive not mapped
Reason: UPSTREAM got a good return code from the drive mapping but when it checked the drive status, it reported the following status.
Action: Contact FDR/UPSTREAM Tech Support.

PC2598E (Novell Login - SMS) Standard login required
Reason: You checked the “No standard login” checkbox in the Novell Profile. This option is not allowed for the NLM version of UPSTREAM.
Action: Modify the Novell Profile.

PC2599D (Novell Login) Error setting context
Reason: There was an error setting the default name context.
Action: The Novell return code which follows may indicate the real problem for a later error.

OS/2 specific file access errors.

PC2600E (OS/2) Extended Attribute Record Overflow
Reason: The extended attribute for the given file is larger than 65280 bytes.
Action: Reduce the size of the extended attribute.

PC2601E (OS/2) Error accessing extended attributes
Reason: There was an error accessing extended attributes for the given file.
Action: See additional messages.

PC2602E (OS/2) Error setting extended attributes
Reason: There was an error setting extended attributes for the given file.
Action: See additional messages.

PC2603E (OS/2) Error saving file information
Reason: There was an error retrieving information which should be available.
Action: See additional messages.

PC2604E (OS/2) Saved file info doesn’t match
Reason: The information saved in the internal buffer for later updating doesn’t match file or directory name to update. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC2605E (OS/2) Error setting file information
Reason: There was an error setting information.
Action: See additional messages.

PC2606E (OS/2) Error loading network function
Reason: There was an error loading a required function to access the ACLs.
Action: See additional messages.

PC2607E (OS/2) Error finding network library
Reason: There was an error finding the network facilities.
Action: See additional messages.

PC2608E (OS/2) Error listing all the drives
Reason: There was an error listing the known mapped drives on this PC.
Action: See additional messages.

PC2609E (OS/2) Error checking for ACLs
Action: See additional messages.

PC2614E (OS/2) Error getting share information
Reason: An error occurred while retrieving information about a UNC share name.
Action: See additional messages.

PC2615E (OS/2) Error allocating put memory
Reason: There was a memory shortage allocating memory required for OS/2 duplicate file handling.
Action: Either reduce the maximum number of duplicate files or free memory.

PC2616E (OS/2) Remote server ACLs not supported
Reason: While checking for ACLs for a file on a remote server UPSTREAM found that the remote server does not support ACL checking. ACL checking for all other files on this remote server will be skipped. This is the only message of this kind that will be issued for this remote server.
Action: See additional messages.

PC2620E (OS/2) Error deleting existing ACLs
Action: See additional messages.

PC2621E (OS/2) Error creating ACLs
Action: See additional messages

PC2622E (OS/2) Error allocating data area to save info
Action: Free memory.

PC2623E (OS/2) Error setting file attribute
Reason: There was an error setting a file’s attribute.
Action: See additional messages.

PC2624W (OS/2) ACLs disabled
Reason: You specified ACLs be backed up but you also specified that ACLs be disabled using the USNOACL environment variable. The process will continue.

PC2625E (OS/2) Error allocating EA buffer memory
Reason: There was a memory shortage allocating memory required for OS/2 extended attribute handling.
Action: See additional messages and free memory.

WMIQuery errors.

PC2630E (WMIQuery) Got invalid drive from LogicalDisks query
Reason: A WMI query of LogicalDisks returned and invalid drive letter.
Action: Contact FDR/UPSTREAM Tech Support.

PC2631E (WMIQuery) Unable to initialize COM
Reason: An error occurred while attempting to initialize the COM interface in order to perform a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2632E (WMIQuery) Unable to create locator object
Reason: An error occurred while attempting to create a locator object required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2633E (WMIQuery) Unable to create service object
Reason: An error occurred while attempting to create a service object required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2634E (WMIQuery) Unable to create security object
Reason: An error occurred while attempting to create a security object required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2635E (WMIQuery) Unable to get authority level
Reason: An error occurred while attempting to get the authority level from the security object which is required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2636E (WMIQuery) Unable to set authority level
Reason: An error occurred while attempting to set the authority level on the server object required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2637E (WMIQuery) Unable to create enumeration object
Reason: An error occurred while attempting to create an enumeration object required for performing a WMI query.

PC2638E (WMIQuery) Unable to set authority level
Reason: An error occurred while attempting to set the authority level on the enumeration object required for performing a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2639E (WMIQuery) Unable to enumerate objects
Reason: An error occurred while attempting to enumerate the objects returned as a result of a WMI query.
Action: Contact FDR/UPSTREAM Tech Support.

PC2640E (WMIQuery) Unable to get object properties
Reason: An error occurred while attempting to get the properties of a WMI query result object.
Action: Contact FDR/UPSTREAM Tech Support.

PC2641E (WMIQuery) Unable to get properties lower bound
Reason: An error occurred while attempting to get the lower bound of the properties of a WMI query result object.
Action: Contact FDR/UPSTREAM Tech Support.

PC2642E (WMIQuery) Unable to get properties upper bound
Reason: An error occurred while attempting to get the upper bound of the properties of a WMI query result object.
Action: Contact FDR/UPSTREAM Tech Support.

PC2643E (WMIQuery) Unable to get property name
Reason: An error occurred while attempting to get a property name for a property of a WMI query result object.
Action: Contact FDR/UPSTREAM Tech Support.

PC2644E (WMIQuery) Unable to get property value
Reason: An error occurred while attempting to get a property value for a property of a WMI query result object.
Action: Contact FDR/UPSTREAM Tech Support.

Performance test errors.

PC2800E VSAM I/O test error
Reason: There was an error starting or receiving the results of a VSAM I/O test.
Action: See additional messages.

PC2801D Performance Tests Results:

PC2802E File I/O test error
Reason: There was a file I/O test error and the results shown in the statistics will be wrong.
Action: See additional messages.

PC2803E Communications volume test error
Reason: There was an error in the communications test and the results shown in the statistics will be wrong.
Action: See additional messages.

PC2804E Error saving performance tests values
Action: See additional messages.

As of date restore errors.

PC2900W Nothing to restore
Reason: You requested an “As of...Restore” and there were not versions matching your specified criteria.
Action: Respecify.

PC2901E Duplicate backup profile names
Reason: You specified the same profile name in the full and incremental profile fields.
Action: Specify different names or leave the incremental profile field blank (required for merge backups).

High compression errors.

PC3000E High compression reinitialization error
Reason: There was an error initializing for high compression. This is an unexpected error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3001E High compression error
Reason: There was an error attempting to compress a record using high compression.
Action: See additional message.

PC3002E High compression initialization error
Reason: There was an error initializing for high compression. You probably do not have enough memory.
Action: See additional message.

PC3003E Error during high decompression
Reason: There was an error decompressing a record which was compressed using high compression.
Action: Contact FDR/UPSTREAM Tech Support.

PC3004E Error reinitializing high decompression
Reason: There was an error reinitializing during a restore for high compression. This is an unexpected error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3005E Error initializing for high decompression
Reason: There was an error initializing a restore for high compression. You probably do not have enough memory.
Action: See additional message.

PC3006E High compression, non-file overage
Reason: After compressing a block of non-file data, the data was too large to fit into a single record.
Action: Contact FDR/UPSTREAM Tech Support.

PC3007E High decompression, non-file overage
Reason: After decompressing a block of non-file data, the data was too large to fit into a single record. This is an unexpected error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3008E High decompression, non-file input exhausted
Reason: While decompressing a block of non-file data, the data was exhausted without being completed. This is an unexpected error.
Action: Contact FDR/UPSTREAM Tech Support.

Remote initiate errors.

PC3100N Waiting for remote initiate
Reason: UPSTREAM is waiting for the remote system to start a function on the PC. You can press the CANCEL button to exit UPSTREAM.

PC3101I Remote initiate received
Reason: A remote initiated function will now be processed.

PC3102D Remote initiate received
Reason: A remote initiated function was received. It will be processed shortly.

PC3103E Error allocating data for remote initiate
Reason: There was insufficient data space for processing the remote initiate request. Further remote initiates will be rejected.
Action: Exit UPSTREAM and free memory.

PC3104E Remote initiated request rejected
Reason: The remote initiate request is rejected due to a problem reported earlier.

PC3105E Remote requested non-queued and PC busy
Reason: The remote system requested immediate execution of a function and this machine is currently busy processing another function that can not be interrupted at this point.
Action: The remote will retry.

PC3106E Error saving current parameters during remote
Reason: There was an error saving the current parameters so that remotely initiated parameters could be processed.
Action: See additional messages.

PC3107E Invalid parameter received (%s)
Reason: A parameter received from a remotely initiated request was in error.

PC3108E Error recalling parameters for execution
Reason: There was an error retrieving saved remotely specified parameters for execution now.
Action: See additional messages.

PC3109E Error saving parameters for remote execution
Reason: There was an error saving the received parameters.
Action: See additional messages.

PC3110E Error restoring original parameters
Reason: After saving parameters for remote execution, there was an error restoring the original parameters.
Action: See additional messages.

PC3111E Missing parameter (%s %s)
Reason: The parameters that were remotely received are incomplete.
Action: See additional messages.

PC3112E Error saving current parameters
Reason: There was an error saving the current parameters so that a remote execution request can be processed.
Action: See additional messages.

PC3113E Error restoring current parameters
Reason: There was an error restoring the current parameters after a remote execution request was processed.
Action: See additional messages.

PC3114E User requested reject of remote functions
Reason: To reactivate remote functions, select the “Unattended Remote Functions” option from the Action menu.

PC3115E Error saving remote parameter file name
Reason: There was an error saving the remotely specified parameter file name.
Action: See additional messages.

PC3116E Error reading remotely specified param file
Reason: There was an error reading the parameter file specified by the remote system.
Action: Verify that the name is correct.

PC3117E User requested reject of PC requests
Reason: The user requested that PC initiation requests be rejected.

PC3118E PC is busy
Reason: The PC is busy processing another request and is not available to process a request where the calling facility (USTBATCH or another PC) will wait for completion.

PC3119D Remote initiate received
Reason: A remote initiated function was received. If it can not be processed within the timelimit below (based on USQUEUETIMELIMIT) it will be rejected.

PC3120E Wrong PC
Reason: This request was sent to a PC whose logical name does not match the logical name of this PC. The logical name received is:

PC3121I Starting another instance of UPSTREAM (US.EXE)
Reason: In order to be able to handle multiple simultaneous remote initiations from the host, another instance of US.EXE is being started to receive another remote initiation. The UPSTREAM command line follows:

PC3122D Waiting for remote initiate, but not listening
Reason: You specified ACTION 3 (wait for remote request) in the parameter file, but you have LISTENFORREMOTE N. Activate “Listen for Remote Function” in “Remote” menu (set LISTENFORREMOTE Y), or specify a different ACTION.

PC3123E Attach manager only facility - this is UPSTREAM
Reason: UPSTREAM received a request which can only be handled by the UPSTREAM attach manager and it is thus denied.

PC3124E Error occurred sending status port info
Reason: While sending the status port information to a cooperating UPSTREAM application, this error occurred.
Action: See additional messages.

PC3125E Error occurred during receipt of remote request

PC3126E Error occurred during receipt of parameters

PC3127E Error occurred during a CONFIRMED of remote

PC3128E Error occurred during the end of a conversation

PC3129E Error occurred while test for remote initiate

PC3130N Waiting for remote initiate
Reason: UPSTREAM is waiting for the remote system to start a function. For PC operating systems (GUI), press the CANCEL button to terminate. For UNIX operating systems use CTRL-C or the kill command if running in the background to terminate. For all others, press the [ESC] key.

PC3131N Waiting for remote initiate
Reason: UPSTREAM is waiting for the remote system to start a function. Use CTRL-C or the kill command if running in the background to terminate.

PC3132N Waiting for remote initiate
Reason: UPSTREAM is waiting for the remote system to start a function. Press [ESC] to terminate.

PC3133I Starting a new instance of UPSTREAM
Reason: To handle multiple simultaneous remote initiations from the host, a new instance of USCMD is being started to process this remote initiation. The UPSTREAM PID and command line follows:

PC3134I Failed to start a new instance of UPSTREAM
Reason: Failed to start a new instance of UPSTREAM to handle multiple remote initiations from the host The error code and UPSTREAM command line follows:

PC3135I UPSTREAM user interface request received

PC3136I Started instance of UPSTREAM now terminated:

PC3137E PEEK operation failed.
Reason: When processing remote request in Attach Manager mode UPSTREAM failed to PEEK on the action requested. The remote request will not be processed.

PC3138E Attach manager only facility
Reason: UPSTREAM received a request which can only be handled by an UPSTREAM running in an attach manager mode and it is thus denied.

PC3139E Error retreiving status info (UNIX only)
Reason: Error in waitpid function to check on running UPSTREAM:

PC3140E Insufficient memory

Reason: There was insufficient memory when allocating the queue area to save the remote request. This job will not be processed.
Action: Free memory or close applications.

PC3141E Rejected because UPSTREAM's busy
Reason: The user specified a USQUEUETIMELIMIT of 0 which causes UPSTREAM to reject any CONV=WAIT or CONV=KEEP jobs if it is busy processing another event.

PC3142E Error deleting queued request
Reason: A queued request which subsequently failed could not be deleted and may end up being serviced.
Action: See additional messages.

PC3143E Remote job timed out
Reason: One of your remote jobs timed out and will not be processed.

PC3144E Error removing timed out job
Reason: A queued request which subsequently timed out could not be deleted and may end up being serviced.
Action: See additional messages.

PC3145E Error accessing saved job
Action: See additional messages.

PC3146E Invalid system for remote request
Action: Add this systems to your list of valid remote systems in the UPSTREAM Configurator (Personalization).

PC3147E Remote system didn't specify a local user
Action: Upgrade the remote copy of UPSTREAM or update remote user personalization settings in the UPSTREAM configurator.

PC3148E Remote system's user denied
Reason: The user who's logged onto the requesting system has been denied access to UPSTREAM functions.
Action: Add this user to the remote system definition in user personalization settings in the UPSTREAM configurator.

PC3149E Local user name not specified
Reason: UPSTREAM personalization requires that you enter a local user name before accessing UPSTREAM functions on this system.
Action: Specify LOCALUSER and LOCALPASSWORD parameters.

PC3150E Error switching to logged on security
Action: See additional messages.

PC3151I Closing UPSTREAM
Reason: UPSTREAM processed the single function that the attach manager started it for.

PC3152I Closing UPSTREAM
Reason: UPSTREAM processed the single function over the Java status port that the attach manager started it for.

PC3153I Closing UPSTREAM
Reason: UPSTREAM closed by user request.

PC3154I Closing UPSTREAM
Reason: UPSTREAM closing due to a fatal listen error.

PC3155I Closing UPSTREAM
Reason: UPSTREAM closing - REMOTETIMEOUT exceeded.

PC3156I Closing UPSTREAM
Reason: UPSTREAM closed by external request.

PC3157I Closing UPSTREAM
Reason: UPSTREAM closed by remote Java program.

PC3158E Occurred poping the remote timed queue

PC3159E Occurred checking for remote initiate

PC3160E Occurred between remote initiates (1)

PC3161E Occurred between remote initiates (1)

PC3162I StartProgam request failed.
Reason: There was an error processing StartProgram request to start a new copy of UPSTREAM:

PC3163E Remotely initiated request failed
Reason: There was an error starting a new instance of UPSTREAM to process a remote initiate request:

PC3164E Failed to obtain status ports
Reason: When preparing to start a new copy of UPSTREAM, we were not able to find a free pair of status ports. Remote request will not be processed.

PC3165E Failed to check on the request.
Reason: Unable to check on the incoming remote request. Request will be processed by this instance of UPSTREAM instead of starting another copy.

PC3167W Inheritance on sockets is set to be off.
Reason: UPSTREAM determined that the inheritance flag on status sockets was turned off. UPSTREAM will try to fix the problem.

PC3168W Error occurred setting requested timeout

PC3169W Error terminating process:

PC3170I UPSTREAM instance terminated:

Parameter file queuing errors.

PC3200E Error allocating memory for parameter queuing
Reason: There was an error allocating enough memory to enqueue a new parameter structure. The process requested will fail.
Action: Free a small amount of additional memory.

PC3201E Error setting specs for parm save
Reason: There was an error setting the current parameter information during a parameter save. The process requested will fail.
Action: See additional messages.

PC3202E Error setting writing parameters for parm save
Reason: There was an error writing the parameters during a parameter save. The process requested will fail.
Action: See additional messages.

Remote request errors. Locational errors

PC3300E Remote request start conversation error
Reason: There was an error starting the conversation with the remote system.
Action: See the return codes.

PC3301E Remote request send request error
Reason: There was an error sending the remote request record.
Action: See the return codes.

PC3302E Remote request send parameter error
Reason: There was an error sending a remote request parameter.
Action: See the return codes.

PC3303E Remote request confirm error
Reason: The remote system did not accept the remote request.
Action: See additional messages

PC3304E Remote request end conversation error
Reason: There was an error terminating the remote request conversation.
Action: See additional messages

Other remote request errors

PC3350E Error saving parameters
Reason: There was an error saving your current parameters so that they could be sent to the remote system.
Action: See additional messages.

PC3351E Error opening parameter file

Reason: There was an error opening the file that is used to hold the parameters that are sent for remote execution.
Action: See additional messages.

PC3352E Error reading parameter file
Reason: There was an error reading the parameter file that is used to hold the parameters for remote execution.
Action: See additional messages.

PC3353E Error removing saved parameters
Reason: There was an error removing the saved parameters that were sent to the remote.
Action: See additional messages.

PC3354E Required parameter missing
Reason: When attempting a remote request either the partner LU, mode name or remote TPN was missing.
Action: Enter all the required parameters

PC3355E TCP/IP requested but not activated
Reason: If you wish to connect using TCP/IP to a remote PC directly, you must use TCP/IP to connect to the host.
Action: Respecify.

PC3356W Remote requests via MVS require SNA
Reason: Remote requests to workstation/servers require that you be connected to the host via SNA. This function will only work if you uncheck the Through MVS option and specify the workstation's IP address directly.

Profile management errors.

PC3400E Error allocating deletion buffer
Reason: There was an error getting memory for the communications buffer for deleting profile info.
Action: Free memory

PC3401E Error starting conversation
Reason: There was an error starting the conversation to delete a version.
Action: See return codes

PC3402E Error sending start conversation
Reason: There was an error sending the request to begin a conversation to delete a version.
Action: See return codes

PC3403E Error sending remove backup
Reason: There was an error sending the remove backup command.
Action: See return codes

PC3404E Error confirming remove backup
Reason: There was an error validating the remove backup
Action: See return codes or remote message

PC3405E Error ending the conversation
Reason: There was an error ending the conversation when removing a backup.
Action: See return codes

PC3410I Deleting the following backup

PC3411I Deleting all backups in the following profile

Host configuration errors.

PC3450E Error allocating memory
Reason: There was an error allocating memory for host configuration management.
Action: Free memory or restart program.

PC3451E Error during start conversation error
Reason: There was an error during host config access.
Action: See additional messages.

PC3452E Error sending start conversation
Action: See additional messages.

PC3453E Error receiving profile
Action: See additional messages.

PC3454E Error sending profile
Action: See additional messages.

PC3455E Error confirming send of profile
Action: See additional messages.

PC3456E Error ending conversation
Reason: There was an error during host config access.
Action: See additional messages.

PC3457E Error opening host config file
Reason: There was an error opening the temporary file used to hold the host configuration entries requested.
Action: See additional messages.

PC3458E Error writing host config file
Reason: There was an error writing to the temporary file used to hold the host configuration entries requested.
Action: See additional messages.

PC3459E NULL Structure
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3460E Error reading host config file
Reason: There was an error reading an entry from the temporary file used to hold the host configuration entries requested.
Action: See additional messages.

PC3461E Unexpected end of file
Reason: There was an unexpected end of file reading entries from the temporary file used to hold the host configuration entries requested.
Action: Contact FDR/UPSTREAM Tech Support.

PC3462E Error deleting file
Reason: There was an error deleting the temporary file used to hold the host configuration entries requested.
Action: See additional messages.

PC3463E Error finding entry in file
Reason: There was an error finding a profile entry in the internal profile file to reflect the update requested.
Action: Contact FDR/UPSTREAM Tech Support.

PC3464E Expected confirm or data
Reason: While receiving profiles, neither a confirm or data was received.
Action: Contact FDR/UPSTREAM Tech Support.

LAN Workstation access errors. Mid-level LAN access errors).

PC3500E (LAN WS) Error allocating I/O buffer
Reason: There was an error dymaically allocating the I/O buffer. Insufficient memory.
Action: Set LANBUFFER to a smaller value or free memory.

PC3502E (LAN WS) Error in negotiation
Reason: The record size specified in UPSTREAM is too small (should be larger than 1024 bytes).
Action: Increase the 'Record Size' value in 'MORE' screen.

PC3505I (LAN WS) An IPX/SPX connection has been established

PC3506I (LAN WS) A TLI connection has been established

PC3507I (LAN WS) A TCP/IP connection has been established

PC3510E (LAN WS) Expected an acknowledgment
Reason: An acknowledgment was expected and something else was received.
Action: Contact FDR/UPSTREAM Tech Support.

PC3511E (LAN WS) Bad data received

Reason: While expecting an acknowledgment from the parter, other data was received.
Action: Contact FDR/UPSTREAM Tech Support.

PC3512E (LAN WS) Error in ULTra performance test

PC3513E (LAN WS) Send buffer alloc error
Reason: Error allocating send buffer in ULTRa performance test.
Action: Stop other application to free memory.

PC3514E (LAN WS) Error parsing performance test request
Reason: Internal interface error.
Action: Upgrade ULTra if earlier than v2.5.6.

PC3515E (LAN WS) Out of files
Reason: (Requestor Msg) There are no more internal files for file access.
Action: Contact FDR/UPSTREAM Tech Support.

PC3516E (LAN WS) Error during a send open file
Reason: (Requestor Msg) There was an error during a send open file request to the workstation.
Action: See additional messages.

PC3517E (LAN WS) Error during a receive open file
Reason: (Requestor Msg) There was an error during the receive of the open file aknowlegment.
Action: See additional messages.

PC3520E (LAN WS) Error sending a read file
Reason: (Requestor Msg) There was an error during the send of a read file request.
Action: See additional messages.

PC3521E (LAN WS) Error receiving data
Reason: (Requestor Msg) There was an error receiving data from a read file request.
Action: See additional messages.

PC3522E (LAN WS) Time out receiving data
Reason: (Requestor Msg) There was a time out receiving data from the workstation.
Action: Verify that the workstation is still running. Increase the TIME-OUT on both sides.

PC3523E (LAN WS) Received bad data
Reason: (Requestor Msg) While receiving file data from the workstation, an unexpected data type was received.
Action: Contact FDR/UPSTREAM Tech Support.

PC3525E (LAN WS) Error sending a write file request
Reason: (Requestor Msg) There was an error sending a write file request to the workstation.
Action: See additional messages

PC3526E (LAN WS) Error sending data
Reason: (Requestor Msg) There was an error sending data to the workstation.
Action: See additional messages.

PC3530E (LAN WS) Error sending a close file request
Reason: (Requestor Msg) There was an error sending a close file request to the workstation.
Action: See additional messages.

PC3531E (LAN WS) Error receiving the close file ack
Reason: (Requestor Msg) There was an error receiving the acknowledgment to the close file request.
Action: See additional messages.

PC3535E (LAN WS) Error sending directory search
Reason: (Requestor Msg) There was an error sending the directory search request.
Action: See additional messages.

PC3536E (LAN WS) Error receiving directory information
Reason: (Requestor Msg) There was an error receiving dir- ectory information from the workstation.
Action: See additional messages.

PC3537E (LAN WS) Error receiving directory information
Reason: (Requestor Msg) There was a time-out or remote disconnect receiving directory information from the workstation.
Action: Verify that the workstation is still running

PC3538E (LAN WS) Error in searching directory
Reason: (Requestor Msg) The workstation reported an error in performing a directory search.
Action: The return code should be looked up in the operating system messages in the UPSTREAM manual.

PC3539E (LAN WS) Unexpected data
Reason: (Requestor Msg) A directory search response contained unexpected data.
Action: Contact FDR/UPSTREAM Tech Support.

PC3545E (LAN WS) Error sending a create dir request
Reason: (Requestor Msg) There was an error sending a create directory request.
Action: See additional messages.

PC3546E (LAN WS) Error receiving create dir ack
Reason: (Requestor Msg) There was an error receiving a create directory acknowledgment.
Action: See additional messages.

PC3547E (LAN WS) Error creating directory
Reason: (Requestor Msg) The workstation reported an error creating directory.
Action: Check the error code. Most likely the existing directory structure is incompatable with that you are restoring.

PC3550E (LAN WS) Error sending set dir info
Reason: (Requestor Msg) There was an error sending a set directory info request (to set attributes).
Action: See additional messages.

PC3551E (LAN WS) Error receiving dir info ack
Reason: (Requestor Msg) There was an error receiving the acknowledgment to the directory info request.
Action: See additional messages.

PC3555E (LAN WS) Error sending set date command
Reason: (Requestor Msg) There was an error sending the command to set a file or system date.
Action: See additional messages.

PC3556E (LAN WS) Error in set date
Reason: (Requestor Msg) There was an error in the set date command.
Action: See additional messages.

PC3557E (LAN WS) Error in delete file request
Reason: (Requestor Msg) There was an error in processing the command to delete a file.
Action: Check if the file was opened by some other application; check the file attributes.

PC3558E (LAN WS) Error receiving delete file ack
Reason: (Requestor Msg) There was an error receiving the acknowledgment to the delete file command.
Action: See additional messages.

PC3559E (LAN WS) Not EA block
Reason: (Requestor Msg) Expected EA block, but neither EA, nor error received. Protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3560E (LAN WS) Error sending read EA request
Reason: (Requestor Msg) There was an error sending the request to read an OS/2 extended attribute.
Action: See additional messages.

PC3561E (LAN WS) Error receiving EA
Reason: (Requestor Msg) There was an error receiving the OS/2 extended attribute for a file.
Action: See additional messages.

PC3562E (LAN WS) Error receiving EA
Reason: (Requestor Msg) There was a timeout or a disconnect during the receipt of an OS/2 extended attribute.
Action: See additional messages.

PC3563E (LAN WS) Error in remove directory request
Reason: (Requestor Msg) There was an error in processing the command to remove a directory.
Action: Check if the directory is not empty or is opened by some other application.

PC3564E (LAN WS) Error receiving remove directory ack
Reason: (Requestor Msg) There was an error receiving the acknowledgment to the remove directory command.
Action: See additional messages.

PC3565E (LAN WS) Error sending write EA
Reason: (Requestor Msg) There was an error sending a request to write an extended attribute.
Action: See additional messages.

PC3566E (LAN WS) Error sending EA
Reason: (Requestor Msg) There was an error sending an extended attribute.
Action: See additional messages.

PC3567E (LAN WS) Error sending EA ack
Reason: (Requestor Msg) There was an error sending the acknowledgment which ends the extended attribute.
Action: See additional messages.

PC3568E LAN interface not active or available
Action: Check if you specified the right LAN interface ('More' screen), check your PC configuration.

PC3570E (LAN WS) (Raw) Error sending install check
Action: See additional messages.

PC3571E (LAN WS) (Raw) Error receiving install response
Action: See additional messages.

PC3572E (LAN WS) (Raw) Error sending list disks
Action: See additional messages.

PC3573E (LAN WS) (Raw) Error receiving list disks response
Action: See additional messages.

PC3574E (LAN WS) (Raw) Error sending open
Action: See additional messages.

PC3575E (LAN WS) (Raw) Error receiving open response
Action: See additional messages.

PC3576E (LAN WS) (Raw) Error sending read
Action: See additional messages.

PC3577E (LAN WS) (Raw) Error receiving data read
Action: See additional messages.

PC3578E (LAN WS) (Raw) Bad data type received
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3579E (LAN WS) (Raw) Error sending data write
Action: See additional messages.

PC3580E (LAN WS) (Raw) Error sending write data
Action: See additional messages.

PC3581E (LAN WS) (Raw) Error receiving write response
Action: See additional messages.

PC3582E (LAN WS) (Raw) Error sending existing request
Action: See additional messages.

PC3583E (LAN WS) (Raw) Error receiving existing response
Action: See additional messages.

PC3584E (LAN WS) (Raw) Error sending close request
Action: See additional messages.

PC3585E (LAN WS) (Raw) Error receiving close response
Action: See additional messages.

PC3586E (LAN WS) (Raw) Error sending shutdown request
Action: See additional messages.

PC3587E (LAN WS) (Raw) Error receiving shutdown response
Action: See additional messages.

PC3588E (LAN WS) Error sending a process file spec request
Reason: (Requestor Msg) There was an error sending a process file spec request to the workstation.
Action: See additional messages

PC3589E (LAN WS) Error receiving process file spec response
Reason: (Requestor Msg) There was an error receiving an acknowledgment to a process file spec request.
Action: See additional messages

PC3590E (LAN WS) Error sending read extra data request
Reason: (Requester Msg) There was an error sending the request to read non-file data.
Action: See additional messages.

PC3591E (LAN WS) Error receiving extra data
Reason: (Requester Msg) There was an error receiving non-file data for a file or directory.
Action: See additional messages.

PC3592E (LAN WS) Error receiving extra data
Reason: (Requester Msg) There was an error reading non-file data on the ULTra workstation.
Action: See additional messages.

PC3593 (LAN WS) Unexpected get extra data response
Reason: (Requester Msg) Expected a non-file data block, but neither it nor an error was received. Protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3594E (LAN WS) Error sending write extra data request
Reason: (Requester Msg) There was an error sending the request to write non-file data. Fix: See additional messages.

PC3595E (LAN WS) Error sending extra data
Reason: (Requester Msg) There was an error sending non-file data for a file or directory.
Action: See additional messages.

PC3596E (LAN WS) Error parsing get non-file data request
Reason: ULTra was not able to parse parameters in get non-file data request. Non-file data is skipped. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3597E (LAN WS) Error in compression level
Reason: The compression level requested by UPSTREAM is not supported by ULTra. Non-file data is skipped.
Action: Set ULTRACOMP parameter in the current para- meter file to the value not greater than you specified for ULTra. For DOS ULTra it is 0.

PC3598E (LAN WS) Buffer too small (Non-file data)
Reason: The record size used by UPSTREAM is larger than the buffer allocated by ULTra.
Action: Set environment variable LANBUFFER to the size of 'Record Size' parameter in UPSTREAM. Restart ULTra.

PC3599E (LAN WS) Error sending non-file data
Reason: Error occurred while sending non-file data to UPSTREAM.
Action: See additional messages.

Mid-level workstation errors

PC3600E (LAN WS) Error sending a close file ack
Reason: (WS Msg) There was an error sending the acknowledgment to a close file command.
Action: See additional messages.

PC3601E (LAN WS) Write error
Reason: There was an error restoring a file.
Action: See additional messages.

PC3602W (LAN WS) Error restoring file attributes

Reason: There was an error attempting to restore original date/time settings for the file.

PC3603E (LAN WS) Error parsing close request
Reason: Sytem error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3605E (LAN WS) File requested not found
Reason: The requested file operation referenced an unknown file handle. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3610E (LAN WS) Parse open file request error
Reason: (WS Msg) There was an error parsing an open file request. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3611E (LAN WS) Out of files
Reason: (WS Msg) The maximum number of files open was exceeded. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3612E (LAN WS) Error opening the file
Reason: (WS Msg) There was an error opening the requested file.
Action: See additional messages.

PC3613E (LAN WS) Intercepted error
Reason: (WS Msg) This error is most likely for one of the previous directory entries. See ULTra log for details.

PC3615E (LAN WS) Error parsing read file request
Reason: (WS Msg) Invalid data was found parsing a read file request. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3616E (LAN WS) Error seeking in an open file
Reason: (WS Msg) There was an operating system error seeking to a location in an open file.
Action: Look up the return code in the operating system messages section of the UPSTREAM manual.

PC3617E (LAN WS) Error reading a file
Reason: (WS Msg) There was an operating system error reading data from an open file.
Action: Look the return code up in the operating system messages section of the UPSTREAM manual.

PC3618E (LAN WS) Error sending file data
Reason: (WS Msg) There was an error sending file data.
Action: Contact FDR/UPSTREAM Tech Support.

PC3619E (LAN WS) Error sending end of data ack
Reason: (WS Msg) There was an error sending the end of data acknowledgment.
Action: Contact FDR/UPSTREAM Tech Support.

PC3620E (LAN WS) Range check during read file. This is an
Reason: internal FDR/UPSTREAM error
Action: Contact FDR/UPSTREAM Tech Support.

PC3625E (LAN WS) Unexpected data during parse
Reason: (WS Msg) While parsing a write file request, unexpected data was received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3626E (LAN WS) Error seeking for file write
Reason: (WS Msg) There was a file error seeking to write data in an open file.
Action: Look the return code up in the operating system messages section of the UPSTREAM manual.

PC3627E (LAN WS) Error writing file data
Reason: (WS Msg) There was a file error writing data to an open file.
Action: Look the return code up in the operating system messages section of the UPSTREAM manual.

PC3630E (LAN WS) Unexpected data during parse
Reason: (WS Msg) While parsing a directory information request, unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3631E (LAN WS) Unexpected data during parse
Reason: (WS Msg) While parsing a directory search request, unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3632E (LAN WS) Error sending directory info
Reason: (WS Msg) There was an error sending directory information.
Action: Contact FDR/UPSTREAM Tech Support.

PC3633E (LAN WS) Error sending dir info ack
Reason: (WS Msg) There was an error sending a directory information acknowledgment.
Action: Contact FDR/UPSTREAM Tech Support.

PC3634E (LAN WS) Error restarting directory search
Reason: (WS Msg) There was an error restarting a directory search.
Action: Contact FDR/UPSTREAM Tech Support.

PC3635E (LAN WS) Unexpected data during parse
Reason: (WS Msg) While parsing a create directory request, unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3636E (LAN WS) Error during a directory create
Reason: (WS Msg) The error occurred servicing a directory create request.
Action: See additional messages.

PC3640E (LAN WS) Unexpected data during parse
Reason: (WS Msg) When parsing a set information (attributes) command unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3641E (LAN WS) Error during a set info ack
Reason: (WS Msg) The error occurred when sending an acknowledgment to a set info (attributes).
Action: See additional messages.

PC3645E (LAN WS) Unexpected data during parse
Reason: (WS Msg) When parsing a set date request, unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3646E (LAN WS) Error during a set date ack
Reason: (WS Msg) The error occurred when sending an acknowledgment to a set date.
Action: See additional messages.

PC3647E (LAN WS) Error setting the file date
Reason: (WS Msg) There was a file error setting the file's date.
Action: Look the return code up in the operating system messages section of the UPSTREAM manual.

PC3650E (LAN WS) Error during receive of service
Reason: (WS Msg) There was an error receiving the service request from the remote.
Action: See additional messages.

PC3651E (LAN WS) Unknown service
Reason: (WS Msg) When waiting for a service request from the requestor, an unknown request was received.
Action: Make sure that the workstation and the requestor are at the same version levels.

PC3652E (LAN WS) Timeout waiting for a request
Reason: (WS Msg) A timeout was detected while waiting for a service request.
Action: Verify that the requestor is still running. Increase the TIMEOUT on both sides.

PC3653E (LAN WS) Invalid response
Reason: Data received from ULTra workstation can not be interpreted. Most likely UPSTREAM and ULTRa got out of synch because of the previous errors.
Action: Contact FDR/UPSTREAM Tech Support.

PC3675I (LAN WS) Normal disconnect
Reason: (WS Msg) Disconnect from remote station processed.

PC3676E (LAN WS) Error during a file deletion
Reason: (WS Msg) The error occurred servicing a file delete request.

Action: See additional messages.

PC3677E (LAN WS) Unexpected data during parse
Reason: (WS Msg) When parsing a delete file information command unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3678E (LAN WS) Error during a directory removing
Reason: (WS Msg) The error occurred servicing a remove directory request.
Action: See additional messages.

PC3679E (LAN WS) Unexpected data during parse
Reason: (WS Msg) When parsing a remove directory information command unexpected data was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC3680E (LAN WS) Error parsing read EA
Reason: (WS Msg) There was an error parsing the data fields for a read OS/2 extended attribute request.
Action: Contact FDR/UPSTREAM Tech Support.

PC3681E (LAN WS) Error searching EAs
Reason: (WS Msg) There was an error listing the extended attributes for a given file or directory.
Action: See additional messages.

PC3682E (LAN WS) Error reading EA
Reason: (WS Msg) There was an error reading a given extended attribute.
Action: See additional messages.

PC3683E (LAN WS) Error sending EA
Reason: (WS Msg) There was an error sending an extended attribute.
Action: See additional messages.

PC3685E (LAN WS) Error parsing write EA
Reason: (WS Msg) There was an error parsing the data fields for a write extended attribute request.
Action: Contact FDR/UPSTREAM Tech Support.

PC3686E (LAN WS) Error receiving EA
Reason: (WS Msg) There was an error receiving an extended attribute.
Action: See additional messages.

PC3687E (LAN WS) Error receiving EA
Reason: (WS Msg) There was a timeout or a disconnect while receiving an extended attribute.
Action: Verify the remote was operating. Increase the TIMEOUT on both sides.

PC3688E (LAN WS) Error writing EA
Reason: (WS Msg) There was an error writing an extended attribute.
Action: See additional messages.

PC3689E (LAN WS) Error during a delete file ack
Reason: (WS Msg) The error occurred when sending an acknowledgment to a delete file command.
Action: See additional messages.

PC3690E (LAN WS) Error during a remove directory ack
Reason: (WS Msg) The error occurred when sending an acknowledgment to a remove directory command.
Action: See additional messages.

Mid level construction/parsing routines

PC3691E (LAN WS) Data received too large
Reason: The data element received is too large for the given space. The ULTra WS name specified shouldn't match any NT Server/Workstation name on your LAN. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3692E (LAN WS) Data length larger than the data
Reason: The length specified for a data element is larger than the remaining entire block. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3693E (LAN WS) Other than EA data recieved
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

Run job errors.

PC3701I Running a job
Reason: The following is the specification for a job to be run immediately.

PC3702E Job file not found
Reason: The file for the job to be run was not found.
Action: Respecify

PC3703I Job execution status
Reason: A step in the execution of a job finished. The The job specification, step and return code follow.

PC3704E The COMSPEC environment variable not found
Reason: The COMSPEC environment variable needed to run a job was not specified in the configuration.
Action: For Windows NT add a "ComSpec=" line to the System Environment Variables list in the System applet of the Control Panel. For all other operating systems add a "SET COMSPEC=" statement to your CONFIG.SYS file (OS/2) or your AUTOEXEC.BAT file (all others).

PC3705E Error parsing a job request
Reason: Invalid data was parsed to ULTra. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3706N Running a job on ULTra WS
Reason: The following ULTra workstation name was obtained from the LAN WS Profile specified. You can abort the execution of the job by pressing the OK button now.

PC3707E Could not acknowledge ULTra WS job request
Reason: An error occurred while attempting to receive an acknowledgement message from an ULTra workstation that was to run a job.
Action: Make sure the ULTra workstation is up and running, and make sure you can access LAN.

PC3708E Could not send a job request to an ULTra WS
Reason: An error occurred while attempting to send a job request to an ULTra workstation.
Action: Make sure the ULTra workstation is up and running, and make sure you can access LAN.

PC3709E ULTra WS job request processing error
Reason: An unknown error occurred in an ULTra workstation while attempting to process a job.
Action: Check the following messages.

PC3710I Running a job on ULTra WS
Reason: The following is the specification for a job to be run on an ULTra workstation.

PC3711E A DOS WS cannot run job
Reason: Jobs can not be run on an ULTra workstation that is running DOS.

PC3712D Job Status: %s
Reason: The status for a job.

PC3713E Could not connect to ULTra WS to run a job
Reason: An error occurred while attempting to connect to an ULTra workstation in order to run a job.

PC3714E Could not get a buffer to run ULTra WS job
Reason: An error occurred while attempting to allocate a communications buffer in order to run a job on an ULTra workstation.

PC3715E User aborted ULTra WS job
Reason: A job to be run on an ULTra workstation was aborted by the user before it was started.

PC3716D The JOBRETURNCODEMAP parameter is invalid

Reason: The format of the JOBRETURNCODEMAP parameter is invalid. The return code returned to the host may not be what was expected.
Action: See the following JOBRETURNCODEMAP parameter and the program and host return codes, and then respecify the JOBRETURNCODEMAP parameter.

PC3717I An error occurred starting a job
Reason: The OS/2 version of UPSTREAM encountered an error on a DosCreateQueue call to create a queue to be used for waiting for a job to finish execution.
Action: See the following 3724E message for the return code.

PC3718I An error occurred starting a job
Reason: The OS/2 version of UPSTREAM encountered an error on a DosStartSession call to start the execution of a job.
Action: See the following 3724E message for the return code.

PC3719I An error occurred waiting for a job
Reason: The OS/2 version of UPSTREAM encountered an error creating a job execution event on which to wait.
Action: See the following 3724E message for the return code.

PC3720I An error occurred waiting for a job
Reason: The OS/2 version of UPSTREAM encountered an error on a DosReadQueue call to get the return code from the job execution.
Action: See the following 3724E message for the return code.

PC3721I An error occurred starting a job
Reason: The Windows 95 or NT version of UPSTREAM encountered an error on a CreateProcess call to start the execution of a job.
Action: See the following 3724E message for the return code.

PC3722I An error occurred waiting for a job
Reason: The Windows 95 or NT version of UPSTREAM encountered an error on a WaitForSingleObject call to get the return code from the job execution.
Action: See the following 3724E message for the return code.

PC3723I An error occurred starting a job
Reason: The Windows 3.1 version of UPSTREAM encountered an error on a WinExec call to start the execution of a job.
Action: See the following 3724E message for the return code.

PC3724E A job did not execute
Reason: A job did not execute because of an error in one of the preexecution steps. The job specification, preexecution step and step error code follow.

PC3725E Job format error Too many parameters
Reason: There can be no more than 20 command line parameters in a job.
Action: Respecify.

PC3726I An error occurred starting a job
Reason: The NLM version of UPSTREAM encountered an error on a spawn call to start the execution of a job.
Action: See the following 3724E message for the return code.

PC3727E File spec not found (FILES missing)
Reason: When requesting a job to be run, you must specify a single file spec with the name of the fully qualified program, script or batch file specified in the FILES parameter.
Action: Respecify.

PC3728E Error switching to user
Reason: While attempting to run a job, there was an error switching to the requested user.
Action: See additional messages.

PC3729E Error switching back from user
Reason: After running the job, there was an error switching back from the requested user.
Action: See additional messages.

PC3730I Terminating parent process (daemon)
Reason: Remotely requested termination of the parent UPSTREAM (daemon) in progress.

PC3731E Error allocating memory for Env. Block
Reason: Error allocation memory for environment block while starting a requested job.

PC3732E Error obtaining environment (Win32)
Reason: Error obtaining environment block:

PC3733I Job still running
Reason: UPSTREAM stopped waiting for the job to terminate either because UPSTREAM itself is terminating or the job ran longer than the wait time limit. The job is still running.

PC3734I Job killed
Reason: The job was killed either because UPSTREAM itself is terminating or the job ran longer than the wait time limit and you requested that it be killed.

PC3735I Job finished with zero return code
Reason: The specified job was run successfully and finished with a return code of 0.

PC3736W Job not run or finished with non-zero return code
Reason: The job was either not run because of a job specification error or some other reason or the job was run and finished with a return code other than 0.
Action: See additional messages.

ULTra compression errors.

PC3750E (LAN WS) Record size is too big
Reason: The record size used by UPSTREAM is larger than the buffer allocated by ULTra.
Action: Set environment variable LANBUFFER to the size of 'Record Size' parameter. Restart ULTra.

PC3751E (LANWS) Xmit buffer sizes out of synch
Reason: Transmition buffer size is too small to accept compression. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3752E (LAN WS) ULTra compression initialization error
Action: You probably do not have enough memory.

PC3753E (LAN WS) ULTra Compression initialization error,
Action: You probably do not have enough memory.

PC3754E (LAN WS) ULTra does not support the specified
Reason: compression level.
Action: Set ULTRACOMP parameter in the current para- meter file to the value not greater than you specified for ULTra. For DOS ULTra it is 0.

PC3755E (LAN WS) Error allocating compression buffer
Action: Stop some application on ULTra side to free memory.

PC3756E (LAN WS) ULTra compression initialization error
Action: You probably do not have enough memory.

PC3757E (LAN WS) Error in high compression routine
Reason: A high compression error was encountered in ULTra(EA). This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3758E (LAN WS) Error in high compression routine
Reason: A high compression error was encountered in ULTra. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3760E (LAN WS) Error in fast decompression routine
Reason: A fast decompression error was encountered in ULTra. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3761E (LAN WS) Error in high decompression routine
Reason: A high decompression error was encountered in ULTra. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3762E (LAM WS) Range check in decompression buffer

Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3763E (LAN WS) Error in high compression routine
Reason: Error in compression of non-file data in ULTra. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3764E (LAN WS) Non-file data was not backed up
Reason: Due to conditions on the ULTra workstation non-file data was not backed up.
Action: See ULTra log.

PC3765E (LAN WS) Error in request for put non-file data
Reason: ULTra was not able to parse the request write non-file data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3766E (LAN WS) Error receiving non-file data
Reason: An error occurred while receiving non-file data.
Action: See additional messages.

PC3767E (LAN WS Windows NT) Error restoring non-file data
Reason: The non-file data for a file or directory could not be restored because the "Restore files and directories" privilege could not be enabled.
Action: Ensure the user account on ULTra workstation has the appropriate rights.

PC3768E (LAN WS) Non-file data not restored
Reason: The non-file data for one or more files was not restored, probably because it was backed up from a different operating system than the one it is being restored to.
Action: Contact FDR/UPSTREAM Tech Support.

PC3769E (LAN WS) Non-file data was not restored
Reason: Due to conditions on the ULTra workstation non-file data was not restored.
Action: See ULTra log.

PC3770E (LAN WS) Error receiving ACK (non-file data)
Reason: There was an error in receive for ACK with the results of non-file data restore.
Action: See Additional messages.

PC3771E (LAN WS) Error restoring non-file data
Reason: ULTra reported an error in non-file data restore.

DOS low level IPX/SPX initialization routines

PC3800E (LAN WS) Error allocating memory
Reason: There was a shortage of memory dynamically allocating the ECBs used in IPX/SPX communications.
Action: Reduce the number of ECBs (using SET NUMECBS=5) or otherwise free memory.

Raw disk errors.

PC3850E (LAN WS) (Raw) Error parsing installed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3851E (LAN WS) (Raw) Error checking installed
Action: See additional messages

PC3852E (LAN WS) (Raw) Error parsing list disks
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3853E (LAN WS) (Raw) Error listing disks
Action: See additional messages

PC3854E (LAN WS) (Raw) Error parsing open
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3855E (LAN WS) (Raw) Error opening the disk
Action: See additional messages

PC3856E (LAN WS) (Raw) Invalid handle
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3857E (LAN WS) (Raw) Range error
Reason: The version of ULTra that you are using does not support this feature.
Action: Upgrade

PC3858E (LAN WS) (Raw) Insufficient memory
Reason: There was insufficient memory on the workstation to read/write the requested amount of data.
Action: Free memory or reduce the record size.

PC3859E (LAN WS) (Raw) Error reading the disk
Action: See additional messages

PC3860E (LAN WS) (Raw) Error sending data
Reason: There was an error sending data read from the workstation's disk.
Action: See additional messages

PC3861E (LAN WS) (Raw) Error parsing read
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3862E (LAN WS) (Raw) Error parsing open
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3863E (LAN WS) (Raw) Error receiving write data
Reason: Communications error.
Action: See additional messages.

PC3864E (LAN WS) (Raw) Invalid data type received
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3865E (LAN WS) (Raw) Write buffer overflow
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3866E (LAN WS) (Raw) Write error
Reason: There was an error writing a block of data.
Action: See addtional messages.

PC3867E (LAN WS) (Raw) Error parsing get existing
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3868E (LAN WS) (Raw) Error getting existing data
Action: See additional messages.

PC3869E (LAN WS) (Raw) Comm error sending existing data
Action: See additional messages.

PC3870E (LAN WS) (Raw) Error parsing close
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3871E (LAN WS) (Raw) Error closing
Action: See additional messages

PC3872E (LAN WS) (Raw) Error parsing shutdown
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3873E (LAN WS) (Raw) Error during shutdown
Action: See additional messages

PC3874E (LAN WS) (Raw) Invalid data received in write
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3880E (LAN WS) Error parsing process file spec
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3881E (LAN WS) Error processing file spec

Action: See additional messages

PC3882W (LAN WS) Only one registry file spec allowed
Reason: The directory that contains the Windows NT/95 registry was included in two or more of the specified file specs. ULTra can process only one registry in a single backup/restore. Only the first file spec that includes the registry directory will backup/restore the registry successfully.
Action: See additional messages

LANIPX.C errors (DOS low level IPX/SPX routines).

PC3900E (LAN WS) SPX not installed
Action: Verify that IPX or the ODI drivers have been installed or that you are using a version of IPX new enough to support SPX.

PC3901E (LAN WS) Error opening IPX socket
Reason: There was a Novell error opening the IPX socket.
Action: Contact FDR/UPSTREAM Tech Support.

PC3902E (LAN WS) Error opening SPX socket
Reason: There was a Novell error opening the SPX socket.
Action: Contact FDR/UPSTREAM Tech Support.

PC3903E (LAN WS) IPX not installed
Action: Verify that IPX or the ODI drivers have been installed.

PC3904E (LAN WS) Error initializing IPX
Action: Contact FDR/UPSTREAM Tech Support.

PC3905E (LAN WS) Error opening SAP socket
Reason: There was a Novell error opening the SAP (Service Advertizing Protocol) socket.
Action: Either disable SAP use (through the NOSAP environment variable) or remove other SAP advertizers from this PC.

PC3906E (LAN WS) Error loading function
Reason: There was a Windows error opening a Novell function required.
Action: Verify that the Novell software is correctly installed.

PC3907E (LAN WS) Error loading NetWare
Reason: There was a Windows error loading the required library.
Action: Verify that the NWIPXSPX.DLL library is in the path.

PC3908E (LAN WS) Error loading NWCALLS
Reason: There was a Windows error loading the required library NWCALLS.DLL.
Action: Verify that the NWCALLS.DLL library is in the path.

PC3910E (LAN WS) No free buffers
Reason: All ECBs are currently in use. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3911E (LAN WS) Error sending broadcast
Reason: (WS Msg) Error sending the SAP broadcast.
Action: Contact FDR/UPSTREAM Tech Support.

PC3912E (LAN WS) Timeout waiting for connection
Reason: There was an time out during the connection process.
Action: Verify the other computer is still operating. Increase the TIMEOUT on both sides.

PC3915E (LAN WS) Error sending FIND_WORKSTATION
Reason: There was an error sending the request for the partner to identify itself.
Action: Verify the other computer is still operating.

PC3920E (LAN WS) Workstation not found
Reason: (Requestor Msg) The specified workstation name was not found in the server's bindery.
Action: Respecify the workstation name.

PC3921E (LAN WS) Error finding workstation
Reason: (Requestor Msg) The attempt to find the work- station resulted in an error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3922E (LAN WS) Error finding workstation
Reason: (Requestor Msg) The attempt to get the default connection ID to find the workstation resulted in an error.
Action: The connection to your server has been lost. Reestablish and retry.

PC3925E (LAN WS) SPX connect error
Reason: (Requestor Msg) There was an error attempting to establish the SPX connection.
Action: Contact FDR/UPSTREAM Tech Support.

PC3926E (LAN WS) Error receiving initial connect
Reason: (WS Msg) There was an error receiving the initial IPX connect message.
Action: Contact FDR/UPSTREAM Tech Support.

PC3927E (LAN WS) Error listening for the broadcast
Reason: (WS Msg) There was an error receiving the broadcast from the requestor.
Action: Contact FDR/UPSTREAM Tech Support.

PC3928E (LAN WS) Timeout listening for SPX connection
Reason: (WS Msg) There was a timeout waiting for the SPX establishment message after the initial connect sequence was complete.
Action: Verify the other computer is still operating. Increase the TIMEOUT on both sides.

PC3930E (LAN WS) Error sending negotiation record
Reason: There was an error sending the negotiation record to the other computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC3935E (LAN WS) Error receiving negotiation record
Reason: There was an error receiving the negotiation record from the other computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC3936E (LAN WS) Timeout waiting for negotiation
Reason: Timed out waiting for the other computer to send the negotiation message
Action: Verify the other computer is still operating. Increase the TIMEOUT on both sides.

PC3937E (LAN WS) Negotation failed
Reason: There was a problem with the parameters specified which caused the other computer to reject the communications.
Action: Check the log on your other computer.

PC3938E (LAN WS) Password mismatch
Reason: (WS Msg) The password specified on the requestor does not match.
Action: Enter the correct password.

PC3939E (LAN WS) Update your UPSTREAM
Reason: (Requestor Msg) The ULTra workstation determined that your UPSTREAM version is outdated.
Action: Upgrade your UPSTREAM to the currently available version (or at least to the version of that ULTra).

PC3945E (LAN WS) Error listening for IPX connect
Reason: (Requestor Msg) While listening to the response from the workstation there was an error.
Action: See additional messages.

PC3946E (LAN WS) No response to IPX broadcast
Reason: (Requestor Msg) The workstation was not found.
Action: Verify that the other computer is still operating.

PC3950E (LAN WS) Error during SPX connect
Reason: (Requestor Msg) There was a Novell error during The SPX connection sequence.
Action: Contact FDR/UPSTREAM Tech Support.

PC3951E (LAN WS) Error listening for SPX connect
Reason: (WS Msg) There was an error waiting for the connection from the requestor.
Action: See additional messages.

PC3952E (LAN WS) Time out during SPX connect
Reason: (Requestor Msg) The workstation did not respond to the SPX connection message.

Action: Verify that the other computer is still operating. Increase the TIMEOUT on both sides.

PC3955E (LAN WS) The IN-USE flag changed
Reason: The internal "in-use" flag was turned off and then got turned on again before action could be taken. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3956E (LAN WS) Unexpected ECB complete
Reason: When a receive ECB was expected a send was detected or vice-versa. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3957E (LAN WS) Corrupted flow
Reason: The data flow was corrupted due to the failure of the communications layer to observe interrupt disabling.
Action: Contact FDR/UPSTREAM Tech Support.

PC3960E (LAN WS) Error terminating SPX connection
Reason: When the SPX connection was terminated a return code was received.
Action: Contact FDR/UPSTREAM Tech Support.

PC3961E (LAN WS) Error canceling posted ECB
Reason: There was an error canceling a posted ECB during the shutdown process.
Action: Contact FDR/UPSTREAM Tech Support.

PC3970E (LAN WS) Error sending flow control
Reason: There was an error sending a flow control message to the other PC.
Action: Contact FDR/UPSTREAM Tech Support.

PC3975E (LAN WS) Error flushing received data
Reason: There was an error flushing received data in order to perform a send.
Action: Contact FDR/UPSTREAM Tech Support.

PC3976E (LAN WS) Time out waiting for a send to complete
Reason: A time-out occurred waiting for a send to finish.
Action: Verify that the other computer is still operating. Increase the TIMEOUT on both sides.

PC3980E (LAN WS) Time out flushing receives
Reason: When flushing received preparatory to sending there was a time-out.
Action: Verify that the other computer is still operating. Increase the TIMEOUT on both sides.

PC3981E (LAN WS) Send buffer lost
Reason: A send ECB that was posted is no longer there. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3982E (LAN WS) Time-out sending
Reason: There was a time-out waiting for a send to complete before a new send could be posted.
Action: Verify that the other computer is still operating.

PC3983E (LAN WS) Error receiving flow control
Reason: There was an error receiving a flow control message from the remote system.
Action: Contact FDR/UPSTREAM Tech Support.

PC3984E (LAN WS) Expected flow control message
Reason: Received data from the remote computer instead of a flow control message. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3985E (LAN WS) Expected flow control message
Reason: A time-out or remote disconnect message was received instead of a flow control message.
Action: Verify that the other computer is still operating.

PC3986E (LAN WS) Error parsing save file info request
Reason: ULTra was not able to parse parameters in get a save file info request. Non-file data is skipped. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3987E (LAN WS) Error parsing set file info request
Reason: ULTra was not able to parse parameters in get a save file info request. Non-file data is skipped. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3988E (LAN WS) Error saving file info
Reason: ULTra encountered a problem while attemping to save file information for subsequent restore. Fix: Check ULTra log.

PC3989E (LAN WS) Error setting file info
Reason: ULTra encountered a problem while attemping to reset file information previously saved. Fix: Check ULTra log.

PC3990 (LAN WS) Unexpected save file info response
Reason: (Requester Msg) Expected an acknowledgement to a save file info request, but received something unexpected. Protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3991 (LAN WS) Unexpected set file info response
Reason: (Requester Msg) Expected an acknowledgement to a set file info request, but received something unexpected. Protocol error.
Action: Contact FDR/UPSTREAM Tech Support.

PC3992E (LAN WS) Communication error receiving ack
Reason: (Requester Msg) There was a communication error while attempting to receive the response to a save file info request
Action: See additional messages.

PC3993E (LAN WS) Error receiving save file info ack
Reason: (Requester Msg) There was an error reading the save file info response.
Action: See additional messages.

PC3994E (LAN WS) Communication error receiving ack
Reason: (Requester Msg) There was a communication error while attempting to receive the response to a set file info request
Action: See additional messages.

PC3995E (LAN WS) Error receiving set file info ack
Reason: (Requester Msg) There was an error reading the set file info response.
Action: See additional messages.

PC3996E (LAN WS) Error sending save file info request
Reason: (Requester Msg) There was an error sending the request to save file info. Fix: See additional messages.

PC3997E (LAN WS) Error sending set file info request
Reason: (Requester Msg) There was an error sending the request to set file info. Fix: See additional messages.

DOS TSR Messages

PC4000I (LAN WS) TSR loaded

PC4001I (LAN WS) TSR unloaded

PC4095I Remote Disconnect request OS/2 IPX/SPX low-level functions

PC4100E (LAN WS) Error loading function
Reason: There was an error loading a function from a dynamically loaded DLL module.
Action: See additional messages.

PC4103E (LAN WS) DOSCALL1.DLL not found
Reason: The required DOSCALL1.DLL module was not found when UPSTREAM attempted to dynamically load it.
Action: See additional messages.

PC4104E (LAN WS) Error loading DOSCALL1.DLL
Reason: There was an error attempting to dynamically load the DOSCALL1.DLL module.
Action: See additional messages.

PC4105E (LAN WS) IPXCALLS.DLL not found

Reason: The required IPXCALLS.DLL module was not found when UPSTREAM attempted to dynamically load it.
Action: See additional messages.

PC4106E (LAN WS) Error loading IPXCALLS.DLL
Reason: There was an error attempting to dynamically load the IPXCALLS.DLL module.
Action: See additional messages.

PC4107E (LAN WS) SPXCALLS.DLL not found
Reason: The required SPXCALLS.DLL module was not found when UPSTREAM attempted to dynamically load it.
Action: See additional messages.

PC4108E (LAN WS) Error loading SPXCALLS.DLL
Reason: There was an error attempting to dynamically load the SPXCALLS.DLL module.
Action: See additional messages.

PC4109E (LAN WS) NWCALLS.DLL not found
Reason: The required NWCALLS.DLL module was not found when UPSTREAM attempted to dynamically load it.
Action: See additional messages.

PC4110E (LAN WS) Error loading NWCALLS.DLL
Reason: There was an error attempting to dynamically load the NWCALLS.DLL module.
Action: See additional messages.

PC4115E (LAN WS) Error dynamically allocating memory
Reason: There was an error dynamically allocating required memory.
Action: Unload programs or free disk.

PC4120E (LAN WS) Error opening SAP socket
Reason: There was a Novell error opening the IPX socket using for SAP (Service Advertising Protocol) broadcasts.
Action: See additional messages.

PC4121E (LAN WS) Error opening SPX socket
Reason: There was a Novell error opening the SPX socket.
Action: Verify that UPSTREAM is not running on your PC in another screen group. Specify another socket.

PC4122E (LAN WS) Error opening IPX socket
Reason: There was a Novell error opening the IPX socket.
Action: Verify that UPSTREAM is not running on your PC in another screen group. Specify another socket.

PC4123E (LAN WS) Error setting the SPX error check level
Reason: There was a Novell error setting the level where SPX errors are reported.
Action: Contact FDR/UPSTREAM Tech Support.

PC4125E (LAN WS) Error getting a free buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4130E (LAN WS) Error receiving connect request
Reason: There was an IPX error receiving the connection request.
Action: See additional messages.

PC4135E (LAN WS) Error sending SAP broadcast
Reason: (WS Msg) There was an IPX error sending the Service Advertising Protocol (SAP) message to all server.
Action: See additional messages.

PC4140E (LAN WS) Error getting local target
Reason: (Requestor Msg) There was an error getting the immediate address of the target PC.
Action: See additional messages.

PC4141E (LAN WS) Error sending FIND_WORKSTATION
Reason: There was an error sending the request to find the other PC.
Action: See additional messages.

PC4145E (LAN WS) Error during receive SPX connection
Reason: (WS Msg) There was an error listening for the inbound SPX connection request.
Action: See additional messages.

PC4146E (LAN WS) Error during receive SPX connection
Reason: (WS Msg) There was an error after the system attempted to listen for the inbound SPX connection request.
Action: See additional messages.

PC4147E (LAN WS) Time out during connection
Reason: (WS Msg) There was a timeout or a disconnect request while attempting to receive an inbound SPX connection request.
Action: Verify that the remote is functioning. Increase the TIMEOUT on both sides.

PC4150E (LAN WS) Error getting default connection ID
Reason: (Requestor Msg) There was a Novell error getting the default connection ID.
Action: See additional messages.

PC4151E (LAN WS) Workstation not found
Reason: (Requestor Msg) The specified workstation was not found.
Action: Verify that ULTra is running on the requested workstation.

PC4152E (LAN WS) Error finding requested workstation
Reason: (Requestor Msg) There was a Novell server error searching for the address of the specified workstation.
Action: See additional messages.

PC4153E (LAN WS) Error getting local target
Reason: (Requestor Msg) Error finding the address of the nearest connection to the workstation.
Action: See additional messages.

PC4155E (LAN WS) Error posting SPX listens
Reason: There was an error posting SPX listen(s) (for data).
Action: See additional messages.

PC4160E (LAN WS) Workstation not responding
Reason: (Requestor Msg) The remote workstation is not responding to the connection request.
Action: Verify that the remote workstation is not on the other side of a bridge or use the SAP facility.

PC4165E (LAN WS) Connection failed
Reason: (Requestor Msg) The connection failed to the workstation immediately.
Action: See additional messages.

PC4166E (LAN WS) Connection failed
Reason: (Requestor Msg) The connection failed to the workstation.
Action: See additional messages.

PC4167E (LAN WS) Connection timed out
Reason: (Requestor Msg) The connection failed to the workstation either through a time-out or a disconnect.
Action: Verify that the workstation did not unload ULTra.

PC4168E (LAN WS) Disconnect during connection
Reason: (Requestor Msg) The connection failed to the remote workstation due to a disconnect request.
Action: Verify that the workstation did not unload ULTra.

PC4170E (LAN WS) Error sending negotiation
Reason: There was an error sending the negotiation message.
Action: See additional messages.

PC4174E (LAN WS) Xmit Buffer too small
Reason: The transmition buffer is smaller than the backup record size.
Action: Set LANBUFFER environment variable on both UPSTREAM and ULTra PCs to the value of backup RECORD SIZE.

PC4175E (LAN WS) Error receiving negotiation
Reason: There was an error receiving the negotiation message.
Action: See additional messages.

PC4176E (LAN WS) Time out during negotiation
Reason: There was a time-out during the negotiation
Action: Verify that the remote is operating. Increase the TIMEOUT on both sides.

PC4177E (LAN WS) Negotation failed
Reason: The negotiation message did not parse correctly. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4178E (LAN WS) Disconnect during negotation
Reason: The remote disconnected during the negotiation phase.
Action: Restart the remote and retry.

PC4179E (LAN WS) Password mismatch
Reason: (WS Msg) The specified password did not match.
Action: Respecify the password and retry.

PC4180E (LAN WS) Error receiving
Reason: There was an error receiving data from the remote (immediately).
Action: See additional messages.

PC4185E (LAN WS) Error setting SPX semaphore
Reason: There was an OS/2 error setting the SPX wait for completion semaphore.
Action: Contact FDR/UPSTREAM Tech Support.

PC4190E (LAN WS) Error checking SPX semaphore
Reason: There was an OS/2 error checking the SPX was for completion semaphore.
Action: Contact FDR/UPSTREAM Tech Support.

PC4191E (LAN WS) Semaphore not found
Reason: The semaphore does not match one of the internal data blocks. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4195E (LAN WS) Error terminating SPX connection
Reason: There was a Novell error terminating the SPX connection.
Action: See additional messages.

PC4200E (LAN WS) Error sending flow control
Reason: There was an error sending a flow control message.
Action: See additional messages.

PC4205E (LAN WS) Error finishing sending
Reason: There was an error while waiting for all the send packets to complete.
Action: See additional messages.

PC4206E (LAN WS) Timeout finishing sending
Reason: There was a timeout during the process of waiting for send messages to complete.
Action: Increase the TIMEOUT on both sides.

PC4210E (LAN WS) Timeout flushing receives
Reason: While flushing receives there was a timeout.
Action: Verify that the remote is operating. Increase the TIMEOUT on both sides.

PC4211E (LAN WS) Send buffer lost
Reason: A buffer in use could not be found. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4212E (LAN WS) Error sending packet
Reason: There was an immediate Novell error sending a packet to the remote.
Action: See additional messages.

PC4213E (LAN WS) Time out sending a packet
Reason: There was a timeout waiting for a packet to be sent.
Action: Verify that the remote is operating. Increase the TIMEOUT on both sides.

PC4214E (LAN WS) Error listing for flow control
Reason: There was a Novell error listening for a flow control message.
Action: See additional messages.

PC4215E (LAN WS) Expected a flow control message
Reason: A flow control message was expected and something else was received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4216E (LAN WS) No flow control
Reason: A timeout or disconnect was received instead of a flow control message.
Action: Verify the remote is still operating.

OS/2 USIPX.c errors

PC4300E Error starting required timer
Reason: There was an OS/2 system error starting an interval timer.
Action: Contact FDR/UPSTREAM Tech Support.

PC4301E ULTra Normal load
Reason: ULTra is now operational.

PC4302E ULTra Normal unload
Reason: ULTra is now shut down.

PC4303W ULTra Forced Unload
Reason: ULTra was forced to shut down during backup/restore by operator.

PC4305E Error starting processing thread
Reason: There was an OS/2 system error starting the remote processing thread.
Action: Contact FDR/UPSTREAM Tech Support.

NetBIOS errors

PC4400E (LAN WS) Error in LISTEN command (NetBIOS)
Reason: Usually this is the result of a previous error.
Action: See the explanation of the error code in the UPSTREAM manual.

PC4401E (LAN WS) Error accepting connection (NetBIOS)
Reason: from UPSTREAM.
Action: See the explanation of the error code in the UPSTREAM manual.

PC4402E (LAN WS) Error terminating the NetBIOS session

PC4403E (LAN WS) Error deleteing a NetBIOS session name

PC4404E (LAN WS) Error adding session name (NetBIOS)
Reason: Error adding a session name to a local NetBIOS table.
Action: See the explanation of the error code in the UPSTREAM manual.

PC4405E (LAN WS) NetBIOS error sending data
Action: See the explanation of the error code in the UPSTREAM manual.

PC4406E (LAN WS) NetBIOS error receiving data
Action: See the explanation of the error code in the UPSTREAM manual.

PC4407E (LAN WS) Error canceling a wait on NetBIOS session

PC4408E (LAN WS) Error in NetBIOS connection
Reason: Error in NetBIOS connection to the remote station.

PC4409E (LAN WS) Error registering UPSTREAM to NetBIOS

PC4410E (LAN WS) TimeOut in Send (NetBIOS)
Action: If your peer is still up and running, increase the LANTIMEOUT value on your side.

PC4411E Communication error - no errors(dummy entry)

PC4412E Communication error - TimeOut

PC4413E Communication error - Disconnected

PC4414E Communication error - Send/Receive incomplete

PC4415E Communication error - Status error

PC4416I (LAN WS) A NetBIOS connection has been established

PC4417E (LAN WS) Error allocating a NetBIOS receive buffer
Reason: There was an error dymaically allocating the NetBIOS receive buffer. Insufficient memory.
Action: Set LANBUFFER and/or NUNECBS to a smaller value or free memory.

PC4418E (LAN WS) Error allocating a NetBIOS send buffer
Reason: There was an error dymaically allocating the NetBIOS send buffer. Insufficient memory.

Action: Set LANBUFFER and/or NUMECBS to a smaller value or free memory.

PC4420E (LAN WS) DLL not found (NetBIOS)
Reason: The specified NetBIOS DLL was not found. (it could be not an error if you are using another one or IPX/SPX interface):

PC4421E (LAN WS) Error loading NetBIOS
Reason: Error loading NetBIOS interface functions. NetBIOS interface disabled.
Action: Use OS/2 HELP command to obtain the description of the error: HELP SYSxxx , where xxx is the error code provided.

PC4422E (LAN WS)NetBIOS SUBMIT function was not loaded
Reason: NetBIOS interface disabled. Error code 127 means that the function wasn't found in NETAPI.DLL.
Action: Contact FDR/UPSTREAM Tech Support.

PC4423E (LAN WS) NetBIOS interrupt vector not found

PC4424E (LAN WS) NetBIOS not present
Reason: NetBIOS not present (int 5C not initialized or not a valid NetBIOS interrupt).
Action: See the explanation of the error code in the UPSTREAM manual.

PC4425E (LAN WS) NetBIOS interface is not active
Reason: This may not be an error if you are using another NetBIOS interface or an IPX/SPX interface.

PC4426E (LAN WS) LAN support program
Action: Check if you have NETAPI.DLL in the \MUGLIB\DLL directory and that this directory is in the LIBPATH statement in your CONFIG.SYS. Also check if you have the LAN Requestor running.

PC4427E LAPs NetBIOS
Action: Check if you have ACSNETB.DLL in the \MUGLIB\DLL directory and that this directory is in the LIBPATH statement in your CONFIG.SYS. Also check if you are loading NETBIOS.OS2 in CONFIG.SYS.

PC4428 (LAN WS) WIN32 NetBIOS error
Reason: Error enumerating virtual adapters.
Action: Contact FDR/UPSTREAM Tech Support.

PC4429 (LAN WS) Error in memory allocation.(WIN32 NetBIOS)
Reason: There was not enough memory for the virtual adapter array.
Action: Check if you have too many applications running, close some and try again. Increase your page file size.

PC4430 (LAN WS) Error in ADAPTER (WIN32 NetBIOS)
Reason: The adapter specified in ADAPTER environment variable was not found in your configuration.
Action: NT 4.0: Go to Control Panel, Network, Services, NetBIOS interface and click on Properties button. For ADAPTER variable specify the Lana Number which stands for the Network Route starting with 'Nbf -'. NT 3.51: Go to Control Panel, Network, push Binding button. Select bindings for NetBIOS interface and move 'NetBIOS-NetBEUI' to the first line.

TLI errors

PC4431E (LAN WS) Error finding workstation (TLI/Sockets)
Reason: (Requestor Msg) There was a Novell server error searching for the address of the specified TLI workstation.
Action: See additional messages.

PC4432E (LAN WS) Error finding workstation (TLI/Sockets)
Reason: (Requestor Msg) The attempt to get the default connection ID to find the workstation(TLI) resulted in an error.
Action: The connection to your server has been lost. Reestablish and retry.

PC4435E (LAN WS) Error opening TLI
Reason: The attempt to open TLI handle failed. System error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4436E (LAN WS) Error binding TLI connection point
Reason: Attempt to bind TLI connection point/socket failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4437E (LAN WS) Error in connect(TLI/sockets)
Reason: Attempt to establish a connection to workstation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4438E (LAN WS) Error in connect (TLI/sockets)
Reason: Workstation was found, but the connection request timed out.
Action: Contact FDR/UPSTREAM Tech Support.

PC4439E (LAN WS) Receive timed out (TLI/sockets)
Reason: The receive operation timed out.
Action: Check if the peer application is still up and running. Set LANTIMEOUT environment variable to the higher value.

PC4440E (LAN WS) Receive error (TLI/Sockets)
Reason: The receive operation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4441E (LAN WS) Send timed out (TLI/sockets)
Reason: The send operation timed out.
Action: Check if the peer application is still up and running. If it is set LANTIMEOUT environment variable to the higher value.

PC4442E (LAN WS) Send error (TLI/Sockets)
Reason: The Send operation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4443E (LAN WS) T_LOOK failed (TLI)
Reason: The attempt to retrieve the error code for the previous call failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4444E (LAN WS) Workstation not found (TLI/sockets)
Reason: (Requestor Msg) The specified workstation was not found.
Action: Verify that ULTra is running on the requested workstation.

PC4445E (LAN WS) Error accepting connection (TSI/Sockets)
Reason: While waiting for connection from UPSTREAM an error occurred.
Action: Contact FDR/UPSTREAM Tech Support.

PC4446E (LAN WS) Error allocating memory (TLI/Sockets)
Reason: There was an error allocating memory for databuffer which is used for TLI/sockets traffic.
Action: Free memory.

PC4447E (LAN WS) Error in listen (TLI/Sockets)
Reason: When preparing for incoming connection an error occurred.
Action: Contact FDR/UPSTREAM Tech Support.

PC4448E (LAN WS) Error opening TLI handle (NoSAP)
Reason: The attempt to open TLI handle for datagram exchange failed. System error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4449E (LAN WS) Error binding TLI/sockets
Reason: Attempt to bind TLI connection point/socket for datagram exchange failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4450E (LAN WS) Receive datagram error (TLI/sockets, NoSAP)
Reason: Receive datagram failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4451E (LAN WS) Send datagram error (TLI/sockets)
Reason: Send datagram failed (Broadcast WS ID, NoSAP FindWS).
Action: Contact FDR/UPSTREAM Tech Support.

PC4452E (LAN WS) Error in POLL (TLI, NoSAP)
Reason: Error while polling FindWS broadcasts.
Action: Contact FDR/UPSTREAM Tech Support.

PC4454E (LAN WS) Error in POLL (TLI, NoSAP)
Reason: While polling for FindWS broadcast unsupported status was retrieved.
Action: Contact FDR/UPSTREAM Tech Support.

PC4455E (LAN WS) Unexpected condition on network (TLI)
Reason: The session was interrupted by an underlying protocol.
Action: Contact FDR/UPSTREAM Tech Support.

PC4456E (LAN WS) Connection error (Sockets)
Reason: Connection to the remote WS failed.
Action: Check if the Novell interfaceis properly configured and functioning. Check if the remote WS is still up and running.

PC4457E (LAN WS) Received block is too big (TLI/sockets)
Reason: The length of the block to be received exceeds the negotiated size.
Action: Contact FDR/UPSTREAM Tech Support.

PC4458E (LAN WS) Advertise error (Sockets)
Reason: Attempt to advertise ULTra workstation to Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4459E (LAN WS) Error sending datagram (TCP/IP)
Reason: Attempt to send workstation query response failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4460E (LAN WS) Error opening TLI handle for SAP
Reason: Attempt to open TLI handle to advertise ULTra workstation to Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4461E (LAN WS) Error binding TLI connection point
Reason: Attempt to bind TLI conn.point to advertise ULTra workstation to Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4462E (LAN WS) Error sending SAP packet (TLI)
Reason: Attempt to send SAP packet to advertise ULTra to Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4463E (LAN WS) Error allocating TLI structures
Reason: Attempt to allocate memory for TLI working structures failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4464W (LAN WS) Error creating TCP socket (Sockets)
Reason: Attempt to create a datagram socket failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4465W (LAN WS) Error receiving datagram (TCP/IP)
Reason: Attempt to receive workstation query broadcast failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4466E (LAN WS) Error creating SPX socket (Sockets)
Reason: Attempt to create a socket failed.
Action: Contact FDR/UPSTREAM Tech Support. b467E (LAN WS) Error in StartUp (Sockets) Attempt to prepare NetWare environment for sockets interface failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4468E (LAN WS) Error opening IPX socket for SAP (Sockets)
Reason: Attempt to open IPX socket to advertise ULTra for Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4469E (LAN WS) Error closing IPX socket for SAP(Sockets)
Reason: Attempt to close IPX socket used to advertise ULTra for Novell failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4470E (LAN WS) Error sending flow control (TLI/sockets)
Reason: Attempt to send flow control packet failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4471E (LAN WS) Error receiving flow control (TLI/sockets)
Reason: Attempt to receive flow control packet failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4472W (LAN WS) Error geting current state(TLI/Sockets)
Reason: Attempt to get current communication state failed. Disconnect process will continue.

PC4473E (LAN WS) Not a flow control (TLI/sockets)
Reason: Flow control packet was expected, but some other packet was received. Communication error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4474E (LAN WS) Error receiving disconnect request (TLI)
Reason: Unexpected disconnect condition was detected, but receive disconnect request failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4475E (LAN WS) Error in disconnect (TLI)
Reason: The orderly release connection condition was detected, but receive release failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4476E (LAN WS) Allocate CALL failed (TLI)
Reason: Attempt to allocate data structures for CALL command failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4477E (LAN WS) Allocate INFO failed (TLI)
Reason: Attempt to allocate INFO data structures failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4478E (LAN WS) Allocate BIND failed (TLI)
Reason: Attempt to allocate data structures for BIND command failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4479E (LAN WS) Allocate UDATA failed (TLI, NoSAP)
Reason: Attempt to allocate datagram data structures failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4480E (LAN WS) Datagram size is too small (TLI, NoSAP)
Reason: The supported datagram size is less than FindWS packet.
Action: Contact FDR/UPSTREAM Tech Support.

PC4481E (LAN WS) Error opening TLI handle (Sockets, NoSAP)
Reason: Attempt to open TLI handle for datagram exchange failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4482E (LAN WS) Error binding TLI (Sockets, NOSAP)
Reason: Attempt to bind TLI conn. point for datagram exchange failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4483E (LAN WS) Error receiving datagram (Sockets, NoSAP)
Reason: Attempt to receive datagram failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4484E (LAN WS) Error sending datagram (Sockets, NoSAP)
Reason: Attempt to receive datagram failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4485E (LAN WS) Error setting socket options (Sockets, NoSAP)
Reason: Attempt to set broadcast option failed.
Action: Contact FDR/UPSTREAM Tech Support.

TCP/IP errors

PC4486E (LAN WS) Error allocating memory for data buffer
Reason: There was an error allocating memory which is used for TCP/IP sockets traffic.
Action: Free memory.

PC4487E (LAN WS) Receive timed out (TCP/IP)
Reason: The receive operation timed out.
Action: Check if the peer application is still up and running. Set LANTIMEOUT environment variable to the higher value.

PC4488E (LAN WS) Receive error (TCP/IP)
Reason: The receive operation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4489E (LAN WS) Received block is too big (TCP/IP)
Reason: The length of the block to be received exceeds the negotiated size.
Action: Contact FDR/UPSTREAM Tech Support.

PC4490E (LAN WS) Send timed out (TCP/IP)
Reason: The send operation timed out.
Action: Check if the peer application is still up and running. If it is set LANTIMEOUT environment variable to the higher value.

PC4491E (LAN WS) Send error (TCP/IP)
Reason: The Send operation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4492E (LAN WS) Error in StartUp (TCP/IP)

Reason: Attempt to prepare TCP/IP environment for sockets interface failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4493E (LAN WS) Error creating TCP/IP socket (TCP/IP)
Reason: Attempt to create a socket failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4494E (LAN WS) Error binding TCP/IP socket
Reason: Attempt to bind TCP/IP socket failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4495E (LAN WS) Error in listen (TCP/IP)
Reason: When preparing for incoming connection an error occurred.
Action: Contact FDR/UPSTREAM Tech Support.

PC4496E (LAN WS) Error accepting connection (TCP/IP)
Reason: While waiting for connection from UPSTREAM an error occurred.
Action: Contact FDR/UPSTREAM Tech Support.

PC4497E (LAN WS) Error resolving WS name (TCP/IP)
Reason: UPSTREAM was unable to get workstation IP address from the name provided.
Action: Check the following message and/or error code.

PC4498E (LAN WS) Error in connect(TCP/IP)
Reason: Attempt to establish a connection to workstation failed.
Action: Contact FDR/UPSTREAM Tech Support.

PC4499E (LAN WS) Address verification failed (TCP/IP)
Reason: TCP/IP ULTra didn't find the address of the UPSTREAM server tried to establish connection in the list of valid UPSTREAM servers (UPSTREAM.VRF).
Action: Check if you properly configured UPSTREAM.VRF file, or watch for intruders.

Reporting Errors.

PC4500E Error opening report file
Action: See additional messages.

PC4501E Error writing time to report file
Action: See additional messages.

PC4502E Error writing beginning message to report
Action: See additional messages.

PC4503E Error getting text from message file
Action: See additional messages.

PC4504E Error writing a message to the report
Action: See additional messages.

PC4505E Error saving parameters for the report
Action: See additional messages.

PC4506E Error listing parameters for the report
Action: See additional messages.

PC4507E Error reading parameters for the report
Action: See additional messages.

PC4508E Not in session for status reporting
Reason: You requested status reporting and you are not connected to a system to perform this type of reporting.
Action: Respecify.

PC4509E Report file busy.
Reason: The report file specified is in use by another process. The current report was saved in the following file:

PC4510E Error reading temp report.
Reason: There was an error reading a temp report file while appending it to the specified report file name.

PC4511E Error writing report.
Reason: There was an error writing to the specified report file while appending a temp report to it.

PC4512E Report not appended.
Reason: There was an error appending temp report to the report file specified. The current report was saved in the following file:

PC4513W Temp report file not deleted.
Reason: The temporary report file was not deleted. You can delete all files ustmp.*.rpt if there are no UPSTREAM instances running.

Win32 system errors.

PC4601W Win32 initialization error
Reason: The initialization of the Win32 WOW thunk layer could not be performed. UPSTREAM can still function as a 16 bit application, but all functionality dependent on the Win32 WOW thunk layer is not available.

PC4602W File system initialization error
Reason: One or more of the Win32 file system functions are not available. UPSTREAM can still function, but long file name support, extended attribute support and possibly other support is not available.

PC4603W The SeBackupPrivilege is disabled
Reason: UPSTREAM will not be able to backup Security information, Extended Attributes and alternate data streams for files and directories.
Action: Ensure your account has the Back up files and directories right granted to it or the account is a member of the Administrators group either directly or indirectly.

PC4604W The SeRestorePrivilege is disabled
Reason: UPSTREAM will not be able to restore Security information, Extended Attributes and alternate data streams for files and directories.
Action: Ensure your account has the Restore files and directories right granted to it or the account is a member of the Administrators group either directly or indirectly.

PC4605W The SeSecurityPrivilege is disabled
Reason: UPSTREAM may be able to backup and restore Security information, Extended Attributes and alternate data streams for files and directories, but not Security ACL information used for auditing access.
Action: Ensure your account has the Manage auditing and security log right granted to it or the account is a member of the Administrators group either directly or indirectly.

PC4606W The SeSystemtimePrivilege is disabled
Reason: UPSTREAM will not be able to synchronize the Windows NT system clock with the mainframe.
Action: Ensure your account has the Change the system time right granted to it or the account is a member of the Administrators group either directly or indirectly.

PC4607E Unable to allocate registry information
Reason: storage for the following file.
Action: Close some other applications and try the UPSTREAM function again.

PC4608E Unable to open the key for a hive file
Reason: Unable to access one of the main registry hive keys in preparation for backing it up.
Action: See additional messages.

PC4609E Unable to save the key for a hive file
Reason: Unable to back up one of the main registry hive files.
Action: See additional messages.

PC4610E Unable to replace the key for a hive file
Reason: Unable to restore one of the main registry hive files.
Action: See additional messages.

PC4611E Unable to get the file name of a loaded hive
Reason: An error occurred while enumerating the values of the "HKLM\SYSTEM\CurrentControlSet\Control\hivelist" key in the registry (HKLM = HKEY_LOCAL_MACHINE). These values contain the file names of the main registry hives that are currently loaded in the registry.

PC4612E Unable to get list of user profile directories

Reason: An error occurred while opening the "HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList" key in the registry (HKLM = HKEY_LOCAL_MACHINE). This key contains subkeys which are the SIDs for each user that has a user profile directory on disk.

PC4613E Unable to get the name of user's SID subkey
Reason: An error occurred while enumerating the subkeys of the "HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList" key in the registry (HKLM = HKEY_LOCAL_MACHINE). These subkeys have names that are the SIDs of the users defined to the system that have user profile directories on disk.

PC4614E Unable to open a user's SID subkey
Reason: An error occurred while opening one of the subkeys of the "HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList" key in the registry (HKLM = HKEY_LOCAL_MACHINE). These subkeys have names that are the SIDs of the users defined to the system that have user profile directories on disk.
Action: See additional messages.

PC4615E Unable to get the profile directory for a user
Reason: An error occurred while reading the ProfileImagePath value for one of the SID subkeys of the "HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList" key in the registry (HKLM = HKEY_LOCAL_MACHINE). The ProfileImagePath value contains the name of a directory on the disk that contains the user's profile. Part of the user's profile is a file named NTUSER.DAT which contains the user's registry hive.
Action: See additional messages.

PC4616D Reboot the computer
Reason: All or part of the registry on the local or remote computer has been restored or modified. The registry modifications will not take effect until the computer is restarted. If the computer to be rebooted is an ULTra workstation computer, you should examine the ULTRA.LOG file on that computer for messages that direct you to perform manual operations.

PC4617D Backing up Registry and/or Event Log files
Reason: One or more Registry and/or Event Log files are included in this backup.

PC4618E Unable to get list of event log files
Reason: An error occurred while opening the "HKLM\SYSTEM\CurrentControlSet\Services\EventLog" key in the registry (HKLM = HKEY_LOCAL_MACHINE). This key contains subkeys which define the subsections of the event log. The File value for each of these subkeys contains the name of the event log file on disk.
Action: See additional messages.

PC4619E Unable to get the name of an event log section
Reason: An error occurred while enumerating the subkeys of the "HKLM\SYSTEM\CurrentControlSet\Services\EventLog" key in the registry (HKLM = HKEY_LOCAL_MACHINE). These subkeys define the subsections of the event log. The File value for each of these subkeys contains the name of the event log file on disk.
Action: See additional messages.

PC4620E Unable to open an event log section key
Reason: An error occurred while opening one of the subkeys of the "HKLM\SYSTEM\CurrentControlSet\Services\EventLog" key in the registry (HKLM = HKEY_LOCAL_MACHINE). These subkeys define the subsections of the event log. The File value for each of these subkeys contains the name of the event log file on disk.
Action: See additional messages.

PC4621I Unable to get the name of an event log file
Reason: An error occurred while reading the File value for one of the event log section subkeys of the "HKLM\SYSTEM\CurrentControlSet\Services\EventLog" key in the registry (HKLM = HKEY_LOCAL_MACHINE). The File value contains the name of the event log file on disk.
Action: See additional messages.

PC4622E Unable to open an event log file
Reason: An event log file for one of the event log subsections could not be opened.
Action: See additional messages.

PC4623E Unable to backup an event log file
Reason: An event log file for one of the event log sections could not be backed up.
Action: See additional messages.

PC4624D An event log file has been restored to a file
Reason: with a different name. See the following messages for the event log file's original name and the name of the file to which it was restored.

PC4625E (NT) Error allocating put memory
Reason: There was a memory shortage allocating memory required for NT duplicate file handling.
Action: Either reduce the maximum number of duplicate files or free memory.

PC4626W The registry for the destination drive could
Reason: not be opened.
Action: See additional messages.

PC4627E Event log file excluded
Reason: An attempt to open an event log file on a remote computer for either backup or restore is disallowed by default.
Action: Set the USREMOTENTEVENTLOGS environment variable to Y and try the operation again.

PC4628E Can't get the Win32 process ID
Action: Contact FDR/UPSTREAM Tech Support.

PC4629E Can't get the Win32 process handle
Action: Contact FDR/UPSTREAM Tech Support.

PC4630E Can't get the Win32 thread handle
Action: Contact FDR/UPSTREAM Tech Support.

PC4631E Can't set the Win32 process priority
Action: Contact FDR/UPSTREAM Tech Support.

PC4632E Can't set the Win32 thread priority
Action: Contact FDR/UPSTREAM Tech Support.

PC4633E Can't get the Win32 process priority
Action: Contact FDR/UPSTREAM Tech Support.

PC4634E Can't get the Win32 thread priority
Action: Contact FDR/UPSTREAM Tech Support.

PC4635W Can't find a share name in the registry
Reason: A share name was used to share a drive path on another Windows NT system, but a definition for this share name could not be found in the registry for that system.
Action: See additional message.

PC4636W Path for share name is not the root
Reason: A share name was used to share a drive path on another Windows NT system, but the path specified for the share on that system is not the root of its system drive (i.e. "%SystemDrive%\"). As a result UPSTREAM cannot back up or restore the registry files that may reside in this path or one of its subdirectories.
Action: Create an explicitly defined share name for the root of the drive you want to share and map a drive on your local system (the one on which UPSTREAM runs) to that share name. Ex: On remote system: NET SHARE CDRIVE=C:\ On local system: NET MAP X: \\remote\CDRIVE

PC4637E Can't get the computer name
Reason: An error occurred while attempting to get the name of the local computer from the system.
Action: See additional messages

PC4638I Can't open the \MACHINE registry key
Reason: An error occurred while attempting to open the \MACHINE registry key. This message can be ignored if the target drive is not a Windows NT system drive.
Action: See additional messages

PC4639E Can't determine the operating system type
Reason: An error occurred while attempting to open the two registry keys that are used to determine the type of computer system. These two keys are: \SOFTWARE\Microsoft\Windows NT\CurrentVersion & \SOFTWARE\Microsoft\Windows\CurrentVersion
Action: See additional messages

PC4640E Can't get the SystemRoot registry value
Reason: An error occurred while attempting to read the SystemRoot registry value.
Action: See additional messages

PC4641E Can't open the Shares registry key
Reason: An error occurred while attempting to open the Shares registry key.
Action: See additional messages

PC4642E Can't open the \MACHINE registry key
Reason: An error occurred while attempting to open the \MACHINE registry key.
Action: See additional messages

PC4643E Can't open the \USER registry key
Reason: An error occurred while attempting to open the \USER registry key.
Action: See additional messages

PC4644E Can't open the hivelist registry key
Reason: An error occurred while attempting to open the SYSTEM\CurrentControlSet\Control\hivelist registry key.
Action: See additional messages

PC4645E ULTra cannot be used to access a remote system
Reason: Your ULTra license does not give you permission to backup from or restore to a computer system that is a remote system to the system on which ULTra runs. The name of the remote computer system follows.
Action: Do not attempt to use ULTra to backup from or restore to a remote computer system.

PC4646I Could not create the event log list
Reason: A problem exists in the Windows NT registry which prevented UPSTREAM from creating a list of event log files. This does not prevent UPSTREAM from performing a backup of the registry or other non-event log files.
Action: Examine the registry to ensure that each of the subkeys of \HKLM\System\CurrentControlSet\Services\EventLog have a "File" value name with the name of a valid event log file as its value.

PC4647E (WinNT) Insufficient memory
Reason: There was insufficient memory allocating memory to hold file information for Windows NT.
Action: Close applications

PC4648E (WinNT) Error locating save info list entry
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4649E (WinNT) Error converting from Unicode
Action: See additional messages.

PC4650E (WinNT) Error converting from Unicode
Reason: This error occurred converting a file name which actually contained Unicode characters.
Action: See additional messages.

PC4651E (WinNT) Length exceeded converting from Unicode
Reason: This file will not translate properly.
Action: Rename the file to include fewer non-ANSI codes.

PC4652E (WinNT) Error converting to Unicode
Action: See additional messages.

PC4653E (WinNT) Error converting to Unicode
Reason: This error occurred converting a file name which actually contained Unicode characters.
Action: See additional messages.

PC4654D (WinNT) Error determining if we are NTFS
Reason: While performing an initial directory search there was an error determining if the volume is NTFS.
Action: See additional messages.

PC4655D (WinNT) Error determining if we are NTFS
Reason: While performing an subsequent directory search there was an error determining if the volume is NTFS.
Action: See additional messages.

PC4656D (WinNT) Error setting permissions
Reason: There was an error adding the user to the permissions list for the file or directory.
Action: See additional messages.

PC4657E (Win32) Error continuing file search
Action: See additional messages.

PC4658D (WinNT) Error determining NTFS drive status
Reason: There was an NT error determining if this path was an NTFS drive.
Action: See additional messages.

PC4659D (WinNT) Error loading permissions library
Action: See additional messages.

PC4660D (WinNT) Error loading permissions function
Action: See additional messages.

PC4661D (WinNT) Error getting existing permissions
Reason: While attempting to add permissions for this user, there was an error getting the existing permissions.
Action: See additional messages.

PC4662D (WinNT) Error getting user name
Reason: While attempting to add permissions for this user, there was an error getting the name of the current user.
Action: See additional messages.

PC4663D (WinNT) Error adding to ACL
Reason: While attempting to add permissions for this user, there was an error adding the user's information to the existing ACL.
Action: See additional messages.

PC4664D (WinNT) Error setting permissions
Reason: While attempting to add permissions for this user to the file system, there was an error.
Action: See additional messages.

PC4665D (WinNT) Error testing security
Reason: While attempting to take security, there was a non-security related error.
Action: See additional messages.

PC4666D (WinNT) Error setting permissions during open
Reason: There was an error setting the permissions for a file after a failed file open.
Action: See additional messages.

PC4667W (WinNT) Error creating hard link
Reason: Error writing hard link header.
Action: See file I/O message.

PC4668W (WinNT) Error creating hard link
Reason: Error writing hard link name.
Action: See file I/O message.

PC4669W (WinNT) Error creating hard link
Reason: Error writing hard link trailer.
Action: See file I/O message.

PC4670I (WinNT) Attempting to authorize key/subkey
Reason: There was an error accessing the key/subkey below. UPSTREAM will attempt to authorize it.
Action: If the operation fails or the access still fails, you should contact FDR/UPSTREAM Tech Support for help. Otherwise, future accesses will work and this message will not occur again.

PC4671E (WinNT) Error looking up account infomation
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4672E (WinNT) Error opening registry key for write
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4673E (WinNT) Error looking up key security
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4674E (WinNT) Error initializing security descriptor
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4675E (WinNT) Error getting DACL
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4676E (WinNT) Error getting ACL info
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4677E (WinNT) Error initializing ACL
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4678E (WinNT) Error getting ACE
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC4679E (WinNT) Error adding ACE
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

Win32 system errors from USTPSERV.EXE.

PC4680E Invalid parameters passed to USTPSERV
Reason: The service name and program specification are required as the first two paramters to USTPSERV.EXE.
Action: Run the USTPCFG.EXE program, select the TP service for which this execution applies, change the EXE Path Name field to "d:\path\USTPSERV.EXE" and change the Parameters field to "servicename programfilespec [param1 ... paramN]"

PC4681E USTPSERV could not start the service
Reason: The service provided to USTPSERV.EXE could not be started by the Service Control Dispatcher. The name of the service and the error code follow:

PC4682E The service started by USTPSERV did not complete
Reason: The service provided to USTPSERV.EXE did not complete successfully. The name of the service and the error code follow:

PC4683E USTPSERV could not register the SC Handler
Reason: The Service Control Handler for the service provided to USTPSERV.EXE could not be registered. The name of the service and the error code follow:

PC4684E USTPSERV could not set the service status
Reason: The status for the service provided to USTPSERV.EXE could not be set. The name of the service and the error code follow:

PC4685I USTPSERV started the program for the service
Reason: The program for the service provided to USTPSERV.EXE was started successfully. The name of the service and the program specification follow:

PC4686E USTPSERV could not start the program for the service
Reason: The program for the service provided to USTPSERV.EXE could not be started. The name of the service and the program specification follow:

PC4687I The service program started by USTPSERV terminated
Reason: The program for the service provided to USTPSERV.EXE terminated normally. The name of the service and the program specification follow:

PC4688W The service program started by USTPSERV was stopped
Reason: The program for the service provided to USTPSERV.EXE was stopped prematurely. The name of the service and the program specification follow:

PC4689E The service program started by USTPSERV did not terminate
Reason: The program for the service provided to USTPSERV.EXE did not terminate. It may still be running. The name of the service and the program specification follow:

PC4690E The service program started by USTPSERV ABENDED
Reason: The program for the service provided to USTPSERV.EXE terminated abnormally. The name of the service and the program specification follow:

PC4691I The service started by USTPSERV received a SC request
Reason: The service provided to USTPSERV.EXE received a request from the Service Control Manager. The name of the service and the type of request received follow:

PC4692E The program name is not a valid executable program
Reason: The second or third parameter provided to USTPSERV.EXE must be the name of an executable program file, but the program name provided is not a valid 32-Bit or 16-Bit executable program file.

PC4693I The service program started by USTPSERV was not waited on
Reason: USTPSERV.EXE did not wait for the termination of the program for the service provided to it. The program is still running. The name of the service and the program specification follow:

PC4694I Issuing a USCNTL request to kill the program
Reason: USTPSERV.EXE is issuing a USCNTL request to kill the program for which it was started. The name of the service and the USCNTL command line follow:

PC4695W Forcing program termination due to USCNTL failure
Reason: The USCNTL request to kill the program was unsuccessful so USTPSERV.EXE will force the termination of the program's process. The name of the service and program to be terminated follow:

OS/2 specific TCP/IP errors.

PC4700E Error creating named pipe
Reason: There was an OS/2 error creating the named pipe necessary to communicate with the subprogram USTCPIP.
Action: The return code is the OS/2 error. Run HELP SYSxxxx with the return code for a full description.

PC4701E Error allocating status named data area
Reason: There was an error allocating the data area necessary to communicate with the subprogram USTCPIP.
Action: The return code is the OS/2 error. Run HELP SYSxxxx with the return code for a full description.

PC4702E Error starting USTCPIP.EXE
Reason: There was an error starting the program USTCPIP.EXE.
Action: The return code is the error returned from the spawn call. See the Errors chapter in the UPSTREAM manual for a list of these return codes. Also try running the program USTCPIP manually - if it can't load the DLL SO32DLL make sure you have TCP/IP installed and started.

PC4703E Error connecting to USTCPIP
Reason: There was an error connecting the named pipe to the subprogram USTCPIP.
Action: The return code is the OS/2 error. Run HELP SYSxxxx with the return code for a full description.

PC4704E Error reading named pipe
Reason: There was an error reading the named pipe used to communicate with USTCPIP.
Action: The return code is the OS/2 error. Run HELP SYSxxxx with the return code for a full description.

PC4705E Error writing named pipe
Reason: There was an error writing to the named pipe used to communicate with USTCPIP.
Action: The return code is the OS/2 error. Run HELP SYSxxxx with the return code for a full description.

PC4706E Internal TCP/IP error
Reason: USTCPIP reported an internal error.
Action: The error text and return codes should help you diagnose the problem.

PC4707E Error loading required TCP/IP function
Reason: The function listed below could not be loaded.

Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4708E Error loading required TCP/IP module
Reason: The module listed below could not be loaded.
Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4709E Novell TCP/IP not loaded
Reason: The "loaded" call returned that Novell TCP/IP services are not available.
Action: Verify the LWP install is correct.

PC4710E Error starting TCP/IP thread
Reason: OS/2 would not allow the TCP/IP thread to begin.
Action: Shut down some other processes and retry.

PC4711E Error setting semaphore
Reason: There was an error setting a required semaphore before thread start.
Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4712E Error setting semaphore
Reason: There was an error setting a required semaphore used for the main thread.
Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4713E Error clearing semaphore
Reason: There was an error clearing a required semaphore used for the TCP/IP thread.
Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4714E Error waiting on thread semaphore
Reason: There was an error waiting on the TCP/IP thread semaphore.
Action: The return code lists the OS/2 error. Look up OS/2 errors by entering (from a command line) HELP SYSxxxx where xxxx is the return code.

PC4715E Unknown TCP/IP request
Reason: There was an error communicating between the main thread and the TCP/IP thread. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

General TCP/IP errors.

PC4750E TCP/IP communications error
Reason: The following messages describes the error and the location within UPSTREAM where it happened.

PC4751E (TCP/IP) sock_init failed
Reason: The sock_init call (which is used to init- ialize structures and detect the existance of TCP/IP) failed.
Action: Verify that TCP/IP is installed and operational.

PC4752E (TCP/IP) socket failed
Reason: The socket call (which is used to begin communications) failed.

PC4753E (TCP/IP) connect failed
Reason: The connect call which is used to connect to the mainframe failed.

PC4754E (TCP/IP) Error allocating internal memory
Reason: There was an error allocating memory which is used for TCP/IP traffic.
Action: Free memory.

PC4755E (TCP/IP) Receive buffer too small
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4756E (TCP/IP) Remote closed connection
Reason: The remote system closed the connection while this system was expecting it to be open.
Action: See remote UPSTREAM log.

PC4757E (TCP/IP) Data size mismatch
Reason: Expected to receive a block of a given size (based on the length prefix) and the data received was a different size.
Action: Contact FDR/UPSTREAM Tech Support.

PC4758E (TCP/IP) Error during confirm
Reason: Error having the host verify that the data was received correctly.
Action: See additional messages.

PC4759E (TCP/IP) Error during confirmed
Reason: Error notifying the host that the data has been correctly received.
Action: See additional messages.

PC4760E (TCP/IP) Send sizes wrong
Reason: There was an error matching the requested transmit size to the size encoded in the data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4761E (TCP/IP) soclose failed
Reason: The soclose call which is used to disconnect from the remote failed.

PC4762E (TCP/IP) Exceeded max sockets
Reason: FDR/UPSTREAM has no more room for the more sockets. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4763E (TCP/IP) Sending receive request
Reason: Error occurred when sending a request to the host to receive.

PC4764E (TCP/IP) socket failed
Reason: The socket call (which is used to begin communications for remote initiates) failed.

PC4765E (TCP/IP) bind failed
Reason: The bind call (which is used to begin communications for remote initiates) failed. This usually occurs when another copy of UPSTREAM has already bound to the inbound TCP port. This message can be ignored unless you need to service remote requests.

PC4766E (TCP/IP) ioctl failed
Reason: The ioctl call (which is used to begin communications for remote initiates) failed.

PC4767E (TCP/IP) accept failed
Reason: The accept call (which is used to begin communications for remote initiates) failed.

PC4768E (TCP/IP) Insufficient memory
Reason: There was not sufficient memory to allocate the CreateTP structure which is necessary to properly process the received request.
Action: Free memory.

PC4769E (TCP/IP) recv failed
Reason: The recv call (which is used to receive data from the remote) failed.

PC4770E (TCP/IP) send failed
Reason: The send call (which is used to send data to the remote) failed.

PC4771E (TCP/IP) Received no data
Reason: The data length received is too small to contain any data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4772E (TCP/IP) Unknown APPC request
Reason: The APPC request was unrecognized. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4773E (TCP/IP) listen failed
Reason: The listen call (which is used to listen for a remote request) failed.

PC4774E (TCP/IP) Deallocate failed
Reason: The request to the remote to deallocate failed.

PC4775E (TCP/IP) Receive of CONFIRMED failed
Reason: The CONFIRM response was not properly received.

PC4776E (TCP/IP) Expected a CONFIRMED
Reason: While waiting for a CONFIRM response, an unexpected data type was received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4777E (TCP/IP) linger failed
Reason: The linger call to request unsent data flushed failed.

PC4778W (TCP/IP) Error occurred while flushing data
Reason: The error occurred while flushing data prior to closing the connnection.

PC4779E (TCP/IP) Error occurred while setting blocking
Reason: The error occurred when attempting to set the remotely received conversation as blocking.

PC4780E (TCP/IP) Incomplete received
Reason: The data record received is larger than the data buffer. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4781E (TCP/IP) Socket in use
Reason: A socket call returned a socket number in use. There is a bug in your TCP/IP implementation.
Action: Contact FDR/UPSTREAM Tech Support.

PC4782E (TCP/IP) Error in specified TCP/IP Option
Reason: You specified in the UPSTREAM configuration to use a TCP/IP option and your TCP/IP reported the following error.

PC4783E (TCP/IP) Invalid IP address or host name
Reason: The mainframe IP address is not valid or the name specified for the mainframe was not resolved.
Action: Return to UPSTREAM configurator and check the value of TCP/IP Address field. It should be either dotted IP address or the name of your mainframe computer running UPSTREAM.

PC4784E (TCP/IP) Name server is not found and there
Reason: is no such entry in the local HOST table.

PC4785E (TCP/IP) The host specified is not found

PC4786E (TCP/IP) The local server does not receive
Reason: a response from an authorized server. Try again.

PC4787E (TCP/IP) Unrecoverable error

PC4788E (TCP/IP) The requested host name is valid, but
Reason: does not have an internet address at the name server.

PC4789D (TCP/IP) Shutdown error
Reason: TCP/IP reported an error during the shutdown. In most cases this will not affect the data transmission.

PC4790D (TCP/IP) Error disabling Nagle algorithm
Reason: There was a TCP/IP error disabling the Nagle algorithm used to improve performance.

PC4791D (TCP/IP) Error enabling Nagle algorithm
Reason: There was a TCP/IP error enabling the Nagle algorithm used to improve performance.

PC4792E (TCP/IP) Error in setting send buffer
Reason: You specified in the UPSTREAM configuration to set the send buffer size and your TCP/IP reported the following error.

PC4793I (TCP/IP) Dynamically adjusted listening port

PC4794I (TCP/IP) CONFIRM connection closed
Reason: Generally can be ignored.

PC4795E (TCP/IP) Error resolving local adapter address
Action: Reconfigure your local outbound adapter address in the UPSTREAM advanced configuration.

PC4796E (TCP/IP) Error binding adapter
Reason: When connecting to a remote system, UPSTREAM had an error using the local adapter (not the host address) for the connect.
Action: Verify that you have specified the correct IP address for the local adapter in the advanced configuration options.

PC4797E (TCP/IP) Error resolving local adapter address
Action: Reconfigure your local inbound adapter address in the UPSTREAM advanced configuration.

PC4798E (TCP/IP) Error checking receives before close
Reason: An error occurred while checking for any pending data before closing the connnection.

PC4799E (TCP/IP) Error in setting receive buffer
Reason: You specified in the UPSTREAM configuration to set the receive buffer size and your TCP/IP reported the following error.

TCP/IP return codes.

PC4800E Unknown return code
Reason: The following return code could not be interpreted.
Action: Contact FDR/UPSTREAM Tech Support.

PC4801E (TCP/IP) Not owner

PC4802E (TCP/IP) No such process

PC4803E (TCP/IP) Interrupted system call

PC4804E (TCP/IP) No such device or address

PC4805E (TCP/IP) Bad file number

PC4806E (TCP/IP) Permission denied

PC4807E (TCP/IP) Bad address

PC4808E (TCP/IP) Invalid argument

PC4809E (TCP/IP) Too many open files

PC4810E (TCP/IP) Broken pipe
Reason: Can be caused by some intemediate device (router, cable, etc.) going down. Can also be cause by the remote system going down completely (crashing).

PC4811E (TCP/IP) OS/2 Error

PC4812E (TCP/IP) Operation would block

PC4813E (TCP/IP) Operation now in progress

PC4814E (TCP/IP) Operation already in progress

PC4815E (TCP/IP) Socket operation on non-socket

PC4816E (TCP/IP) Destination address required

PC4817E (TCP/IP) Message too long

PC4818E (TCP/IP) Protocol wrong type for socket

PC4819E (TCP/IP) Protocol not available

PC4820E (TCP/IP) Protocol not supported

PC4821E (TCP/IP) Socket type not supported

PC4822E (TCP/IP) Operation not supported on socket

PC4823E (TCP/IP) Protocol family not supported

PC4824E (TCP/IP) Address family not supported by protocol family

PC4825I (TCP/IP) Port number already in use
Reason: Usually caused by another copy of UPSTREAM actively listening on the inbound TCP/IP port.

PC4826E (TCP/IP) Can’t assign requested address

PC4827E (TCP/IP) Network is down

PC4828E (TCP/IP) Network is unreachable

PC4829E (TCP/IP) Network dropped connection on reset

PC4830E (TCP/IP) Software caused connection abort

PC4831E (TCP/IP) Connection reset by peer
Reason: Can be caused by a number of different problems. Check the UPSTREAM log on both sides. For Windows 95 or NT may be caused by Windows TCP/IP not properly handing delays (can be fixed by increasing the TcpMaxDataRetransmissions in the registry).

PC4832E (TCP/IP) No buffer space available
Reason: Memory or disk shortage.

PC4833E (TCP/IP) Socket is already connected

PC4834E (TCP/IP) Socket is not connected

PC4835E (TCP/IP) Can't send after socket shutdown

PC4836E (TCP/IP) Too many references: can't splice

PC4837E (TCP/IP) Connection timed out

PC4838E (TCP/IP) Connection refused
Reason: Most often caused by the remote application not running. Can also be caused by TCP/IP on MVS being recycled and UPSTREAM not being recycled.

PC4839E (TCP/IP) Too many levels of symbolic links

PC4840E (TCP/IP) File name too long

PC4841E (TCP/IP) Host is down

PC4842E (TCP/IP) No route to host

PC4843E (TCP/IP) Directory not empty

PC4846E (TCP/IP) Error examining inbound data
Action: Retry your connection

PC4847E (TCP/IP) Incomplete inbound data
Action: Retry your connection

PC4848E (TCP/IP) Bad socket index (index %d, state %d)
Reason: Detected during set for non-blocking. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC4849E (TCP/IP) Error setting non-blocking
Reason: There was a TCP/IP error setting the given socket non-blocking (so as to force a timeout).
Action: See additional messages.

PC4850E (TCP/IP) Send timed out.

PC4851E (TCP/IP) Receive timed out.

PC4852E (TCP/IP) Error occurred in a TCP select

DOS specific TCP/IP errors.

PC4900E (DOS TCP/IP) Error allocating memory
Reason: There wasn't enough memory to allocate the shared data buffer.
Action: Free memory.

PC4901E (DOS TCP/IP) Invalid interrupt
Reason: The interrupt number specified with the environment variable USTCPINT is outside the valid range.
Action: Specify an interrupt greater than 60.

PC4902E (DOS TCP/IP) TCP/IP TSR not found
Reason: The required UPSTREAM TCP/IP processing TSR program was not found at the specified interrupt.
Action: Load UPSTREAM TCP/IP TSR.

PC4903E (DOS TCP/IP) Internal TCP/IP error
Reason: The TSR reported an internal error.
Action: The error text and return codes should help you diagnose the problem.

Windows specific TCP/IP errors.

PC4950E (Win TCP/IP) Error loading function
Reason: The function below is required but not found.
Action: Verify that WINSOCK.DLL or WSOCK32.DLL is in your PATH and is a high enough version.

PC4951E (Win TCP/IP) WINSOCK.DLL not found
Reason: WINSOCK.DLL or WSOCK32.DLL is required for TCP/IP access.
Action: Verify that it is in your path.

PC4952E (Win TCP/IP) Error loading WINSOCK.DLL
Reason: The following error occurred when loading WINSOCK.DLL or WSOCK32.DLL.
Action: Contact FDR/UPSTREAM Tech Support.

PC4953E (Win TCP/IP) Sockets initialization error
Reason: WSAStartup returned the following return code.
Action: See your TCP/IP documentation.

PC4954E (Win TCP/IP) Error creating test socket
Reason: UPSTREAM creates a test socket to test the functionality of the WinSock environment and the test creation failed.
Action: See return code.

PC4955D (Win TCP/IP) Error in WSAAsyncSelect
Reason: This is a shutdown error and can generally be ignored.
Action: See additional messages.

PC4956D (Win TCP/IP) Timeout waiting for FD_CLOSE
Reason: This is a shutdown error and can generally be ignored.

PC4957D (Win TCP/IP) Set blocking error
Reason: This is a shutdown error and can generally be ignored.
Action: See additional messages.

NLM specific TCP/IP errors.

PC4975E (NLM TCP/IP) Error starting WINSOCK
Reason: The following error occurred when starting WINSOCK. UPSTREAM will continue to function but it will not be able to perform using the attach manager functions.
Action: Contact FDR/UPSTREAM Tech Support.

PC4976I (NLM TCP/IP) WINSOCK not installed
Reason: UPSTREAM needs to have the WINSOCK interface installed to operate in attach manager mode. UPSTREAM can operate without WINSOCK but the built-in multi-user functions will not operate.
Action: Install WINSOCK.

LAN Workstation profile errors.

PC5000E (LAN WS Prf) Novell not installed
Reason: Novell access is not available and required for the LAN Workstation profile facility.
Action: Install Novell

PC5001E (LAN Ws Prf) Error opening profile
Reason: There was a file system error opening the specified profile.
Action: Specify an existing profile.

PC5002E (LAN WS Prf) Error reading profile
Reason: There was an error reading the profile.
Action: See additional messages.

PC5003N (LAN WS Prf) Beginning LAN WS Backup/Restore

Reason: The following profile was obtained from the LAN WS Profile specified. You can abort the entire process by pressing the CANCEL button now.

PC5004E (LAN WS Prf) User abort of LAN WS
Reason: Backup/Restore.

PC5005W (LAN WS) Files with long file names ignored
Reason: One or more files or directories with long file names were found on the workstation. These files cannot be handled by the DOS or Windows 3.1 versions of UPSTREAM.
Action: If it is not an OS/2 workstation set the environment variable USUSEWIN32ALTERNATEFILENAMES=Y so that the alternate file names can be used.

Status errors.

PC5100E (Status) Error during start conversation
Action: See additional messages

PC5101E (Status) Error sending start conversation
Action: See additional messages

PC5102E (Status) Error sending status request
Action: See additional messages

PC5103E (Status) Error receiving response
Action: See additional messages

PC5104E (Status) Unexpected conversation state
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5105E (Status) Error during Confirm
Action: See additional messages.

PC5106E (Status) Error during Confirmed
Action: See additional messages.

PC5107E (Status) Error during end of conversation
Action: See additional messages.

IncrDB errors.

PC5150E (IncrDB) Error opening incr file for read
Action: See additional messages.

PC5151E (IncrDB) Error opening incr file for append
Action: See additional messages.

PC5152E (IncrDB) Error deleting/creating incr file
Action: See additional messages.

PC5153E (IncrDB) Error writing incr file block
Action: See additional messages.

PC5154E (IncrDB) Error reading incr file block
Action: See additional messages.

PC5155E (IncrDB) Error seeking incr file begin
Action: See additional messages.

PC5156E (IncrDB) Error deleting incr file
Action: See additional messages.

UNIX system errors.

PC5200E (UNIX) Error occurred reading symbolic link
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5201E (UNIX) Error occurred creating symbolic link
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5202E (UNIX) Error occurred removing symbolic link
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5203E (UNIX) Statx error on symbolic link restore
Reason: A statx error occurred while attempting to restore a symbolic link. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5204E (UNIX) Can not restore symbolic link
Reason: An existing entry in the file system is not a symbolic link.
Action: Remove the existing file or directory IF AND ONLY IF you want the symbolic link to replace the existing file or directory and rerun the restore.

PC5205E (UNIX) Error resetting last access date
Reason: There was an operating system error in resetting the last access date for a file. This is expected for /etc/mnttab (Solaris).
Action: See additional messages.

PC5206E (UNIX) Unable to get memory for w_getmntent
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5207E (UNIX) Filesystem mount entry not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5208E (UNIX) Error occurred getting mount table
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5209I (UNIX) Resolved to system path:

PC5210E (UNIX) Error creating a device file
Reason: There was an operating system error using mknod to create a BLK or CHR special file.
Action: See additional messages.

PC5211E (UNIX) Error creating a fifo
Reason: There was an operating system error using mkfifo to create a fifo.
Action: See additional messages.

Host reporting errors

PC5300E (Host Rpt) Error allocating memory
Action: Free memory.

PC5301E (Host Rpt) Error opening file
Reason: There was an error opening the specified host reporting parameter file.
Action: See additional messages.

PC5302E (Host Rpt) Error reading parameter
Action: See additional messages.

PC5303E (Host Rpt) Error opening file
Reason: There was an error opening the specified host reporting parameter file for write.
Action: See additional messages.

PC5304E (Host Rpt) Error writing parameter
Action: See additional messages.

PC5305E (Host Rpt) User canceled host report

PC5306E (Host Rpt) Error occurred during a start conv
Action: See additional messages.

PC5307E (Host Rpt) Error occurred during send of start

PC5308E (Host Rpt) Error occurred during send of req

PC5309E (Host Rpt) Error getting result count
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5310E (Host Rpt) Error getting result string
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5311E (Host Rpt) Error occurred during send of selection

PC5312E (Host Rpt) Error occurred during receive

PC5313E (Host Rpt) Unexpected conversation state
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5314E (Host Rpt) Error occurred during a confirmed

PC5315E (Host Rpt) Error opening report file
Action: See additional messages.

PC5316E (Host Rpt) Error writing to report file
Action: See additional messages.

PC5317E (Host Rpt) Error occurred during end conversation

PC5318W (Host Rpt) No information matched criteria
Action: Respecify.

PC5319E (Host Rpt) Error allocating memory
Action: Free memory.

PC5320E (Host Rpt) Error allocating memory
Action: Free memory.

PC5321I (Host Rpt) Report generation succeeded

PC5322E (Host Rpt) Report generation failed

Personalization errors.

PC5400E (Per) Personaliziation file not found
Reason: For UPSTREAM, the personalization file is US.SER and must be found either in the Work Path or in the UPSTREAM directory; in USCFG, the specified file was not found.
Action: You may be able to copy USSER to US.SER.

PC5401E (Per) Error reading the personalization file
Action: See additional messages.

PC5402E (Per.) Personalization illegally modified
Action: Reload UPSTREAM from the original diskettes.

PC5403E (Per.) Error in access
Action: Reload UPSTREAM from the original diskettes.

PC5404E (Per.) Error in access
Action: Reload UPSTREAM from the original diskettes.

PC5405E (Per.) Error in access
Action: Reload UPSTREAM from the original diskettes.

PC5406E (Per.) Error in access
Action: Reload UPSTREAM from the original diskettes.

PC5407E (Per) Error writing to the personalization file
Action: See additional messages.

PC5408E (Per) Error opening ZAP file
Action: See additional messages.

PC5409E (Per) Error reading ZAP file
Action: See additional messages.

PC5410E (Per) Error opening personalization file
Reason: The personalization file could not be opened. For UPSTREAM this is fatal - for USCFG, specify a different file.
Action: See additional messages.

PC5411E (Per.) Error reading personalization file
Action: Reload UPSTREAM from original media.

PC5412E (Per.) Error reading personalization file
Action: Reload UPSTREAM from original media.

PC5413E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5414E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5415E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5416E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5417E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5418E (Per) Corrupted personalization file
Action: Reload UPSTREAM from original media.

PC5419E (Per.) Insufficient memory
Action: Close applications or free memory.

PC5420E (Per.) Insufficient memory
Action: Close applications or free memory.

PC5421E (Per) Error writing to the personalization file
Action: See additional messages.

PC5422E (Per) Error writing to the personalization file
Action: See additional messages.

PC5423E (Per) Missing systems record
Action: Contact FDR/UPSTREAM Tech Support.

PC5424E (Per) Missing user record
Action: Contact FDR/UPSTREAM Tech Support.

PC5425E (Per) Error writing to the personalization file
Action: See additional messages.

PC5426E (Per) Error reading personalization file
Action: Contact FDR/UPSTREAM Tech Support.

PC5427E (Per) Error reading personalization file
Action: Contact FDR/UPSTREAM Tech Support.

PC5450E (Per.) Invalid personalization
Action: Contact FDR/UPSTREAM Tech Support.

PC5451E (Per.) Backups disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5452E (Per.) Restores disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5453E (Per.) As of...Restores disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5454E (Per.) Performance tests disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5455E (Per.) Remote requests disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5456E (Per.) Profile management disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5457E (Per.) Profile configuration disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5458E (Per.) Host status disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5459E (Per.) Host reporting disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5460E (Per.) ULTra disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5461E (Per.) Novell Profiles disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5463E (Per.) Bindery/NDS Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5464E (Per.) Migration Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5465E (Per.) Deletion Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5466E (Per.) Non-merge backups Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5467E (Per.) Merge backups Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5468E (Per.) TCP/IP Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5469E (Per.) SNA Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5470E (Per.) Sequential disk backups Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5471E (Per.) Sequential tape backups Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5472E (Per.) Sequential disk restores Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5473E (Per.) Sequential tape restores Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5474E (Per.) Backups Disallowed at this time
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5475E (Per.) Restores Disallowed at this time
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5476E (Per) Password failed
Reason: The user entered an incorrect password and/or chose not to run UPSTREAM at this time.

PC5477E (Per.) The specification is not allowed
Reason: The file specification (which follows) is not allowed for your copy of UPSTREAM.
Action: Contact your FDR/UPSTREAM administrator.

PC5478E (Per.) Attended operations Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5479E (Per.) Unattended operations Disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5480E (Per.) Sequential backups disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5481E (Per.) Non-sequential backups disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5482E (Per.) File transfers disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5483E (Per.) Host jobs disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5484E (Per.) FDRSOS functions disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5485E (Per.) Destinations disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5486E (Per.) Physical disk access disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5487E (Per.) User name override disallowed
Reason: Your copy of UPSTREAM has specifically disallowed this function.
Action: Contact your FDR/UPSTREAM administrator.

PC5488E (Per.) Restore file fail rename disallowed
Reason: You must enable this function using personalization to use it.
Action: Contact your FDR/UPSTREAM administrator.

Target name errors

PC5501E Error starting conversation
Reason: There was an error starting a conversation to inform the host of your target name.

Action: See communications return codes.

PC5502E Error allocating memory.
Reason: There was an error allocating memory to inform the host of your target name.
Action: Free memory or disk.

PC5503E Error sending target name info.
Reason: There was an error sending the target name information to the host.
Action: See communications return codes.

PC5504E Error in confirm of target name.
Reason: There was an error confirming the transmission of the target name information to the host.
Action: See communications return codes.

PC5505E Error ending conversion of target name.
Reason: There was an error ending the conversation of the transmission of the target name to the host.
Action: See communications return codes.

PC5506I Registered the following name to the host:

PC5507E Error sending target name start conversation
Reason: There was a communications error sending the start conversation record to the host.
Action: See communications return codes.

PC5508E Error receiving workstation information
Reason: There was a communications error receiving the requested workstation information from the host.
Action: See communications return codes.

PC5509D Automatic update
Reason: The local machine received an automatic update indication from the host. When terminating or idle, the automatic update will proceed.

PC5510D Running Automatic Update
Reason: The following UPSTREAM control file (.dat) is being executed (usually a restore) as part of the automatic update process. If you press the CANCEL button, the auto-update will be skipped.

PC5511D Running Automatic Update
Reason: The following UPSTREAM job (batch file or script) is being executed (usually a restore) as part of the automatic update process. If you press the CANCEL button, the auto-update process will be skipped.

PC5512D ULTra automatic update
Reason: The ULTra version is not at the level of the master version. The automatic update will begin.

PC5513D Running ULTra Automatic Update
Reason: The following UPSTREAM control file (.dat) is being executed (usually a restore) as part of the automatic update process. If you press the CANCEL button, the auto-update process will be skipped.

PC5514D Running ULTra Automatic Update
Reason: The following UPSTREAM job (batch file or script) is being executed (usually a restore) as part of the automatic update process.

PC5515E Auto-update parameter file error
Action: See additional messages.

PC5516E Error saving parameters
Reason: When attempting to automatically update an ULTra workstation, there was an error saving the existing parameters.
Action: See additional messages.

PC5517E ULTra auto-update parameter file error
Action: See additional messages.

PC5518E Error restoring parameters
Reason: When attempting to restore parameters after an ULTra automatic update there was an error.
Action: See additional messages.

PC5519E Error saving parameters
Reason: When attempting to automatically update, there was an error saving the existing parameters.
Action: See additional messages.

PC5520E Error restoring parameters
Reason: When attempting to restore parameters after an automatic update.
Action: See additional messages.

PC5521D User requested skip of auto-update

PC5522E Occurred during registration

PC5523E Occurred during registration

UNIX System Restore errors.

PC5575E You must select a version to restore. Inquiry/Restore errors

PC5600W Error deleting file inquiry file
Reason: There was a file system error deleting the file used to store inquired files information.
Action: See additional messages.

PC5601E Error opening inquiry file
Action: See additional messages.

PC5602E Error reading inquiry file
Action: See additional messages.

PC5603E Unexpected EOF in inquiry file
Action: Contact FDR/UPSTREAM Tech Support.

PC5604E Error deleting inquiry file
Action: See additional messages.

PC5605E Error writing inquiry file
Action: See additional messages.

PC5606E UNIX file system
Reason: You can not perform an inquiry of a UNIX backup from a PC.
Action: Inquire from a UNIX system.

PC5607E PC file system
Reason: You can not perform an inquiry of a PC backup from a UNIX system.
Action: Inquire from a PC.

PC5608D UNIX file skipped
Action: You must delete these from a UNIX system.

PC5609D PC file skipped
Action: You must delete these from a PC system.

PC5610I File inquiry succeeded

PC5611E File inquiry failed

Security validation errors.

PC5650E Error allocating required memory
Reason: When performing security validation, there was a memory shortage.
Action: Free memory or disk and retry.

PC5651E Error starting conversation
Reason: When performing security validation, there was an error starting the conversation with the host.
Action: See the comm. return codes.

PC5652E Error sending request
Reason: When performing security validation, there was an error sending the security information.
Action: See the comm. return codes.

PC5653E Security information confirm error
Reason: If there is not a comm error, most likely there was an error with your security information.
Action: Reenter your security information.

PC5654E Error ending conversation
Reason: There was an error ending the security validation conversation.
Action: See the comm. return codes.

PC5655E Can't read STDOUT or STDERR output from pipe
Action: See Windows NT message above.

PC5657W Job output follows:

PC5658E Can't create an anonymous pipe for a program
Action: See Windows NT message above.

PC5659E Can't duplicate a pipe handle for a program
Action: See Windows NT message above.

PC5660E Remote password invalid
Reason: The password entered on the remote system is not the password personalized on the PC.
Action: Resubmit with the correct password.

PC5661E Can't set STDOUT
Action: See Windows NT message above.

PC5662E Can't set STDERR
Action: See Windows NT message above.

PC5663E Can't reset STDOUT
Action: See Windows NT message above.

PC5664E Can't reset STDERR
Action: See Windows NT message above.

PC5665E (Win32 Sec) Error logging in
Reason: There was a Windows NT error logging in a given local user.
Action: See Windows NT message above.

PC5666E (Win32 Sec.) Error loading security library
Reason: There was a Windows NT error loading a required security library.
Action: See Windows NT message above.

PC5667E (Win32 Sec.) Error loading security function
Reason: There was a Windows NT error loading a required security function.
Action: See Windows NT message above.

PC5668I (Sec.) Logged on as the following user:

PC5669E (Win32 Sec) Error impersonating user
Action: See previous messages.

PC5670E (Win32 Sec.) Privilege lookup error
Reason: There was an error looking up the following privilege's value.
Action: See Windows NT message.

PC5671W (Win32 Sec.) Required privilege not enabled
Reason: A required privilege can not be enabled. The UPSTREAM function may fail for security reasons later.
Action: See Windows NT message.

PC5672E (Unix Sec.) User not defined
Reason: The user that you specified is not defined in your Unix system.
Action: Specify a valid user.

PC5673E (Unix Sec.) Must be root for remote logins
Reason: UPSTREAM must be running as the root user to allow remote logins.
Action: Restart UPSTREAM as root.

PC5674E (Unix Sec.) Invalid password
Action: Respecify

PC5675E (Unix Sec.) Error during logoff
Reason: There was an error switching back to UPSTREAM security during the logoff.

PC5676E (Unix Sec.) Error during logon
Reason: There was an error switching back to the new login security during login.

PC5677E (Unix Sec.) Error setting effective UID

PC5678E (Unix Sec.) Error setting effective GID

PC5679E (Unix Sec.) User not defined
Reason: The user that you specified is not defined in your Unix system.
Action: Specify a valid user.

PC5680E (Unix Sec.) User not defined
Reason: The user that you specified is not defined in your Unix system.
Action: Specify a valid user.

PC5681E (Sec.) Error during file existance check

PC5682E (Sec.) Error during directory search

PC5683E (Unix Sec.) User not defined
Reason: The user that you specified is not defined in your Unix system.
Action: Specify a valid user.

PC5684E (Unix Sec.) Invalid password
Action: Respecify

PC5685E (Sec.) Insufficient memory
Reason: There was insufficient memory to allocate a new internal security list member.
Action: Close applications or free memory.

PC5686E (Win32 Sec) Error duplicating token
Reason: There was an operating system error attempting to duplicate an existing login token.
Action: See additional messages.

PC5687E (Win32 Sec.) Thread not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5688I (Sec.) Reverting to the UPSTREAM user: %s

PC5689E (NT Sec) Security check failed

PC5690I (Sec.) Security check successful. User: %s

PC5691E (UNIX Sec.) Security check; UPSTREAM not root

PC5692E (NT Sec) Thread not found
Action: Contact FDR/UPSTREAM Tech Support.

PC5693E (NT Sec.) Error restoring security
Reason: The active function may fail as a result.
Action: Contact FDR/UPSTREAM Tech Support.

PC5694E (NLM Sec.) Already logged on.
Reason: A Novell Profile can only be used for one operation at a time.
Action: Resubmit your request when the current one has completed.

PC5695E (NT Sec.) Error running a job.

PC5696E (UNIX) You must be root to specify HOLDUSERDIRS
Reason: Only the root user is able to open and hold user directories.
Action: Logon as root or do not specify this option.

PC5697I (UNIX) Holding user directory %s

PC5698E (UNIX) Insufficient memory
Reason: There was insufficient memory to allocate an internal structure to hold user directory entries.
Action: Close applications or increase swap space.

PC5699W (UNIX) Error opening directory
Reason: During the hold user directory process, there was an error opening a specific user directory. The process will continue.
Action: See additional messages for the operating system error number and user directory.

SMS errors.

PC5701E (SMS) Error getting default connection ID

Reason: There was a Novell error getting the default connection ID.
Action: Look up the return code in the Novell messages section of the UPSTREAM manual.

PC5702E (SMS) Error scanning object
Reason: There was a Novell error scanning for the SMS Server.
Action: Look up the return code in the Novell messages section of the UPSTREAM manual.

PC5703E (SMS) Badly formatted IP address
Reason: The IP address of the USSMS PC was incorrectly formatted. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5704E (SMS) SPX address location error
Reason: There was an error extracting from the bindery the SPX address of the given workstation.
Action: Look up the return code in the Novell messages section of the UPSTREAM manual.

PC5705E (SMS) Can't allocate comm buffer area
Reason: Memory shortage.
Action: Free memory or disk and retry.

PC5706E (SMS) TLI error in open
Reason: There was a TLI error in a t_open.
Action: See additional messages.

PC5707E (SMS) TLI error in bind
Reason: There was a TLI error in a t_bind.
Action: See additional messages.

PC5708E (SMS) TLI error in connect
Reason: There was a TLI error in a t_connect.
Action: See additional messages.

PC5709E (SMS) Exceeded buffer for field
Reason: While adding a field to a transmission buffer, we attempted to go past the end of the buffer. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5710E (SMS) TLI error in receive
Reason: There was a TLI error in a t_rcv of data length.
Action: See additional messages.

PC5711E (SMS) TLI error in receive
Reason: There was a TLI error in a t_rcv.
Action: See additional messages.

PC5712E (SMS) Lost connection to server
Reason: There was a TLI error in a t_snd.
Action: See additional messages.

PC5713E (SMS) Received buffer too small
Reason: The buffer received from the server was too small. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5714E (SMS) Unexpected received data type
Reason: Your workstation received an unknown data type from the server. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5715E (SMS) Unexpected end of data
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5716E (SMS) Field length exceeds received buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5717E (SMS) Received length exceeds field
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5718E (SMS) Received file server message:

PC5719E (SMS) Insufficient memory
Reason: Error allocating the buffer required for server transport.
Action: Specify a USSMSXMITSIZE environment variable or free memory.

PC5720E (SMS) Server not found
Reason: The requested server was not found in the bindery.
Action: Verify the USSMS.NLM program is running and configured for the specified connection type.

PC5721E (SMS) Error in disconnect
Reason: There was a TLI error in t_sndrel.
Action: See additional messages.

PC5722E (SMS) Insufficient memory
Reason: Error allocating the buffer required to begin server transport.
Action: Free memory or disk.

PC5723E (SMS) Not connected
Reason: The SMS function you're attempting doesn't work unless you have connected to a server first.
Action: Select a server and connect.

PC5724E (SMS) Invalid field length
Action: Contact FDR/UPSTREAM Tech Support.

PC5725E (SMS) Error checking for received data
Reason: When attempting to transmit data, there was a TLI error checking to see if there was any data to receive.
Action: See additional messages.

PC5726E (SMS) Unexpected receive type
Reason: The NLM send unexpected data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5727E (SMS) Unexpected t_look data state
Action: Retry the operation.

PC5728E (SMS) Error getting connection for server
Reason: There was an error getting the connection handle for the specified server.
Action: See Novell return code

PC5729E (SMS) Error getting connection reference
Reason: There was an error getting the connection reference (default).
Action: See Novell return code

PC5730E (SMS) Receive into buffer too small
Reason: The specified buffer is too small. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5731E (SMS) Receive into buffer too small
Reason: The specified buffer is too small. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5732E (SMS-Windows) Error starting TCP/IP
Reason: There was an error starting TCP/IP for Windows.
Action: See additional messages.

PC5733E (SMS-Windows) Error in socket call
Action: See additional messages.

PC5734E (SMS-Windows) Error in connect call
Action: See additional messages.

PC5735E (SMS-Windows) Error in recv call
Action: See additional messages.

PC5736E (SMS-Windows) Error in ioctlsocket call
Action: See additional messages.

PC5737E (SMS-Windows) Error in send call
Action: See additional messages.

PC5738E (SMS-Windows) Error in closesocket call
Action: See additional messages.

Auto-recall specific errors

PC5750W (Auto Recall) Can't open server conn
Reason: Unable to open connection to file server.
Action: See Novell return code

PC5751W (Auto Recall) Can't get file name
Reason: For the requested name space, the file name could not be obtained.
Action: See Novell return code

PC5752W (Auto Recall) The file name received is bad
Reason: The received file name does not have a colon separator used to denote the volume name.
Action: Contact FDR/UPSTREAM Tech Support.

PC5753W (Auto Recall) Unable to start UPSTREAM
Reason: UPSTREAM could not be started to perform the auto-recall.
Action: See return code.

PC5754W (Auto Recall) UPSTREAM restore failed
Reason: The UPSTREAM restore failed.
Action: See UPSTREAM log.

PC5755D (Auto Recall) Received recall request

PC5756D (Auto Recall) Recall successful

PC5757I (Auto Recall) Enter NWRecall

PC5758I (Auto Recall) Exit NWRecall

PC5759E (Auto Recall) Error opening input parameter file
Reason: The input parameter file could not be opened.
Action: See additional messages.

PC5760E (Auto Recall) Error opening output parameter file
Reason: The output parameter file could not be opened.
Action: See additional messages.

PC5761E (Auto Recall) Error reading input parameter file
Action: See additional messages.

PC5762E (Auto Recall) Error writing output parameter file
Action: See additional messages.

PC5763E (Auto Recall) Error reading input parameter file
Reason: Error occurred while skipping to the file spec info.
Action: See additional messages.

PC5764E (Auto Recall) Error writing output parameter file
Reason: Error occurred while writing file spec info.
Action: See additional messages.

PC5765E (Auto Recall) Error writing output parameter file
Reason: Error occurred while writing file spec data.
Action: See additional messages.

PC5766I (Auto Recall) Deleted expired file:

PC5767W (Auto Recall) Error deleting expired file

PC5768W (Auto Recall) Lost connection to server; retrying

PC5769W (Auto Recall) Recovered connection to server

PC5770I (Auto Recall) Delete expired file %s (expired %02d/%02d/%02d)

USW2KAgt errors

PC5801E (USW2KAgt) Can't load a DLL
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A DLL could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC5802E (USW2KAgt) Can't load a DLL function
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A DLL function could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC5803E (USW2KAgt) Can't open the Shares subkey
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The ...\CurrentControlSet\Services\lanmanserver\Shares key could not be opened.
Action: Contact FDR/UPSTREAM Tech Support.

PC5804E (USW2KAgt) Can't read a Shares value
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A ...\CurrentControlSet\Services\lanmanserver\Shares value could not be read.
Action: Contact FDR/UPSTREAM Tech Support.

PC5805E (USW2KAgt) Can't parse a Share value
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A ...\CurrentControlSet\Services\lanmanserver\Shares value could not be parsed.
Action: Contact FDR/UPSTREAM Tech Support.

PC5806E (USW2KAgt) Can't initialize the FRS API
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The FRS (File Replication System) API could not be initialized.
Action: Contact FDR/UPSTREAM Tech Support.

PC5807E (USW2KAgt) Can't get replication sets
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The FRS (File Replication System) API replication sets could not be read.
Action: Contact FDR/UPSTREAM Tech Support.

PC5808E (USW2KAgt) Can't enumerate replication sets
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The FRS (File Replication System) API replication sets could not be enumerated.
Action: Contact FDR/UPSTREAM Tech Support.

PC5809E (USW2KAgt) Can't get a replication set directory
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A FRS (File Replication System) API replication set directory could not be read.
Action: Contact FDR/UPSTREAM Tech Support.

PC5810E (USW2KAgt) Can't get a replication set SYSVOL status
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A FRS (File Replication System) API replication set SYSVOL status could not be read.
Action: Contact FDR/UPSTREAM Tech Support.

PC5811E (USW2KAgt) Expecting ACK record
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. USW2KAgt received a record from FDR/UPSTREAM which was not an ACK record when one was expected to end the restore of a replicated directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC5812E (USW2KAgt) Can't end replication directory restore
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A FRS (File Replication System) API replication directory restore could not be ended.
Action: Contact FDR/UPSTREAM Tech Support.

PC5813E (USW2KAgt) Can't terminate the FRS API
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The FRS (File Replication System) API could not be terminated.
Action: Contact FDR/UPSTREAM Tech Support.

PC5814E (USW2KAgt) Can't start replication directory restore
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. A FRS (File Replication System) API replication directory restore could not be started.
Action: Contact FDR/UPSTREAM Tech Support.

PC5815E (USW2KAgt) Replication Directory not found
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The RestoreReplicationDirectory record received by USW2KAgt from FDR/UPSTREAM specified the name of a replication directory which does not exist.
Action: Contact FDR/UPSTREAM Tech Support.

PC5816E (USW2KAgt) Can't backup COM+ registration database
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The COM+ registration database could not be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC5817E (USW2KAgt) Can't restore COM+ registration database
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The COM+ registration database could not be restored.
Action: Contact FDR/UPSTREAM Tech Support.

PC5818E (USW2KAgt) Can't get System Protected Files
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The list of system protected files could not be obtained.
Action: Contact FDR/UPSTREAM Tech Support.

PC5819E (USW2KAgt) Can't get System State Files
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The list of system state files could not be obtained.
Action: Contact FDR/UPSTREAM Tech Support.

PC5820E (USW2KAgt) Can't allocate System State Files memory
Reason: An error occurred while attempting to allocation memory to build the list of system state files.
Action: Close applications or free memory.

PC5821E (USW2KAgt) Can't create the SystemStateFiles key
Reason: An error occurred while creating the SystemStateFiles key in the registry.
Action: Contact FDR/UPSTREAM Tech Support.

PC5822E (USW2KAgt) Can't write SystemStateFiles FileNames value
Reason: An error occurred while writing the FileNames value of the SystemStateFiles key in the registry.
Action: Contact FDR/UPSTREAM Tech Support.

PC5823E (USW2KAgt) Can't open a file
Reason: An error occurred while attempting to open a regular file system file for processing by one of the SysState PlugIns.
Action: Contact FDR/UPSTREAM Tech Support.

PC5824E (USW2KAgt) Can't read a SysState virtual file
Reason: An error occurred while attempting to read a regular file system file that is being processed by on of the SysState PlugIns.
Action: Contact FDR/UPSTREAM Tech Support.

PC5825E (USW2KAgt) Can't write a SysState virtual file
Reason: An error occurred while attempting to write a regular file system file that is being processed by on of the SysState PlugIns.
Action: Contact FDR/UPSTREAM Tech Support.

PC5826E (USW2KAgt) Can't get a SysState virtual file size
Reason: An error occurred while attempting to compute the size of one of the PlugIn virtual files which is part of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5827E (USW2KAgt) Can't find SysState virtual file PlugIn
Reason: An error occurred while attempting to open one of the PlugIn virtual files which is part of the system state. The PlugIn for the virtual file could not be determined.
Action: Contact FDR/UPSTREAM Tech Support.

PC5828E (USW2KAgt) Can't open a SysState virtual file
Reason: An error occurred while attempting to open one of the PlugIn virtual files which is part of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5829E (USW2KAgt) Can't read a SysState virtual file
Reason: An error occurred while attempting to read one of the PlugIn virtual files which is part of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5830E (USW2KAgt) Can't write a SysState virtual file
Reason: An error occurred while attempting to write one of the PlugIn virtual files which is part of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5831E (USW2KAgt) Unknown file error
Reason: An unknown error occurred while processing one of the PlugIn virtual files which is part of the system state.
Action: See additional messages. Contact FDR/UPSTREAM Tech Support.

PC5832E (USW2KAgt) Received an invalid record
Reason: An invalid record was received by the client while processing a restore of one of the PlugIn virtual files which is part of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5833E (USW2KAgt) Can't get SysState virtual file size
Reason: An error occurred while attempting to calculate the size of one of the SysState PlugIn virtual files which is part of the system state. The file name listed on the (5833,1) line above will not be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC5834E (USW2KAgt) Restore discontinued by PlugIn
Reason: While processing the restore of the PlugIn virtual files which are part of the system state, one or more of the PlugIns discontinued the restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC5835E (USW2KAgt) SysState PlugIn not loaded
Reason: One or more of the PlugIns required to backup or restore one of the components of the system state were not loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC5836E (USW2KAgt) Expecting a Boolean record
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. USW2KAgt received a record from FDR/UPSTREAM which was not a Boolean record when one was expected to end the backup or restore of the system state.
Action: Contact FDR/UPSTREAM Tech Support.

PC5837E (USW2KAgt) Can't shutdown the computer
Reason: An error occurred while attempting to shutdown the computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC5838E (USW2KAgt) Can't enable the Shutdown privilege
Reason: An error occurred while attempting to enable the shutdown privilege in preparation for shutting down the computer.
Action: Make sure the account under which US.exe is run has the Shutdown the System privilege.

PC5839E (USW2KAgt) Can't write SystemStateFiles MaximumFileNameLength value
Reason: An error occurred while writing the MaximumFileNameLength value of the SystemStateFiles key in the registry.
Action: Contact FDR/UPSTREAM Tech Support.

PC5840E (USW2KAgt) Can't write SystemStateFiles NumberOfFileNames value
Reason: An error occurred while writing the NumberOfFileNames value of the SystemStateFiles key in the registry.
Action: Contact FDR/UPSTREAM Tech Support.

PC5841E (USW2KAgt) Cant acquire System State access
Reason: An error occurred while attempting to access the system state. This is most likely caused by another system state backup or restore which is in progress. The system state can be accessed by only one backup or restore at a time.
Action: Contact FDR/UPSTREAM Tech Support.

PC5842E (USW2KAgt) Can't schedule COM+ registration database restore
Reason: An error occurred in the FDR/UPSTREAM Windows 2000 agent service on the server name listed above. The COM+ registration database restore operation could not be run in ASR Recovery mode and the operation could not be scheduled to be run at the next reboot.
Action: Contact FDR/UPSTREAM Tech Support.

PC5843E (USW2KAgt) The operating system is not Windows XP
Reason: A request was made to the FDR/UPSTREAM Windows 2000 agent service to create the ASR files, but the operating system is not Windows XP or above.
Action: Contact FDR/UPSTREAM Tech Support.

PC5844E (USW2KAgt) Can't get critical volumes
Reason: An error occurred while preparing to create the ASR state file. The list of critical volumes could not be determined. Refer to the event log for more information.
Action: Contact FDR/UPSTREAM Tech Support.

PC5845E (USW2KAgt) Can't create ASR state file
Reason: An error occurred while attempting to create the ASR state file.
Action: Contact FDR/UPSTREAM Tech Support.

PC5846E (USW2KAgt) Can't add sif entry
Reason: An error occurred while attempting to add a command to the ASR state file.
Action: Contact FDR/UPSTREAM Tech Support.

PC5847E (USW2KAgt) Can't build USASR.key file
Reason: An error occurred while building the USASR.key file.
Action: Contact FDR/UPSTREAM Tech Support.

PC5848E (USW2KAgt) Can't get a volume name
Reason: An error occurred while attempting to get the volume name for a drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC5849E (USW2KAgt) Can't backup TLS database
Reason: An error occured while attempting to backup the Terminal Service Licensing Server (TLS) database.
Action: Contact FDR/UPSTREAM Tech Support.

PC5850E (USW2KAgt) Can't restore TLS database
Reason: An error occured while attempting to restore the Terminal Service Licensing Server (TLS) database.
Action: Contact FDR/UPSTREAM Tech Support.

PC5851E (USW2KAgt) Can't backup IIS metabase
Reason: An error occured while attempting to backup the Internat Information Service (IIS) metabase.
Action: Contact FDR/UPSTREAM Tech Support.

PC5852E (USW2KAgt) Can't restore IIS metabase
Reason: An error occured while attempting to restore the Internat Information Service (IIS) metabase.
Action: Contact FDR/UPSTREAM Tech Support.

PC5853E (USW2KAgt) Can't backup WMI repository
Reason: An error occured while attempting to backup the Windows Management Instrumentation (WMI) repository.
Action: Contact FDR/UPSTREAM Tech Support.

PC5854E (USW2KAgt) Can't restore WMI repository
Reason: An error occured while attempting to restore the Windows Management Instrumentation (WMI) repository.
Action: Contact FDR/UPSTREAM Tech Support.

PC5855E (USW2KAgt) Can't copy ASR boot files
Reason: An error occured while attempting determine the boot directory which contains the ASR boot files.
Action: Contact FDR/UPSTREAM Tech Support.

PC5856E (USW2KAgt) Can't copy ASR boot file
Reason: An error occured while copying or creating an ASR boot file.
Action: Contact FDR/UPSTREAM Tech Support.

Local backup errors.

PC5901E (Lcl Bkp) Error deleting backup file
Reason: There was a file system error deleting the following backup file.
Action: See additional messages.

PC5902E (Lcl Bkp) Error allocating memory
Reason: There was a memory shortage allocating the internal local backup memory area.
Action: Free memory or disk.

PC5903E (Lcl Bkp) Error opening local backup file
Action: See additional messages.

PC5904E (Lcl Bkp) Error writing backup description
Action: See additional messages.

PC5905E (Lcl Bkp) Write header out of order
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5906E (Lcl Bkp) Read record out of order
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5907E (Lcl Bkp) Record read exceeds buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5908E (Lcl Bkp) Error reading header
Action: See additional messages.

PC5909E (Lcl Bkp) Write record out of order
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5910W (Lcl Bkp) Error writing a local backup record
Reason: UPSTREAM will save the local backup "as is".

PC5911E (Lcl Bkp) Find file out of order
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5912E (Lcl Bkp) Error reading record
Reason: There was an error doing a sequential search for a given record. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5913E (Lcl Bkp) Unexpected end of file
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5914E (Lcl Bkp) Error reading record
Reason: There was an error doing a direct search for a given record. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5915E (Lcl Bkp) Expected file not found
Reason: The following file was not found at the given location. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5916E (Lcl Bkp) Corrupted data
Reason: A record read was not a file info record (as required). This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5917E (Lcl Bkp) Exceeded record
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5918E (Lcl Bkp) Local backup isn't restartable
Reason: A consistancy error was detected in the local backup file. This file will be deleted.

PC5919E (Lcl Bkp) Restore out of order
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC5920E (Lcl Bkp) Error updating the file header
Action: See additional messages.

PC5921E (Lcl Bkp) Error reading counter file
Reason: There was an error reading the local backup counter file (profile name.000).
Action: See additional messages.

PC5922E (Lcl Bkp) Error opening local backup source
Reason: During a local backup copy, there was an error opening the source file.

Action: See additional messages.

PC5923E (Lcl Bkp) Error opening local backup dest
Reason: During a local backup copy, there was an error opening the destination file.
Action: See additional messages.

PC5924E (Lcl Bkp) Error reading local backup source
Reason: During a local backup copy, there was an error reading the source file.
Action: See additional messages.

PC5925E (Lcl Bkp) Error writing local backup dest
Reason: During a local backup copy, there was an error writing the destination file.
Action: See additional messages.

PC5926E (Lcl Bkp) Error deleting the local backup file
Reason: There was an error deleting the local backup file when the local backup directory was changed.
Action: See additional messages.

File transfer errors.

PC6001E (File Xfer) Wildcards not allowed
Reason: You can not specify more than one file in a file transfer request.
Action: Respecify.

PC6002E (File Xfer) Record packing required
Reason: You must enable record packing to use file transfer.
Action: Set the parameter PACKRECSIZE to a non- zero value.

Host job submission errors.

PC6100E Error allocating memory
Reason: There was an error allocating memory for host job submission.
Action: Free memory or restart program.

PC6101E Error during start conversation error
Reason: There was an error during host job submission
Action: See additional messages.

PC6102E Error sending start conversation
Action: See additional messages.

PC6103E Error sending non-repeated description
Action: See additional messages.

PC6104E Error sending repeated description
Action: See additional messages.

PC6105E Error receiving job submission info
Action: See additional messages.

PC6106E Error in confirmed of host job
Action: See additional messages.

PC6107E Error ending conversation
Action: See additional messages.

PC6108I Submitting existing host job

PC6109D Host job submitted

PC6110I Host job submission failed

UPSTREAM/SOS integration errors.

PC6200D Error creating SOS file
Reason: Could not create the SOS timestamp file. SOS restores will have to be performed manually.
Action: See additional messages.

PC6201D Could not find the SOS file
Reason: Expected the SOS file and it was not found.
Action: Verify the SOS Timestamp Path. If you removed the file, you will have to restore it.

PC6202E Expected SOS timestamp file spec
Reason: There were no SOS capable file specifications.
Action: Respecify the restore.

UPSTREAM/Auto-Recall notification errors.

PC6300E Expected connection not found
Reason: When searching through the list of connected servers, your configured server was not found. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6301E Connection number not found
Reason: When looking at the connected server an unexpected error was returned. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6302E No longer connected
Action: Restart the USRECALL NLM and USNOTIFY.

PC6303I Enter USNotify

PC6304I Exit USNotify

FDRSOS - Raw disk errors.

PC6400E (Raw Disk) Bad disk name Use PC/UNIX name
Reason: You specified a raw disk access type not valid for your operating system.
Action: Specify the name as displayed on the PC/UNIX UPSTREAM disk display screens. For PCs: 1,{disk number}, or 2,{adapter},{targ},{LUN} (for DOS ASPI); for UNIX it's 4,{disk name}

PC6401E (Raw Disk) Read of 0 sectors not allowed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6402E (Raw Disk) Attempt to read past end of disk
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6403E (Raw Disk) Write of 0 sectors not allowed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6404E (Raw Disk) Attempt to write past end of disk
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6405E (Raw Disk) Error allocating memory
Reason: Insufficient memory allocating partition table memory.
Action: Free memory.

PC6406E (Raw Disk) Error allocating memory
Reason: Insufficient memory allocating a partition table list entry.
Action: Free memory.

PC6407E (Raw Disk) DPMI error
Reason: There was a DPMI error simulating a real mode interrupt.
Action: Contact FDR/UPSTREAM Tech Support.

PC6408E (Raw Disk) Not a UNIX physical disk
Reason: The received physical disk is not in the form: or /.
Action: Respecify.

PC6409E (Raw Disk) Not PC physical disk
Reason: The received physical disk is not in the form: \ or :\
Action: Respecify.

PC6412E (Raw Disk) Async write pending
Reason: A write was requested with a pending async function still posted. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6413E (Raw Disk) Async read pending
Reason: A read was requested with a pending async function still posted. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6500E (Raw Disk-Dos) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC6501E (Raw Disk-Dos) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC6502E (Raw Disk-Dos) Disk not found
Reason: The specified disk was not found. This message may be reported for a physical disk backup/restore or a FDRSOS local backup/restore.
Action: Respecify the location with a valid disk or disable FDRSOS Local Backups.

PC6503E (Raw Disk-Dos) DOS error
Reason: There was a DOS error when requesting the disk statistics.
Action: Contact FDR/UPSTREAM Tech Support.

PC6504E (Raw Disk-Dos) Disk position error
Reason: There was an error in the generated values for the disk read/write. Often caused by invalid BIOS or other system values.
Action: Contact FDR/UPSTREAM Tech Support.

PC6505E (Raw Disk-Dos) DOS error in read/write
Action: Contact FDR/UPSTREAM Tech Support.

PC6506E (Raw Disk-Dos) Incomplete read
Reason: The expected number of sectors were not read.
Action: Contact FDR/UPSTREAM Tech Support.

PC6507E (Raw Disk-Dos) Insufficient memory
Reason: There was insufficient memory during an attempt to read existing data (VolSer).
Action: Free DOS memory

PC6600E (Raw Disk-ASPI) Error allocating memory
Reason: Insufficient memory allocating identification comparison string.
Action: Free memory.

PC6601E (Raw Disk-ASPI) Error opening ASPI driver
Reason: There was a DOS error opening the ASPI driver
Action: Contact FDR/UPSTREAM Tech Support.

PC6602E (Raw Disk-ASPI) Error getting ASPI entry point
Reason: There was a DOS error getting the ASPI entry point.
Action: Contact FDR/UPSTREAM Tech Support.

PC6603E (Raw Disk-ASPI) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC6604E (Raw Disk-ASPI) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC6605E (Raw Disk-ASPI) Invalid host adapter
Reason: Host adapter values range from 0..7.
Action: Respecify the location.

PC6606E (Raw Disk-ASPI) Invalid Target ID
Reason: SCSI target ID values range from 0..7.
Action: Respecify the location.

PC6607E (Raw Disk-ASPI) Invalid LUN
Reason: SCSI Logical Unit Number values range from 0..7.
Action: Respecify the location.

PC6608E (Raw Disk-ASPI) Error allocating memory
Reason: There was a memory shortage allocating required memory.
Action: Free memory.

PC6609E (Raw Disk-ASPI) Error during adapter inquiry
Reason: ASPI returned an error during a Host Adapter Inquiry command.
Action: Contact FDR/UPSTREAM Tech Support.

PC6610E (Raw Disk-ASPI) Device not installed
Reason: The specified SCSI device is not installed.
Action: Respecify or activate the device.

PC6611E (Raw Disk-ASPI) Timed-out
Reason: The command timed-out (exceeded the internal time limit).
Action: Verify that the device is still active.

PC6612E (Raw Disk-ASPI) Error allocating memory
Reason: There was a memory shortage allocating required memory.
Action: Free memory.

PC6613E (Raw Disk-ASPI) Command error
Reason: The following information describes an error executing a SCSI command.
Action: Contact FDR/UPSTREAM Tech Support.

PC6614E (Raw Disk-ASPI) Error allocating memory
Reason: There was a memory shortage allocating required memory.
Action: Free memory.

PC6615E (Raw Disk-ASPI) Drive info not returned
Reason: The disk drive infomation for the specified SCSI disk could not be obtained.
Action: Respecify or activate the device.

PC6616E (Raw Disk-ASPI) Error getting the device type
Reason: An error occurred while determining the type of a SCSI device.
Action: Contact FDR/UPSTREAM Tech Support.

PC6700E (Raw Disk-NT) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC6701E (Raw Disk-NT) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC6702E (Raw Disk-NT) Disk not found
Reason: This message may be reported for a physical disk backup/restore or a FDRSOS local backup/restore.
Action: Respecify the location with a valid disk or disable FDRSOS Local Backups.

PC6703E (Raw Disk-NT) OS error
Reason: There was an OS error when opening the disk.
Action: Contact FDR/UPSTREAM Tech Support.

PC6704E (Raw Disk-NT) Disk position error
Reason: There was an error in the generated values for the disk read/write. Often caused by invalid BIOS or other system values.
Action: Contact FDR/UPSTREAM Tech Support.

PC6705E (Raw Disk-NT) OS error in read/write
Action: Contact FDR/UPSTREAM Tech Support.

PC6706E (Raw Disk-NT) Incomplete read
Reason: The expected number of sectors were not read.
Action: Contact FDR/UPSTREAM Tech Support.

PC6707E (Raw Disk-NT) OS error
Reason: There was an OS error when getting disk statistics.
Action: Contact FDR/UPSTREAM Tech Support.

PC6708E (Raw Disk-NT) OS error
Reason: There was an OS error while setting the file access location.
Action: Contact FDR/UPSTREAM Tech Support.

PC6709E (Raw Disk-NT) OS error
Reason: There was an OS error while flushing written data to disk.
Action: Contact FDR/UPSTREAM Tech Support.

PC6710E (Raw Disk-NT) OS error
Reason: There was an OS error when creating the event structure for asynchronous operations.

Action: Contact FDR/UPSTREAM Tech Support. or disable async support by setting the USRAWNOOVERLAP environment variable to any value.

PC6711E (Raw Disk-NT) OS error
Reason: There was an OS error when resetting the event structure for asynchronous operations.
Action: Contact FDR/UPSTREAM Tech Support. or disable async support by setting the USRAWNOOVERLAP environment variable to any value.

PC6712E (Raw Disk-NT) OS error
Reason: There was an OS error when performing asynch I/O.
Action: Contact FDR/UPSTREAM Tech Support. or disable async support by setting the USRAWNOOVERLAP environment variable to any value.

PC6713E (Raw Disk-NT) OS error
Reason: There was an OS error when checking the status of a asynchronous operation.
Action: Contact FDR/UPSTREAM Tech Support. or disable async support by setting the USRAWNOOVERLAP environment variable to any value.

PC6714E (Raw Disk-NT) OS error
Reason: There was an OS error when checking the completion status of a asynchronous operation.
Action: Contact FDR/UPSTREAM Tech Support. or disable async support by setting the USRAWNOOVERLAP environment variable to any value.

PC6715E (Raw Disk-NT) Size mismatch
Reason: Expecting a given size, the I/O reported a differing size. It also occurred in an unexpected location.
Action: Contact FDR/UPSTREAM Tech Support.

PC6716E (Raw Disk-NT) Size mismatch
Reason: Expecting a given size, the I/O reported a differing size.
Action: Contact FDR/UPSTREAM Tech Support.

PC6800E (Raw Disk-OS2) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC6801E (Raw Disk-OS2) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC6802E (Raw Disk-OS2) Disk not found
Reason: This message may be reported for a physical disk backup/restore or a FDRSOS local backup/restore.
Action: Respecify the location with a valid disk or disable FDRSOS Local Backups.

PC6803E (Raw Disk-OS2) OS error
Reason: There was an OS error when opening the disk.
Action: Contact FDR/UPSTREAM Tech Support.

PC6805E (Raw Disk-OS2) OS error in read/write
Action: Contact FDR/UPSTREAM Tech Support.

PC6806E (Raw Disk-OS2) Incomplete read
Reason: The expected number of sectors were not read.
Action: Contact FDR/UPSTREAM Tech Support.

PC6807E (Raw Disk-OS2) OS error
Reason: There was an OS error when getting disk statistics.
Action: Contact FDR/UPSTREAM Tech Support.

PC6809E (Raw Disk-OS2) OS error
Reason: There was an OS error checking for raw disk support.
Action: Contact FDR/UPSTREAM Tech Support.

PC6810E (Raw Disk-OS2) Disk position error
Reason: There was an error in the generated values for the disk read/write. Often caused by invalid BIOS or other system values.
Action: Contact FDR/UPSTREAM Tech Support.

PC6811E (Raw Disk-OS2) Insufficient memory
Reason: There was an error in allocating memory for the track table.
Action: Free disk or close applications.

PC6850E (Raw Disk-NLM) Insufficient memory
Reason: There was an error in AllocateResourceTag
Action: Unload unnecessary NLMs.

PC6851E (Raw Disk-NLM) Registration error
Reason: There was an error in MM_Register_Application.
Action: See additional message.

PC6852D (Raw Disk-NLM) Reserve error
Reason: There was an error reserving the disk which is the necessary step to accessing it with raw disk facilities.
Action: See additional messages.

PC6853E (Raw Disk-NLM) Error getting disk stats
Reason: There was a media manager error in a MM_Return_Object_Generic_Info call.
Action: See additional messages.

PC6854E (Raw Disk-NLM) Error in I/O
Reason: There was a media manager error in a read write call.
Action: See additional messages.

PC6855E (Raw Disk-NLM) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC6856E (Raw Disk-NLM) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC6857E (Raw Disk-NLM) Media manager functions not loaded
Action: Load the media manager functions and restart UPSTREAM.

PC6858I (Raw Disk-NLM) Volume manager functions not loaded
Reason: This is only informational; you may not need the volume manager.
Action: Load the volume manager functions (VOLLIB) and restart UPSTREAM.

PC6859W (Raw Disk-NLM) Error getting NetWare version
Reason: Netware version 4 will be assumed - UPSTREAM may not be able to use raw disk facilities if NSS is installed.
Action: Contact FDR/UPSTREAM Tech Support.

PC6860E (Raw Disk-NLM) Error loading NetWare 5 MMAPI.
Reason: The module listed below was not found in the environment. NetWare 4 MMAPIs will be used. This is only a problem if you have NSS loaded; NetWare 4 MMAPIs will work fine otherwise.

PC6861I (Raw Disk-NLM) NetWare v5 Media Mgr APIs loaded

PC6862I (Raw Disk-NLM) NetWare v4 Media Mgr APIs forced

PC6863E (Raw Disk-NLM) Insufficient memory
Action: Free memory or close applications

PC6864E (Raw Disk-NLM) Handle not found
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6900I FDRSOS restore started

PC6901D FDRSOS restore completed successfully

PC6902D FDRSOS restore completed with errors

PC6903D FDRSOS restore suspended by user

PC6904I Restarting an FDRSOS restore

PC6905D Restarted FDRSOS restore successful

PC6906D Restarted FDRSOS restore completed with errors

PC6910E During a FDRSOS restore start

PC6911E During a FDRSOS restore send description

PC6912E During a FDRSOS restore receive desc

PC6913E During a FDRSOS restore receive file

PC6914E During a FDRSOS restore confirmed

PC6915E During a FDRSOS restore end

PC6920I Adjusted record size
Reason: Record sizes must be a multiple of 4096.
Action: Respecify.

PC6921E Record packing size invalid
Reason: You must enable record packing (PACKRECSIZE non zero) and specify it to be larger than the record size.
Action: Respecify.

PC6922E Insufficient memory
Reason: There was insufficient memory allocating a buffer for a raw disk restore.
Action: Free memory.

PC6923E Too many file specifications
Reason: For an FDRSOS restore you can only have one file specification.
Action: Respecify.

PC6924E Unknown type
Reason: During an FDRSOS restore, an unexpected type was received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6925E Unexpected conversation state
Reason: During an FDRSOS restore, the system entered an conversation state other than receive or confirm. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6926E Insufficient memory
Reason: There was insufficient memory allocating a raw disk handle buffer for a raw disk restore.
Action: Free memory.

PC6927E Compression initialization error
Action: See additional messages.

PC6928E Fast decompression error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6929E High decompression error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6930E Buffer overwrite
Reason: For Windows environments, record packing is required.
Action: Enable record packing

PC6931E Unwritten data
Reason: After high decompression, there was remaining data (not a multiple of 512) in the buffer. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6932E User suspended physical disk restore

PC6933D Restored from an FDRSOS backup

PC6934E Bad file name
Reason: The received file name had an invalid format. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC6935E Error saving your original parameters
Reason: During a restart, there was an error saving your original parameters.
Action: See additional messages.

PC6936E Error reading restart information
Reason: There was an error reading the restart info.
Action: See additional messages.

PC6937E Error reading restart parameters
Reason: There was an error reading the restart info.
Action: See additional messages.

PC6938E Restore not completely started
Reason: This restore did not run long enough to be restartable.
Action: Restart manually.

PC6939E Error sending restarted restore
Action: Look up the communications error.

PC6940E Restart file bad
Reason: The last successful file received from the host has an invalid format. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7000I FDRSOS backup started

PC7001D FDRSOS backup completed successfully

PC7002D FDRSOS backup completed with errors

PC7003D FDRSOS backup suspended by user

PC7004I Restarting an FDRSOS backup

PC7005D Restarted FDRSOS backup completed successfully

PC7006D Restarted FDRSOS backup completed with errors

PC7010E During a FDRSOS backup start

PC7011E During a FDRSOS backup send description

PC7012E During a FDRSOS backup receive desc

PC7013E During a FDRSOS backup receive file

PC7014E During a FDRSOS backup confirmed

PC7015E During a FDRSOS backup end

PC7020I Adjusted record size
Reason: Record sizes must be a multiple of 4096.
Action: Respecify.

PC7021E Record packing size invalid
Reason: You must enable record packing (PACKRECSIZE non zero) and specify it to be larger than the record size.
Action: Respecify.

PC7022E Insufficient memory
Reason: There was insufficient memory allocating a buffer for a raw disk backup.
Action: Free memory.

PC7023E Too many file specifications
Reason: For an FDRSOS backup you can only have one file specification.
Action: Respecify.

PC7024E Insufficient memory
Reason: There was insufficient memory allocating a raw disk handle buffer for a raw disk backup.
Action: Free memory.

PC7025E Insufficient memory
Reason: There was insufficient memory allocating a raw disk compression buffer for a raw disk backup.
Action: Free memory.

PC7026E Compression initialization error
Action: See additional messages.

PC7027E High compression error
Action: See additional messages.

PC7028E User suspended physical disk backup

PC7029E Error writing restart information
Action: See additional messages.

PC7030E Error saving restart information
Reason: There was an error saving your parameters for a later potential restart.
Action: See additional messages.

PC7031E Error writing restart information
Reason: Error occurred starting the backup.
Action: See additional messages.

PC7032E Error saving your original parameters
Reason: During a restart, there was an error saving your original parameters.
Action: See additional messages.

PC7033E Error reading restart information
Reason: There was an error reading the restart info.
Action: See additional messages.

PC7034E Error reading restart parameters
Reason: There was an error reading the restart info.
Action: See additional messages.

PC7035E Backup not completely started
Reason: This backup did not run long enough to be restartable.
Action: Restart manually.

PC7036E Error sending restarted backup
Action: Look up the communications error.

PC7037E Restart file bad
Reason: The last successful file received from the host has an invalid format. This usually occurs if a physical disk backup was not completely started.
Action: Manually restart the backup.

PC7100E (Raw Disk-UNIX) Invalid access type
Reason: While parsing the location information, the access type was invalid.
Action: Respecify the location.

PC7101E (Raw Disk-UNIX) Required field missing
Reason: While parsing the location information, a required sub-field was missing.
Action: Respecify the location.

PC7102E (Raw Disk-UNIX) Disk not found
Reason: This message may be reported for a physical disk backup/restore or a FDRSOS local backup/restore.
Action: Respecify the location with a valid disk or disable FDRSOS Local Backups.

PC7103E (Raw Disk-UNIX) OS error
Reason: There was an OS error when opening the disk.
Action: Contact FDR/UPSTREAM Tech Support.

PC7104E (Raw Disk-UNIX) Invalid access position
Reason: Attempt to access a physical disk randomly beyond 4GB. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7105E (Raw Disk-UNIX) OS error in read/write
Action: Contact FDR/UPSTREAM Tech Support.

PC7106E (Raw Disk-UNIX) Incomplete read
Reason: The expected number of sectors were not read.
Action: Contact FDR/UPSTREAM Tech Support.

PC7107E (Raw Disk-UNIX) OS error
Reason: There was an OS error when getting disk statistics.
Action: Contact FDR/UPSTREAM Tech Support.

PC7108E (Raw Disk-UNIX) Error reading
Action: See attached UNIX error

PC7109E (Raw Disk-UNIX) You must be the root user
Reason: Access to raw disk functions requires that you be logged in as the root user.
Action: Login as the root user.

PC7110E (Raw Disk-UNIX) Error writing
Action: See attached UNIX error

PC7111E (Raw Disk-UNIX) Unexpected EOF
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7112E (Raw Disk-UNIX) Disk too large
Reason: For the version of the AIX operating system, this disk is too large (greater than 2GB).
Action: Specify another disk.

PC7113E (Raw Disk-UNIX) ioctl call failed
Reason: The ioctl call, used to determine the disk statistics for an AIX disk failed.
Action: See additional messages.

PC7114E (Raw Disk-UNIX) open failed
Reason: The device open for an AIX disk failed.
Action: See additional messages.

PC7115E (Raw Disk-UNIX) ioctl call failed
Reason: The ioctl call, used to determine the disk statistics for a Solaris disk failed.
Action: See additional messages.

PC7116E (Raw Disk-UNIX) read_vtoc call failed
Reason: The read_vtoc call, used to determine the disk statistics for a Solaris disk failed.
Action: See additional messages.

PC7117E (Raw Disk-UNIX) open failed
Reason: The device open for a Solaris disk failed.
Action: See additional messages.

PC7118E (Raw Disk-UNIX) Logical Volume
Reason: (HPUX) You specified a logical volume
Action: Respecify, specifying a physical volume.

PC7119E (Raw Disk-UNIX) Error getting capacity
Reason: (HPUX) There was an error getting the capacity of the physical volume.
Action: See additional messages.

PC7120E (Raw Disk-UNIX) Not physical volume
Reason: (HPUX) The volume you specified is not a UNIX physical volume.
Action: Respecify.

PC7121E (Raw Disk-UNIX) Error getting info
Reason: (HPUX) There was an error getting disk info of the physical volume.
Action: See additional messages.

PC7122E (Raw Disk-UNIX) open failed
Reason: The device open for a HPUX disk failed.
Action: See additional messages.

PC7123E (Raw Disk-UNIX) Error getting def partition table
Reason: (Tru64) There was an error getting the default partition table for the disk.
Action: See additional messages.

PC7124E (Raw Disk-UNIX) Error getting disklabel
Reason: (Tru64) There was an error getting the disklabel for the disk.
Action: See additional messages.

PC7125E (Raw Disk-UNIX) Error getting cur partition table
Reason: (Tru64) There was an error getting the current partition table for the disk.
Action: See additional messages.

PC7126E (Raw Disk-UNIX) open failed
Reason: (Tru64) The raw device open failed.
Action: See additional messages.

PC7127E (Raw Disk-UNIX) Not the c partition
Reason: (Tru64) A raw device for a partition other than c was specified.
Action: Specify a raw device for the c partition.

PC7128E (Raw Disk-UNIX) Error switching security

PC7129E (Raw Disk-UNIX) Error getting number of sectors
Reason: (Linux) The BLKGETSIZE ioctl failed.
Action: See additional messages.

PC7130E (Raw Disk-UNIX) Error opening block device
Reason: (Linux) The open for the block device bound to the raw device failed.
Action: See additional messages.

PC7131E (Raw Disk-UNIX) Raw device not properly bound
Reason: (Linux) The raw device is either not bound or bound to a device that is not a scsi disk device.
Action: Use the raw command to query the raw device.

PC7132E (Raw Disk-UNIX) Error getting binding info
Reason: (Linux) The ioctl RAW_GETBIND to obtain the device the raw device is bound to failed.
Action: See additional messages.

PC7133E (Raw Disk-UNIX) The raw control open failed
Reason: (Linux) The open of the file used for raw control operations failed.
Action: See additional messages.

PC7134E (Raw Disk-UNIX) Not a raw device file
Reason: (Linux) The major number of the device file is not the major number for a raw device.
Action: The raw device file must be recreated.

PC7135E (Raw Disk-UNIX) Raw device file not char
Reason: (Linux) The raw device file is not a character special file.
Action: The raw device file must be recreated.

FDRSOS Local backup messages.

PC7200E (LclSOS) Error allocating memory
Reason: Insufficent memory allocating sector memory.
Action: Free memory.

PC7201E (LclSOS) Not a FDRSOS local backup disk
Reason: There is not a FDRSOS local backup partition on the specified local disk.
Action: Initialize the disk

PC7202E (LclSOS) Not a FDRSOS local backup disk
Reason: There is not partition table on the specified disk.
Action: Initialize the disk

PC7203E (LclSOS) Partition header invalid
Reason: The FDRSOS local backup disk has been corrupted.
Action: Contact FDR/UPSTREAM Tech Support.

PC7204E (LclSOS) Profile entry bad
Reason: A profile entry was expected and invalid data was returned.
Action: Contact FDR/UPSTREAM Tech Support.

PC7205E (LclSOS) Expected profile not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7206E (LclSOS) Record size too small
Reason: The internal profile information could not be read.
Action: Increase your record size.

PC7207E (LclSOS) Range error
Reason: Either the backup number or the number of backups is larger than expected. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7208E (LclSOS) Extent table range error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7209E (LclSOS) Profiles don't match
Reason: During an update operation, the following two profiles are required to be the same and aren't. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7210E (LclSOS) Profiles don't match
Reason: During a read operation, the following two profiles are required to be the same and aren't. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7211E (LclSOS) You tried to add an existing profile
Action: Respecify.

PC7212E (LclSOS) Too many profiles
Reason: You have exceeded the maximum number of profiles.
Action: Delete a profile.

PC7213E (LclSOS) Internal length invalid
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7214E (LclSOS) Past valid profiles
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7215E (LclSOS) Internal sizes wrong
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7216E (LclSOS) Profile not found
Reason: You selected to delete a given profile and it was not found.
Action: Respecify.

PC7217E (LclSOS) Backups exist
Reason: You selected to delete a given profile in which there are active backups defined.
Action: Use profile management to delete all active backups before deleting the profile.

PC7218E (LclSOS) Extent not allocated
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7219E (LclSOS) Exceeded space available
Reason: Your backup has exceeded the amount of space available and you configured this profile to terminate if this happened.
Action: Modify your profile or migrate/delete backups.

PC7220E (LclSOS) Profile not found
Reason: The backup profile you specified has not been configured using the "FDRSOS Local Backup Admin" facility.
Action: Configure and retry.

PC7221E (LclSOS) Backup not found
Reason: FDR/UPSTREAM MVS confirmed that it had created the backup definition, but it was not found. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7222E (LclSOS) Profile not found (restart)
Reason: The backup profile you specified has not been configured using the "FDRSOS Local Backup Admin" facility or has been deleted.
Action: Configure and retry.

PC7223E (LclSOS) Unexpected end of data
Reason: While searching for the last restarted file, we read an end of data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7224E (LclSOS) Corrupt data
Reason: While searching for the last restarted file, we ran into corrupted data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7225E (LclSOS) Corrupt data (2)
Reason: While searching for the last restarted file, we ran into corrupted data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7226E (LclSOS) Backup not found
Reason: While reading the disk a given backup was not found.

Action: Contact FDR/UPSTREAM Tech Support.

PC7227E (LclSOS) Bad data on disk
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7228E (LclSOS) Record exceeds length
Reason: The disk buffer exceeds the memory buffer. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7229E (LclSOS) Error creating temporary file
Action: See additional messages.

PC7230E (LclSOS) Error writing to the temp file
Action: See additional messages.

PC7231E (LclSOS) Error reading from the temp file
Action: See additional messages.

PC7232E (LclSOS) Error reading from the temp file
Action: See additional messages.

PC7233E (LclSOS) Invalid length
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7234E (LclSOS) Too many extents
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7235E (LclSOS) Out of space
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7236E (LclSOS) Range error during backup write
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7237E (LclSOS) Backup not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7238E (LclSOS) Error reopening temp file
Action: See additional messages.

PC7239E (LclSOS) End of backup during a restart
Reason: The last file was not found on the backup. This backup is not restartable.
Action: Restart manually.

PC7240E (LclSOS) Record not written
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7241E (LclSOS) Profile not found in profile table
Action: You need to either define a backup profile using the Admin facility or allow the host to dynamically create them.

PC7242E (LclSOS) Backup started not written
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7243E (LclSOS) Unexpected end of file
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7244E (LclSOS) Expected a file info record
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7245E (LclSOS) File name mismatch
Reason: The file name on local disk does not match the file name received.
Action: Contact FDR/UPSTREAM Tech Support.

PC7246E (LclSOS) Profile not found
Reason: While beginning a restore, the specified profile was not found on the local disk.
Action: Specify the proper profile or disable local backups.

PC7247D (LclSOS) Exceeded backup size
Reason: The maximum backup size has been exceeded; remaining data will be transmitted.

PC7248D (LclSOS) No segments used

PC7249E (LclSOS) Volume greater than 2GB
Reason: You are using a version of the operating system which does not support volumes greater than 2GB for random access reads/writes.
Action: Select another disk or upgrade the OS.

PC7250E (LclSOS) VolSer not found
Action: Specify a host vol ser which exists.

PC7251I (LclSOS) %s found: %s

PC7252E (LclSOS) Error switching security context

PC7253E (LclSOS) Insufficient memory
Reason: While processing restored data, there was insufficient memory to save processed data while waiting from additional from the host.
Action: Free memory.

PC7254E (LclSOS) Internal buffer exceeded (End: %s, Stop: %s)
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7255I (LclSOS) %s first found: %s

PC7256I (LclSOS) %s empty found: %s

PC7257E (LclSOS) No local backup disks found.
Reason: Disks may be locked or have been overwritten.
Action: If the disks have been overwritten, then you may need to reformat them with FDRSOS. If you are unsure, contact Innovation tech support.

PC7258E (LclSOS) No empty local backup disks found (%u skipped)
Reason: Verify that data has not be inadventently left on the disk due to previously failed backups.
Action: Clean up disks with FDRSOS or local backup administration in the Director or UPSTREAM local.

Profile update messages.

PC7300E (LclSOS) Error starting conversation
Reason: While attempting to update the partition table, there was an error communicating with the host to lock the partition table.
Action: See additional messages.

PC7301E (LclSOS) Error sending lock request
Reason: While attempting to update the partition table, there was an error communicating with the host to lock the partition table.
Action: See additional messages.

PC7302E (LclSOS) Error confirming lock request (1)
Reason: While attempting to update the partition table, there was an error communicating with the host to lock the partition table.
Action: See additional messages.

PC7303E (LclSOS) Error releasing lock
Reason: While attempting to update the partition table, there was an error communicating with the host to lock the partition table.
Action: See additional messages.

PC7304E (LclSOS) Error ending conversation
Reason: While attempting to update the partition table, there was an error communicating with the host to lock the partition table.
Action: See additional messages.

PC7305D (LclSOS) Adding the following profile

PC7306D (LclSOS) Deleting the following profile

PC7307D (LclSOS) Updating the following profile

PC7308D (LclSOS) Updating the profile defaults

PC7309D (LclSOS) Deleting the following backup

PC7310E (LclSOS) Open backup temp file error
Reason: There was an error creating the temporary file used to store backup details.
Action: See additional messages.

PC7311E (LclSOS) Open backup temp file error
Reason: There was an error writing to the temporary file used to store backup details.
Action: See additional messages.

PC7312D (LclSOS) Local backup disk report. Disk: %s

PC7313E (LclSOS) Insufficient memory
Reason: Can't allocate memory to update a local backup profile.
Action: Close applications or free memory.

PC7314E (LclSOS) Profile not found: %s
Reason: You asked to act on a profile which was not found.
Action: Specify a valid profile.

PC7315W (LclSOS) Ran local backup disk report
Reason: The following local badkup disk report file was produced.

PC7316E (LclSOS) Local backup disk report not produced
Reason: A previous error caused the local backup disk report to not be produced
Action: See additional messages.

SOS Local Backup - Backup messages

PC7350E (SOS Bkp) Unable to allocate required memory
Action: Free memory.

PC7351W (SOS Bkp) Out of space - sending remainder
Reason: During the backup, there was insufficient space to write all of the data. The remaining data will be transmitted.
Action: To avoid this problem, select a higher level of compression or increase the percentage of space allocated.

PC7352E (SOS Bkp) Disallowed by personalization
Reason: This workstation is disallowed for SOS local backup
Action: Respecify.

PC7353W (SOS Bkp) Out of space - sending remainder
Reason: During the backup, there was insufficient space to write all of the data. The remaining data will be transmitted.
Action: To avoid this problem, select a higher level of compression or increase the percentage of space allocated.

PC7354W (SOS Bkp) Out of space - sending remainder
Reason: During the backup, there was insufficient space to write all of the data. The remaining data will be transmitted.
Action: To avoid this problem, select a higher level of compression or increase the percentage of space allocated.

PC7355W (SOS Bkp) Out of space - sending remainder
Reason: During the backup, there was insufficient space to write all of the data. The remaining data will be transmitted.
Action: To avoid this problem, select a higher level of compression or increase the percentage of space allocated.

PC7356W (SOS Bkp) Unexpected out of space
Reason: After wrapping the buffer there was still a shortage of space. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7357W (SOS Bkp) Out of space - sending remainder
Reason: During the backup, there was insufficient space to write all of the data. The remaining data will be transmitted.
Action: To avoid this problem, select a higher level of compression or increase the percentage of space allocated.

PC7358E (SOS Bkp) Confirm error reusing local disk

PC7359D (SOS Bkp) Out of space - reusing
Reason: This profile has been configured so that if there is insufficient space on the local backup volume the space is reused. Note that this backup is not retained on the local backup volume, but is copied to standard host storage and immediately deleted.

More general file errors.

PC7401E (File) Async I/O disallowed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7402E (File) Async I/O disallowed for ULTra
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7403E (File) Async read timeout
Reason: An async I/O took too long.
Action: Verify your hardware for the action specified.

PC7404E (File) Async write timeout
Reason: An async I/O took too long.
Action: Verify your hardware for the action specified.

PC7405E (File) Async read error
Reason: There was a file error asynchronously reading the file.
Action: See additional messages.

PC7406E (File) Async write error
Reason: There was a file error asynchronously writing the file.
Action: See additional messages.

PC7407E (File) Insufficient bytes read
Reason: Too few bytes were read. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7408D (File) Async I/O num retries:
Reason: You specified the "USLOGASYNCRETRIES" environment variable to log the number of async retries which may be slowing down your system.

PC7409E (File) Error waiting for async file I/O
Reason: Windows NT File I/O error.
Action: See additional messages.

PC7410E (File) Error getting file I/O result
Reason: Windows NT File I/O error getting the number of bytes in the I/O.
Action: See additional messages.

PC7411E (File) Expected a complete record
Reason: During a read, it was expected that we would be able to read a complete record and insufficient bytes were actually read.
Action: Contact FDR/UPSTREAM Tech Support.

PC7412E (File) Error resetting event for an async read
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7413E (File) Error resetting event for an async write
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7414E (File) Error reading file
Reason: There was a file error reading the specified file asynchronously.
Action: See the following Windows NT error.

PC7415E (File) Error writing file
Reason: There was a file error writing the specified file asynchronously.
Action: See the following Windows NT error.

PC7416E (File) Error creating event for an async read
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7417E (File) Error creating event for an async write
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

Status Pipe errors

PC7430E (Control) Error opening pipe for read
Reason: There was an error opening named pipe for read from external process.

PC7431E (Control) Error opening pipe for write
Reason: There was an error opening named pipe for write to external process.

PC7432E (Control) Error sending negotiation record
Reason: There was a write error when UPSTREAM attempted to negotiate with external process.

PC7433E (Control) Error receiving negotiation record
Reason: There was a read error when UPSTREAM attempted to negotiate with external process.

PC7434E (Control) Error in responce to negotiation
Reason: While in negotiation UPSTREAM received unexpected data.

PC7435E (Control) Error sending final record
Reason: There was a write error when UPSTREAM attempted to send final record to external process.

PC7436E (Control) Error receiving final ACK
Reason: There was a read error when UPSTREAM attempted to receive ACK for final record from external process.

PC7438E (Control) Error sending synchronization record
Reason: There was a write error when UPSTREAM attempted to send synchronization record to external process.

PC7439E (Control) Error receiving synchronization ACK
Reason: There was a read error when UPSTREAM attempted to receive ACK for synchronization record from external process.

PC7440E (Control) Error flushing backup data
Reason: There was an error when external process requested flushing of backup data.

PC7441E (Control) External request to fail
Reason: External process requested UPSTREAM to fail the backup.

PC7442E (Control) Error sending status record
Reason: There was a write error when UPSTREAM attempted to send status record to external process.

PC7443E (Control) Error receiving status ACK
Reason: There was a read error when UPSTREAM attempted to receive ACK for status record from external process.

PC7444E (Control) Error in responce
Reason: While waiting for the ACK record UPSTREAM received unexpected data.

PC7445E (Control) Backup failed
Reason: Error in communications with external process caused UPSTREAM to fail the backup.

PC7446E (Control) Error receiving DirInfo
Reason: There was a read error when UPSTREAM attempted to receive DirInfo record from external process.

PC7447E (Control) Error in response
Reason: While waiting for the DirInfo record UPSTREAM received unexpected data.

NLM specific messages.

PC7501E (NLM) Directory search error
Action: See additional messages.

PC7502E (NLM) SetInfo not found during close
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7503W (NLM) Novell Profile not specified
Reason: UPSTREAM will work, however any Novell specific features (trustees, owners, etc.) will not be backed-up/restored.

PC7504W (NLM) Error searching directory
Action: See additional messages.

PC7505E (NLM) Error getting DOS name for LONG name
Reason: During an attempt to open a file that was not found (which was done to get around a Novell bug), there was an error getting the DOS name for the LONG name.
Action: See additional messages.

PC7506W (NLM) DOS drive WORKPATH
Reason: You specified a WORKPATH (in the UPSTREAM Configurator - Advanced options) which writes it's temporary files to a DOS path. This is allowed, but may cause problems. We recommend only doing this after careful consideration.

Remote control/status messages

PC7531W (Java client) Error occurred in delete file

PC7532E (Java client) Insufficient memory (%u)
Reason: There was insufficient memory to allocate the memory buffer above.
Action: Close applications or free memory.

PC7533E (Java client) Write file not text buffer (0x%x)
Reason: Internal error.
Action: Call tech support.

PC7534W (Java client) Error occurred in write file

PC7535I (Java client) Write file

PC7536I (Java client) Completed write file

PC7537W (Java client) Error occurred in directory list

PC7538I (Java client) Directory listing

PC7539I (Java client) Completed directory listing

PC7540E (Java client) Already impersonating a different user %s
Reason: UPSTREAM can only impersonate one user at a time.
Action: Validate as the user above.

PC7541E (Java client) Must check security
Reason: The UPSTREAM system you're connecting to requires security be validated before you perform the requested function.
Action: Login.

PC7542I (Java client) List pending restarts

PC7543I (Java client) Completed list pending restarts

PC7544W (Java client) Error during restart list

PC7545E (Java client) PlugIn request failed
Reason: The processing of a PlugIn request issued by the Director failed.

PC7546E (Java client) PlugIn ID is invalid
Reason: The PlugIn ID number specified on a PlugIn request from the Director is invalid. The PlugIn for this ID number either does not exist or is not loaded.

PC7547I (Java client) PlugIn request

PC7548I (Java client) PlugIn request completed %s

PC7549W (Java client) Processing PlugIn request

PC7550E (Java client) Error while listing physical disks

PC7551E (Java client) Error getting physical disk info

PC7552E (Java client) Not negotiation record
Action: Contact FDR/UPSTREAM Tech Support.

PC7553E (Java client) Error checking security

PC7554I (Java client) Checking security: %s

PC7555I (Java client) Negotiating with remote

PC7556I (Java client) Negotiation complete %s

PC7557I (Java client) Remote request received

PC7558I (Java client) Remote request completed %s

PC7559I (Java client) Monitor started

PC7560I (Java client) Monitor stopped %s

PC7561I (Java client) Connection lost %s

PC7562I (Java client) Control request

PC7563I (Java client) Control request (%s) completed %s

PC7564I (Java client) File read request (%s)

PC7565I (Java client) File read request completed %s

PC7566I (Java client) List disks

PC7567I (Java client) List disks completed %s

PC7568I (Java client) Disk info request

PC7569I (Java client) Disk info completed %s

PC7570I (Java client) Check security

PC7571I (Java client) Security check completed %s

PC7572E (Java client) No connection
Action: Contact FDR/UPSTREAM Tech Support.

PC7573E (Java client) Receive on bad connection
Action: Contact FDR/UPSTREAM Tech Support.

PC7574D (Java client) UPSTREAM termination received
Reason: The Java client requested that UPSTREAM terminate.

PC7575E (Java client) UPSTREAM can't login
Reason: A system condition restricts UPSTREAM logins and UPSTREAM logins are required for this remote connection.

PC7576I (Java client) Remote connection lost

PC7577I (Java client) Missing service for svc. data
Reason: During run function.
Action: Contact FDR/UPSTREAM Tech Support.

PC7578I (Java client) Missing service for svc. data
Reason: During monitor.
Action: Contact FDR/UPSTREAM Tech Support.

PC7579W (Java client) Error getting local backup info
Action: Contact FDR/UPSTREAM Tech Support.

PC7580I (Java client) Examine disk

PC7581I (Java client) Examine disk completed %s

PC7582I (Java client) List disk profiles

PC7583I (Java client) List disk profiles completed %s

PC7584W (Java client) Getting local backup profiles
Action: Contact FDR/UPSTREAM Tech Support.

PC7585I (Java client) Update local profile

PC7586I (Java client) Update local profile completed %s

PC7587W (Java client) Updating local backup profile
Action: Contact FDR/UPSTREAM Tech Support.

PC7588E (Java client) Local Backup not supported.
Action: Use a different UPSTREAM function.

PC7589I (Java client) List local backups

PC7590I (Java client) List local backups completed %s

PC7591W (Java client) Getting local backups

PC7592I (Java client) List PlugIns

PC7593I (Java client) List PlugIns completed %s

PC7594W (Java client) Getting loaded PlugIn list
Action: Contact FDR/UPSTREAM Tech Support.

PC7595E (Rmt status) Bad IP address
Reason: You specified an IP address which can't be resolved.
Action: Respecify.

PC7596E (Rmt status) Error getting inbound IP addr (dy2)
Reason: There was a TCP/IP error determining the inbound IP address specified in UPSTREAM configuration.
Action: Verify your IP address for the configuration parameter TCPINADAPTER.

PC7597E (Rmt status) Error getting inbound IP addr (dyn)
Reason: There was a TCP/IP error determining the inbound IP address specified in UPSTREAM configuration.
Action: Verify your IP address for the configuration parameter TCPINADAPTER.

PC7598E (Rmt status) Error getting inbound IP addr (2)
Reason: There was a TCP/IP error determining the inbound IP address specified in UPSTREAM configuration.
Action: Verify your IP address for the configuration parameter TCPINADAPTER.

PC7599E (Rmt status) Error getting inbound IP addr.
Reason: There was a TCP/IP error determining the inbound IP address specified in UPSTREAM configuration.
Action: Verify your IP address for the configuration parameter TCPINADAPTER.

PC7600E (Rmt status) TCP/IP is not installed

PC7601E (Rmt status) socket call failed
Action: See additional messages.

PC7602D (Rmt status) REUSEADDR call failed
Reason: This is merely a warning message.
Action: See additional messages.

PC7603I (Rmt status) bind call failed
Reason: There was a TCP/IP error opening the specified status port (or status port + 1). These ports are only used for the Java user interface and for remote tracing and are generally not required. This error is usually caused by another copy of UPSTREAM which already has these ports in use.
Action: Specify a different status port (in the UPSTREAM configurator - they must be separated by 3 numbers) or take down the other copy of UPSTREAM.

PC7604E (Rmt status) listen call failed
Action: See additional messages.

PC7605E (Rmt status) iocntl for non-blocking failed
Action: See additional messages.

PC7606E (Rmt status) Insufficient memory
Action: Close other applications.

PC7607E (Rmt status) Service not found
Reason: While removing the service the service type specified was not found.
Action: Contact FDR/UPSTREAM Tech Support.

PC7608E (Rmt status) Insufficient memory
Reason: Occurred allocating service data memory.
Action: Close other applications.

PC7609E (Rmt status) accept call failed
Reason: Remote status will now be disabled.
Action: See additional messages.

PC7610E (Rmt status) Service not registered
Reason: This is probably a version incompatibility.
Action: Upgrade your version of UPSTREAM.

PC7611E (Rmt status) Exceeded data size
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7612E (Rmt status) Error occurred extracting type
Reason: Insufficient received data. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7613E (Rmt status) Exceeded data buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7614E (Rmt status) Exceeded data buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7615E (Rmt status) Receive exceeded buffer
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7616W (Rmt status) Remote error
Reason: This error was reported from the remote system.
Action: See additional messages.

PC7617E (Rmt status) Occurred during remote error
Action: See additional messages.

PC7618E (Rmt status) During check for remote request
Action: See additional messages.

PC7619E (Rmt status) During receive of remote request
Action: See additional messages.

PC7620E (Rmt status) socket call failed
Action: See additional messages.

PC7621D (Rmt status) REUSEADDR call failed
Reason: This is merely a warning message.
Action: See additional messages.

PC7622E (Rmt status) bind call failed
Reason: There was an error accessing the specified port.
Action: See additional messages.

PC7623E (Rmt status) listen call failed
Action: See additional messages.

PC7624E (Rmt status) iocntl for non-blocking failed
Action: See additional messages.

PC7625I (Rmt status) Remote disconnected

PC7626E (Rmt status) socket call failed
Reason: You will not be able to passthrough messages from cooperating PC applications.
Action: See additional messages.

PC7627W (Rmt status) Unable to reuse port
Reason: This is a warning message that can usually be ignored.

PC7628W (Rmt status) bind call failed
Reason: You will not be able to passthrough messages from cooperating PC applications. There was a TCP/IP error opening the specified status port + 2. This port is used to passthrough communications from cooperating PC applications and is generally not required. This error is usually caused by another copy of UPSTREAM which already has this port in use.
Action: Specify a different status port (in the UPSTREAM configurator - they must be separated by 3 numbers) or take down the other copy of UPSTREAM.

PC7629E (Rmt status) listen call failed
Reason: You will not be able to passthrough messages from cooperating PC applications.
Action: See additional messages.

PC7630E (Rmt status) Set non-blocking failed
Reason: You will not be able to passthrough messages from cooperating PC applications.
Action: See additional messages.

PC7631E (Rmt status) Error checking for pending data
Reason: You will not be able to passthrough messages from cooperating PC applications.
Action: See additional messages.

PC7632E (Rmt status) Error receiving remote func
Reason: There was a communications error receiving the remote function type.
Action: See additional messages.

PC7633I (Rmt status) Remote service request
Reason: A remote service request was received and is now being processed.

PC7634D (Rmt status) Remote passthrough request
Reason: A request to pass data through to the host was received and is now being processed. Press the CANCEL button if you wish to abort this process.

PC7635I (Rmt status) Remote service request processed

PC7636I (Rmt status) Remote service request failed

PC7637E (Rmt status) Receive failed
Reason: The receive of data from the remote system failed.
Action: See additional messages.

PC7638E (Rmt status) Unsupported function
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7639E (Rmt status) Error starting conversation
Reason: There was an error starting the conversation with the host while passing data through from another application.
Action: See additional messages.

PC7640E (Rmt status) Error sending data
Reason: There was an error sending data to the host while passing data through from another application.
Action: See additional messages.

PC7641E (Rmt status) Send failed
Reason: The send of data from the remote system failed.
Action: See additional messages.

PC7642E (Rmt status) Send error failed
Reason: The send of an error message through to the host failed.
Action: See additional messages.

PC7643E (Rmt status) Confirm failed
Reason: The send of a CONFIRM through to the host failed.
Action: See additional messages.

PC7644E (Rmt status) Confirmed failed
Reason: The send of a CONFIRMED through to the host failed.
Action: See additional messages.

PC7645E (Rmt status) Deallocate failed
Reason: Conversation end through to the host failed.
Action: See additional messages.

PC7646E (Rmt status) Receive failed
Reason: A receive of data from the host to the application failed.
Action: See additional messages.

PC7647E (Rmt status) Error during confirm
Action: See additional messages.

PC7648E (Rmt status) Unexpected data on confirm
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7649E (Rmt status) Error during deallocate
Action: See additional messages.

PC7650E (Rmt status) Error during host error
Reason: There was an error sending a host error to the remote PC.
Action: See additional messages.

PC7651E (Rmt status) Unexpected host type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7652E (Rmt status) Error going into receive state
Action: See additional messages.

PC7653D (Rmt status) User aborted passthrough

PC7654I (Rmt status) Remote passthrough request
Reason: A request to pass data through to the host was received and is now being processed.

PC7655E (Rmt status) Unexpected service
Reason: UPSTREAM received an unexpected service type. It will be rejected.
Action: Check for client version incompatibility.

PC7656I Dynamically adjusted status port

PC7657E (Rmt status) Missing environment variable
Reason: A required environment variable was missing.
Action: If you started UPSTREAM manually, you will need to unset the USSTATUSSOCKET1 environment variable. Otherwise, this is an internal FDR/UPSTREAM error and you should contact FDR/UPSTREAM Tech Support.

PC7658I Closing status connection

Java client

PC7660E (Java Client) Unexpected initial type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7661E (Java Client) Error extracting negotiation
Reason: There was an error extracting a field from the negotiation record. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7662E (Java Client) Error creating negotiation
Reason: There was an error inserting a field into the negotiation record or sending it. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.
Action: See additional messages.

PC7663E (Java Client) Negotiation unexpected
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7664E (Java Client) Unexpected type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7665E (Java Client) Unexpected state
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7666E (Java Client) Bad Run Function state
Reason: A request to have UPSTREAM perform a function was received in an invalid internal state. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7667E (Java Client) Error in Run Function
Reason: There was an error in the receive of the Run Function request from the client.
Action: See additional messages.

PC7668E (Java Client) Error receiving parameter
Reason: There was an error receiving a parameter line from the client workstation.
Action: See additional messages.

PC7669E (Java Client) Error previously reported

PC7670I (Java Client) Closing client connection

PC7671E (Java Client) Bad parameter type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7672E (Java Client) Error during acknowledgement
Reason: While notifying the client that the parameters are acceptable, there was a comm error.
Action: See additional messages.

PC7673E (Java Client) Error during monitor function
Reason: This error occurred while the client was requesting status information of UPSTREAM
Action: See additional messages.

PC7674E (Java Client) Error during function response
Reason: This error occurred while the client was requesting status information of UPSTREAM
Action: See additional messages.

PC7675E (Java Client) Error adding status information
Reason: This error occurred while building or sending status information to the client.
Action: See additional messages.

PC7676E (Java Client) Unexpected data type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7677E (Java Client) Error during flow control
Reason: An error was detected during the parse of flow control information.
Action: See additional messages.

PC7678E (Java Client) Error during status
Reason: An error was detected during the build or send of the status record to the client.
Action: See additional messages.

PC7679E (Java Client) Error during response
Reason: An error occurred while UPSTREAM was notifying the client of the result of the function requested.
Action: See additional messages.

PC7680E (Java Client) Error during control request
Reason: An error occurred while UPSTREAM was processing a control request from the client.
Action: See additional messages.

PC7681E (Java Client) UPSTREAM Busy
Reason: The request received can not be procesed at this time as UPSTREAM is busy with another process.
Action: Retry later.

PC7682E (Java Client) All status ports unavailable
Action: Contact FDR/UPSTREAM Tech Support.

PC7683E (Java Client) UPSTREAM Busy
Reason: The requested UPSTREAM service is currently unavailable as it is busy processing request from another application.
Action: Try later.

PC7684E (Java Client) Insufficient memory
Action: Free memory or close applications.

PC7685E (Java Client) No allocated conversation
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7686E (Java Client) No allocated conversation
Reason: This is an internal FDR/UPSTREAM error.

Action: Contact FDR/UPSTREAM Tech Support.

PC7687E (Java Client) Bad internal structure
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7688E (Java Client) Bad internal structure
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7689E (Java Client) Bad internal structure
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7690E (Java Client) Bad internal structure
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7691E (Java Client) Control disallowed
Reason: You requested a control function from a machine which requires a login and the current UPSTREAM function is running under the UPSTREAM authority or has completed.
Action: Do the control function from a system which supports running as UPSTREAM.

PC7692E (Java Client) Invalid user/password
Reason: The user name and password specified are either invalid or do not match the user of the current UPSTREAM function
Action: Specify the user which owns the UPSTREAM function.

PC7693W (Java Client) Status reporting error
Action: See additional messages.

PC7694W (Java Client) Error in file read request
Action: See additional messages.

PC7695W (Java Client) Bad log file request type
Reason: This version of UPSTREAM does not support this function.
Action: Use a different function.

PC7696W (Java Client) Error opening requested file
Reason: While sending the requested file to the client, there was an error opening the file.
Action: See additional messages.

PC7697W (Java Client) Error reading requested file
Reason: While sending the requested file to the client, there was an error reading the file.
Action: See additional messages.

PC7698E (Java Client) Error seeking file
Reason: While sending the requested file to the client, there was an error seeing through the log.
Action: See additional messages.

PC7699E (Java Client) Insufficient memory
Action: Free memory or close applications.

Novell SMS errors.

PC7700E (SMS NLM) Error loading symbol
Reason: The following symbol could not be found.
Action: Load SMDR and TSAvvv from the console

PC7701E (SMS) Error connecting to TSA
Action: See additional messages.

PC7702E (SMS) Error connecting to target service
Action: See additional messages.

PC7703E (SMS) The profile you specified is for SMS
Reason: This is not allowed. Specify another profile.

PC7704I (SMS) Performing an SMS logon

PC7705E (SMS) SMS not loaded in directory search
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7706E (SMS) Not a UNC name
Reason: You are required to specify UNC names to use UPSTREAM's SMS facilities.
Action: Respecify.

PC7707E (SMS) Bad UNC name
Reason: The UNC name must include a server, volume and path (missing server).
Action: Respecify.

PC7708E (SMS) Insufficient memory
Reason: There was insufficient memory allocating the server area.
Action: Close applications.

PC7709E (SMS) Bad server
Reason: You specified a server name which you are not connected to.
Action: Respecify.

PC7710E (SMS) Bad UNC name
Reason: The UNC name must include a server, volume and path (missing volume).
Action: Respecify.

PC7711E (SMS) Bad UNC name
Reason: The UNC name must include a server, volume and path (missing path).
Action: Respecify.

PC7712E (SMS) Error creating search name
Reason: This is a SMS error.
Action: See additional messages.

PC7713E (SMS) Error searching (beginning)
Reason: This is a SMS error.
Action: See additional messages.

PC7714E (SMS) Error searching (next)
Reason: This is a SMS error.
Action: See additional messages.

PC7715E (SMS) Error getting name in search
Reason: This is a SMS error.
Action: See additional messages.

PC7716E (SMS) Bad directory format
Reason: File name returned in a search has an unexpected format.
Action: Contact FDR/UPSTREAM Tech Support.

PC7717E (SMS) Bad directory format
Reason: File name returned in a search has an unexpected format.
Action: Contact FDR/UPSTREAM Tech Support.

PC7718E (SMS) SMS Timestamps not allowed with SMS
Action: Deselect the SMS timestamp options.

PC7719E (SMS) File transfer disallowed
Reason: You can not use an SMS Novell Profile for file transfers.
Action: Use a non-SMS Novell Profile

PC7720E (SMS) Invalid file open mode
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7721W (SMS) File not found in open
Reason: The file will be skipped.

PC7722W (SMS) File open failed
Reason: SMS error.
Action: See additional messages.

PC7723E (SMS) Read string not allowed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7724E (SMS) Read pipe not allowed
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7725E (SMS) Write string not allowed
Reason: This is an internal FDR/UPSTREAM error.

Action: Contact FDR/UPSTREAM Tech Support.

PC7726W (SMS) Error assigning new name
Reason: For a renamed file on a restore, there was an error adding the file.
Action: You must specify the file names in DOS name space compatible form (8.3).

PC7727W (SMS) Error opening file for restore
Reason: SMS error.
Action: See additional messages.

PC7728W (SMS) Error reading file
Reason: SMS error.
Action: See additional messages.

PC7729W (SMS) Error writing file
Reason: SMS error.
Action: See additional messages.

PC7730W (SMS) Error deleting file
Reason: SMS error.
Action: See additional messages.

PC7731E (SMS) Extra data not defined for files
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7732E (SMS) Extra data not defined for files (put)
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7733E (SMS) Unexpected extra data type
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7734I (SMS) Error setting archive status
Reason: SMS message.
Action: See additional messages.

PC7735E (SMS) Insufficient memory
Action: Close applications.

PC7736E (SMS) Insufficient memory
Action: Close applications.

PC7737E (SMS) Insufficient memory
Action: Close applications.

PC7738E (SMS) Internal SMS error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7739E (SMS) Truncated name not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7740I (SMS) Truncating file/dir name
Reason: The file name is length is longer than UPSTREAM can support and you activated SMS truncation, so UPSTREAM is truncating the name.
Action: The FDR/UPSTREAM host verstion 3.1.4 can support up to 255 characters; earlier versions up to 230 characters. The client size can be set using the MAXFILENAMESIZE environment variable.

PC7741E (SMS) Search not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7742W (SMS) Error extracting the long name
Reason: The short name will be used instead.
Action: See additional messages.

PC7743I (SMS) SMS File Report Activated
Reason: You specified the USSMSFILEREPORT environment variable to activate the SMS file report, written to SMSFILES.LOG.

PC7744W (SMS) SMS File Report Error
Reason: There was an error opening the SMSFILES.LOG file.
Action: See additional messages.

PC7745W (SMS) SMS File Report Error
Reason: There was an error writing to the SMSFILES.LOG file.
Action: See additional messages.

PC7746E (SMS) SMS backup and a non-SMS restore
Reason: You are trying to restore a SMS backup without using SMS.
Action: Respecify using a SMS Novell Profile. The restore will proceed anyway so that backups which included a mix of SMS and non-SMS files can be restored. You may want to cancel this restore if this is not the case.

PC7747E (SMS) Non-SMS backup and a SMS restore
Reason: You are trying to restore a non-SMS backup with a SMS Novell Profile.
Action: Respecify using a non-SMS Novell Profile The restore will proceed anyway so that backups which included a mix of SMS and non-SMS files can be restored. You may want to cancel this restore if this is not the case.

PC7748E (SMS) Error loading required SMS module
Action: If this is the NLM version, you must load TSA410 (NetWare 4.x), or TSA500 (NetWare 5.x). For Windows NT you must have SMDR32.DLL installed.

PC7749E (SMS) Name not found
Reason: While restoring a file, the file name FID was not found in the data.
Action: Contact FDR/UPSTREAM Tech Support.

PC7750E (SMS) Buffer overflow
Reason: While restoring a file, the file name was not found in the data.
Action: Contact FDR/UPSTREAM Tech Support.

PC7751I (SMS) SMS File Truncate Report Activated to %s
Reason: You specified the USSMSTRUNCATEREPORT environment variable to activate the SMS file truncation report written to the file name specified.

PC7752W (SMS) SMS File Truncate Report Error
Reason: There was an error opening the SMSTRUNC.LOG file.
Action: See additional messages.

PC7753W (SMS) SMS File Truncate Report Error
Reason: There was an error writing to the SMSTRUNC.LOG file.
Action: See additional messages.

PC7754I (SMS) Long file names enabled
Reason: You specified the USSMSLONGNAMES environment variable.

PC7755I (SMS) Generate CRC enabled
Reason: You specified the USSMSGENCRC environment variable.

PC7756I (SMS) Check CRC enabled
Reason: You specified the USSMSCHECKCRC environment variable.

PC7757I (SMS) Disabled long name space
Reason: You specified the USSMSNOLONGNAMES environment variable.

PC7758I (SMS) Expand compressed files
Reason: You specified the USSMSEXPANDCOMPRESS environment variable.

PC7759I (SMS) Specified restore mode bit map (%lu)
Reason: You specified the USSMSRESTOREMODEBITMAP environment variable and the value above will be in effect.

PC7760W (SMS) Error listing target services.
Reason: UPSTREAM needs to list the target services to decide which one to use in the backup. The backup will attempt to continue, but may fail later when it attempts to use just the server name.
Action: Lookup Novell return code.

PC7761E (SMS) Not connected to get list of TS resources
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7762E (SMS) Error building resource list
Action: See additional messages.

PC7763E (SMS) Error listing service resources

Action: See additional messages.

PC7764E (SMS) Target service name (%s) not found.
Reason: Below is a list of valid target service names:

PC7765E (SMS) Error listing TSAs
Action: See additional messages.

PC7766W (SMS) Only one TSA list at a time allowed.
Action: Retry later.

PC7767W (SMS) Only one target service list busy.
Action: Retry later.

Language file errors.

PC7800W (Lang.) Error opening language file
Action: See additional messages.

PC7801W (Lang.) Error reading language file
Action: See additional messages.

PC7802D (Lang.) Duplicate English entry
Reason: The entry you specified in English matches an existing entry.
Action: Modify your entry.

PC7803W (Lang) Insufficient memory
Action: Close applications.

PC7804W (Lang) Insufficient memory
Action: Close applications.

PC7805W (Lang) Insufficient memory
Action: Close applications.

PC7806W (Lang.) English entry too short
Reason: You must specify at least 2 characters for the english language entry.
Action: Modify your language file.

PC7807W (Lang) Language entry too short
Reason: You must specify at least 1 character for the english replacement text.
Action: Modify your language file.

PC7808W (Lang.) Last quote missing in file
Reason: The closing quote is missing from the replacement text field.
Action: Modify your language file.

PC7809W (Lang.) Replacement missing in file
Reason: The English text exists, but the replacement language text is missing.
Action: Modify your language file.

Hard link errors.

PC7900E (Hard links) Error creating tree
Reason: There was a memory shortage creating the tree required for processing hard links.
Action: Free memory or close applications.

PC7901E (Hard links) Error adding to tree
Reason: There was a memory shortage adding to the tree required for processing hard links.
Action: Free memory or close applications.

PC7902I (Hard links) Unable to open file
Reason: The file open failed while checking hard link information.
Action: See messages above. Note that this error can generally be ignored.

PC7903I (Hard links) Error getting hard link info
Reason: When attempting to read the hard link information, there was a file system error.
Action: See messages below. Note that this error can generally be ignored.

PC7904W (Hard links) Error deleting hard links file
Action: See additional messages.

PC7905E (Hard links) Error creating restore file
Action: See additional messages.

PC7906E (Hard links) Error flushing restore file
Action: See additional messages.

PC7907E (Hard links) Unexpected hard link
Reason: After the first pass, a link was received. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7908E (Hard links) Invalid hard link non-file data
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7909E (Hard links) Bad non-file data subtype
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7910E (Hard links) Data size error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7911E (Hard links) Error writing hard link file
Reason: There was an I/O error writing the hard link temporary file.
Action: See file I/O errors.

PC7912E (Hard links) Error reading hard links file
Reason: There was an I/O error reading the hard links temporary file. No additional hard links will be restored.
Action: See file I/O errors.

PC7913E (Hard links) Error rewriting description
Action: See additional messages.

PC7914E (Hard links) Insufficient memory
Reason: While attempting to create a sub-tree in the tree of hard links, there was insufficient memory.
Action: Close applications or free memory.

PC7915E (Hard links) Insufficient memory
Reason: While attempting to add a hard link to the tree of hard links, there was insufficient memory.
Action: Close applications or free memory.

PC7916E (Hard links) Insufficient memory
Reason: While attempting to add a hard link file name to the hard links tree, there was insufficient memory.
Action: Close applications or free memory.

PC7917E (Hard links) Unrestartable restore
Reason: A fatal hard link error occurred earlier in the restore and thus it is non-restartable.
Action: Restart the restore from the beginning.

PC7918E (Hard links) Empty link tree
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7919E (Hard links) Unexpected end of link tree
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7920D (Hard links) Restore complete

PC7921E (Hard links) Error saving original specs
Action: See additional messages.

PC7922E (Hard links) No tree items
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7923E (Hard links) Error recovering original params
Action: See additional messages.

PC7924E (Hard links) No subtree in restore
Reason: This is an internal FDR/UPSTREAM error.

Action: Contact FDR/UPSTREAM Tech Support.

PC7925E (Hard links) File name doesn't match internal
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7926W (Hard links) Error deleting old link
Reason: There was a file I/O error deleting a file we wish to hard link to.
Action: See file I/O error.

PC7927W (Hard links) Link failed
Reason: There was a file I/O error when attempting to perform the hard link on your UNIX system.
Action: See file I/O error.

PC7928W (Hard links) Error opening link file
Reason: There was a file I/O error when attempting to open a file to link it to another file.
Action: See file I/O error.

PC7929E (Hard links) Insufficient memory
Reason: When creating the tree to hold the hard links received, there was insufficient memory.
Action: Close applications or free memory.

PC7930D (Hard links) Restoring hard links
Reason: Now that regular data has been restored, UPSTREAM will restore hard links. This may be performed multiple times depending upon how many hard links were requested.

PC7931E (Hard links) Expected file not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC7932E (Hard links) Original file name not found
Reason: Internal errror.
Action: Contact FDR/UPSTREAM Tech Support.

PC7933E (Hard links) Expected links and none found
Reason: Internal errror.
Action: Contact FDR/UPSTREAM Tech Support.

PC7934E (Hard links) Error saving original parameters
Action: See additional messages.

PC7935E (Hard links) Error recovering original parameters
Action: See additional messages.

PC7936E (Hard links) File not restored: %s
Reason: A previous error kept the hard linked file above from being restored. The data part of the file may not have been backed up due to an access error.

Backup File access errors continued.

PC8000E A user name for the UID is not defined
Action: Add a definition for the UID using the appropriate utility for your system.

PC8001E A group name for the GID is not defined
Action: Add a definition for the GID using the appropriate utility for your system.

PC8002E Bad translation tables for UTF-8
Action: Specify UPSTREAM unicode or one-to-one translation tables (such as ANS2ATOE.TAB and ANS2ETOA.TAB).

PC8003E Insufficient memory
Reason: While saving file system information for SOS timestamp files, there was insufficient memory.
Action: Free memory or close applications.

PC8004E Insufficient memory
Reason: While saving file system information for SOS timestamp files, there was insufficient memory.
Action: Free memory or close applications.

PC8005E Error seeking for write
Reason: While writing to the internal UPSTREAM backup file there was a file system error writing to the file.
Action: See additional messages.

PC8006E Error seeking for read
Reason: While reading from the internal UPSTREAM backup file there was a file system error writing to the file.
Action: See additional messages.

PC8007E (HPUX) sysfs call failed
Reason: The call to determine the file system type failed.
Action: See additional messages.

PC8008E (ALPHA) statfs call failed
Reason: The call to determine the file system type failed.
Action: See additional messages.

PC8009I (UNIX) Resolved to system path:

PC8010I (UNIX) Skip separate file system: %s

PC8011E (LINUX) statfs call failed
Reason: The call to determine the file system type failed.
Action: See additional messages.

PC8012D Skipping non LINUX file system
Reason: The following directory was included in the file specification, but is not a native LINUX file system and thus will not be included in the backup.

PC8013E Error reading backup file for restart
Reason: There was an error reading the backup file for the purpose of retrieving it's version date. This file is skipped, search for restartable backups will continue.
Action: See additional messages

PC8014E Error renaming backup file
Reason: Old restartable backup file with the same PID found, but attemp to rename it to preserve the contents failed. The old backup file will be overwritten.

PC8015E Error reading backup file
Reason: The file info record in the backup file is short.
Action: call atech Support

PC8016E Not local EXT2, Reiser or XFS file system
Reason: The file specification (below) is not part of a local Linux UNIX EXT2, Reiser or XFS file system. Only files in a local file system may be backed up with UPSTREAM.
Action: Respecify.

PC8017E Error sending idle message
Action: See additional messages.

PC8018E Can't skip backup scan and sort backup
Reason: These options are incompatible.
Action: Respecify.

PC8019E (UNIX) Error creating full system spec
Reason: There was an internal error creating a "fake" file spec used to indicate a file system in a full system backup.

PC8020E (UNIX) Error adding param to full system spec
Reason: There was an internal error updating a parameter in a "fake" file spec used to indicate a file system in a full system backup.

NTFile system errors (continued from #4679)

PC8100E (WinNT) Error adding access allowed ACE
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC8101E (WinNT) Error setting security DACL
Reason: During a registry authorization there was a Windows NT error.
Action: See additional messages.

PC8102E (WinNT) Set registry key security
Reason: During a registry authorization there was a Windows NT error.

Action: See additional messages.

PC8103E (WinNT) Error getting logged on user name
Action: See additional messages.

PC8104I (Win9x) Erase the temporary registry file
Reason: The following file name is the name of a temporary registry file that will be created on the target computer after the target computer is rebooted. The file name is relative to the target computer not this computer. This file should be deleted manually after the target computer has finished rebooting.

SAR error messages: Generic SAR error messages

PC9000I Entering SAR (v%s)

PC9001I Exiting SAR

PC9002E TCP/IP not running
Reason: TCP/IP is required for SAR. This is a fatal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9003W Error reading configuration file
Reason: SAR will attempt to create the config file. If this is the first time you are running SAR you should bring up your web browser, go to http://127.0.0.1:1973 and select "Overall Server Configuration Options" to validate configuration parameters.
Action: See additional messages

PC9004W Error writing configuration file
Action: See additional messages.

Registered name file access errors.

PC9090E Error opening registered name file.

PC9091E Error reading registered name file.

PC9092E Error reading registered name file.

PC9093E Error writing registered name file.

PC9094E Error deleting registered name file. Web access errors.

PC9100E Error beginning to listen for web requests
Action: See additional messages.

PC9101E Error checking for web requests
Action: See additional messages.

PC9102E Insufficient memory
Reason: While allocating memory for a small internal buffer (Web requests) there was a memory shortage.
Action: Close applications or Free disk space.

PC9103E Checking pending data
Action: See additional messages.

PC9104E Receiving a web screen
Action: See additional messages.

PC9105E Bad HTTP Command

PC9106E HTTP line too long

PC9107E HTTP empty file

PC9108E Error sending response
Action: See additional messages.

PC9109E Field not found
Action: Contact FDR/UPSTREAM Tech Support.

PC9110E Boolean field not initialized
Action: Contact FDR/UPSTREAM Tech Support.

PC9111E Value not found
Action: Contact FDR/UPSTREAM Tech Support.

PC9112E Value close quote not found
Action: Contact FDR/UPSTREAM Tech Support.

PC9113E No BODY in page
Action: Contact FDR/UPSTREAM Tech Support.

PC9114E Error adding extra message
Action: Contact FDR/UPSTREAM Tech Support.

PC9115E Bad hex parameter
Action: Contact FDR/UPSTREAM Tech Support.

PC9116E Bad parameter
Action: Respecify.

PC9117E Error writing configuration
Action: See additional messages.

PC9118E Bad UPSTREAM command
Action: Contact FDR/UPSTREAM Tech Support.

PC9119E Console already connected
Reason: You can only have one console connected at a time

PC9120E Error sending to console
Action: See additional messages.

PC9121E Insufficient memory
Reason: Error allocating memory to store a console message.
Action: Free memory.

PC9122E Console response received from non-console
Action: Contact FDR/UPSTREAM Tech Support.

PC9123E Console error received:

PC9124E Error beginning listening for console messages
Action: See additional messages.

PC9125E Error checking for new console tasks
Action: See additional messages.

PC9126E Insufficient memory
Action: Free memory or close applications.

PC9127E Error checking for console data
Action: See additional messages.

PC9128E Error receiving console messages
Action: See additional messages.

PC9129E Error sending console message
Action: See additional messages.

PC9130E Error getting task ID from message
Reason: There should have been a task ID in the console message. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9131E Error parsing console error messages
Action: Contact FDR/UPSTREAM Tech Support.

PC9132E Unknown type
Action: Contact FDR/UPSTREAM Tech Support.

PC9133E Error resending console messages
Action: See additional messages.

PC9134D Console requested termination
Reason: SAR will now terminate.

PC9135D Task killed by console request

PC9136W Error sent to console:

PC9137E Error sending console server info
Action: See subsequent messages.

PC9138E Insufficient memory
Reason: Can not process a web server message.
Action: Free memory or close applications.

PC9139E HTTP version not supported (not 1.0 or 1.1)
Action: Contact FDR/UPSTREAM Tech Support.

UPSTREAM host errors.

PC9150E Error beginning to listen for UPSTREAM requests
Action: See additional messages.

PC9151E Error checking for UPSTREAM requests
Action: See additional messages.

PC9152E Insufficient memory
Reason: While allocating data to process a new request.
Action: Close programs or free memory.

PC9153E Error sending console UPSTREAM response
Reason: When a console application requested to perform an UPSTREAM function on the web port there was an error sending the response allowing it to proceed.
Action: See subsequent communications error.

TCP/IP errors

PC9200E Error in initial socket call
Reason: To begin listening for requests, there was a TCP/IP error in the initial socket call.
Action: See additional messages.

PC9201E Insufficient memory
Reason: While allocating memory for a small internal buffer (TCP listen buffer) there was a memory shortage.
Action: Close applications or Free disk space.

PC9202D Error in reusing address
Reason: A non-fatal TCP/IP error occurred in the SO_REUSEADDR called to allow the socket to be quickly reused.
Action: See additional messages.

PC9203E Error in binding to socket
Reason: A fatal error occurred binding to a listening socket.
Action: Most likely this occurs when the listening socket is bound to another application.

PC9204E Error in listening on socket
Reason: A fatal error occurred listening on a socket.
Action: See additional messages.

PC9205E Error in setting socket (non)blocking
Reason: A fatal error occurred setting the blocking status of a socket.
Action: See additional messages.

PC9206E Error accepting remote connect
Action: See additional messages.

PC9207E Insufficient memory
Reason: While allocating memory for a small internal buffer (TCP accept buffer) there was a memory shortage.
Action: Close applications or Free disk space.

PC9208E Error checking for pending receive data
Action: See additional messages.

PC9209E Error receiving data
Action: See additional messages.

PC9210E Error sending data
Action: See additional messages.

PC9211E Error disabling the Nagle algorithm
Action: See additional messages.

PC9212E Error setting keep alives
Action: See additional messages.

PC9213E Received length incorrect
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9214E Error in initial socket call
Reason: While attempting to connect via TCP/IP there was an error in the initial socket call.
Action: See additional messages.

PC9215E Error in connect
Reason: While attempting to connect via TCP/IP there was an error in the connect call.
Action: See additional messages.

PC9216E Broken connection
Reason: While attempting to send, the remote process disconnected.
Action: Restart the remote process and retry.

Host communications errors

PC9225E State error
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9226E Remote system error
Reason: The above message came from the remote system.

PC9227E Expected data
Reason: While expecting data, received a “receive” indicator. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9228E Expected data
Reason: While expecting data, received a “deallocate” indicator. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9229E Expected data
Reason: While expecting data, received a “confirm” indicator. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9230E Unexpected confirmed
Reason: While expecting data, received a “confirmed” indicator. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9231E Unexpected data type on confirmed

PC9232E Insufficient memory
Reason: While allocating memory for record packing
Action: Close applications or free memory.

PC9233E Invalid packing type received
Action: Contact FDR/UPSTREAM Tech Support.

PC9234E Length in packing block too large
Action: Contact FDR/UPSTREAM Tech Support.

PC9235E Pack record length too small
Action: Contact FDR/UPSTREAM Tech Support.

PC9236E Standard packing invalid
Action: Contact FDR/UPSTREAM Tech Support.

PC9237E Fixed packing invalid
Action: Contact FDR/UPSTREAM Tech Support.

PC9238E Variable packing invalid
Action: Contact FDR/UPSTREAM Tech Support.

Program execution errors

PC9250E Error starting program

Action: See additional messages.

PC9251E Insufficient memory
Reason: There was a memory shortage allocating memory to track started task instances.
Action: Close applications.

PC9252E Error checking for program
Reason: While checking the execution status of a USTASK program, the following error was encountered.
Action: See additional messages.

PC9253E Error terminating USTASK
Action: See additional messages.

PC9254I Normal USTASK start

PC9255I Normal USTASK termination

PC9256W USTASK failed
Action: See earlier in this log.

PC9257E Error attaching to console facility
Action: See additional messages.

PC9258W Task to kill not found
Reason: The console user requested a kill of a specific task which is not found. Most likely the task already terminated.

Console access

PC9275E Error connecting to console
Action: See additional messages.

PC9276E Error occurred during wait for console response
Action: See additional messages.

Tape access errors

PC9300E Insufficient memory
Reason: There was a memory shortage allocating memory to list tape drives.
Action: Close applications.

PC9301I Error obtaining inquiry data for device
Reason: There was a Windows NT error obtaining inquiry data for the following device.
Action: Contact your FDR/UPSTREAM administrator.

PC9302E Insufficient memory
Reason: There was a memory shortage allocating memory to open the tape device.
Action: Close applications.

PC9303E Error opening selected SCSI address
Action: See additional messages.

PC9304E Error accessing tape information by name
Action: See additional messages.

PC9305E Name is not a tape drive
Reason: The SCSI name you passed in is not a tape drive.
Action: Respecify the name.

PC9306E Error reading block limits
Action: See additional messages.

PC9307E Error determining if a tape is mounted
Reason: While determining tape information, there was an error determining if the tape is mounted.
Action: See additional messages.

PC9308E Error testing if the tape unit is ready
Action: See additional messages.

PC9309E Error rewinding tape getting tape info
Action: See additional messages.

PC9310E Error rewinding tape
Action: See additional messages.

PC9311E Error spacing over the tape
Action: See additional messages.

PC9312E Error reading the tape position
Action: See additional messages.

PC9313E Error reading from the tape
Action: See additional messages.

PC9314E Tape not in host data format
Action: Mount the correct tape.

PC9315E Error reading tape label
Action: See additional messages.

PC9316E No host label on tape
Reason: An end of file or end of medium was encountered while reading the host label on the tape.
Action: Mount the correct tape.

PC9317E Host label not correct
Reason: This tape is missing the prefix label of “VOL1" on the tape header.
Action: Mount a host tape.

PC9318E Error reading tape label1
Action: See additional messages.

PC9319E No host label1 on tape
Reason: An end of file or end of medium was encountered while reading the host label 1 on the tape.
Action: Mount the correct tape.

PC9320E Host label 1 not correct
Reason: This tape is missing the prefix label of “HDR1" on the tape header.
Action: Mount a host tape.

PC9321E Tape not mounted
Action: Mount a tape.

PC9322E Error reading device configuration
Action: See additional messages.

PC9323E Tape target/LUN not found
Reason: During the open the specified target/LUN was not found on the specified SCSI device.
Action: Respecify.

PC9324E Bad tape device name
Action: See additional messages.

PC9325E Error ejecting tape
Action: See additional messages.

PC9326W Wrong tape
Reason: The tape you used has a different host file name than the last one.
Action: Insert the correct tape.

PC9327W Wrong tape
Reason: The tape you used is the wrong tape in sequence
Action: Insert the next tape in the sequence.

PC9328E Error inquiring on drive
Action: See additional messages.

PC9329E Error reopening drive after eject.
Action: See additional messages.

PC9330E Writes not supported
Reason: You must enable the Windows driver interface to perform backups.

PC9331E Error occurred during a write to tape

PC9332E Error writing a tape filemark

PC9333E Error setting tape variable blocksize

PC9334E Error rewinding to read tape label.

Intercomputer structure errors.

PC9400E Insufficient data
Reason: There must be at least 3 bytes passed to the parsing routines, and there was less.
Action: Contact FDR/UPSTREAM Tech Support.

PC9401E Unexpected structure received
Action: Contact FDR/UPSTREAM Tech Support.

PC9402E A required field is missing
Reason: Occurred during string parsing.
Action: Contact FDR/UPSTREAM Tech Support.

PC9403E Field exceeds data
Reason: During a parse, the field position plus the field length is greater than the structure length.
Action: Contact FDR/UPSTREAM Tech Support.

PC9404E Field length exceeds field
Reason: The length of a field is larger than the size given to hold the data.
Action: Contact FDR/UPSTREAM Tech Support.

PC9405E Struture has too few fields.
Action: Contact FDR/UPSTREAM Tech Support.

PC9410E Buffer exceeded
Reason: While constructing an intercomputer structure, the internal buffer length was exceeded.
Action: Contact FDR/UPSTREAM Tech Support.

Tape label access errors.

PC9420E Tape labels must be 80 bytes.
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9421W Bad tape number
Reason: This tape can't be used.

PC9422W Bad tape identifier
Reason: This tape can't be used.

PC9423E Internal label record build error
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

USLabel media labeling library errors.

PC9430W Invalid tape label
Reason: The tape label appeared to be an UPSTREAM tape but on further inspection failed integrity checking.
Action: Reformat this tape.

PC9431I UPSTREAM formatted tape: VolSer: %s

PC9432I Non-UPSTREAM formatted tape

Remote storage manager access errors.

PC9440E Error loading RSM module
Action: See additional messages

PC9441E Error opening NTMS session
Action: See additional messages

PC9442E Insufficient memory getting GUID list
Action: Free memory or close applications

PC9443E Error getting RSM list
Action: See additional messages

PC9444W Error getting drive information
Action: See additional messages

PC9445W Error getting media information
Action: See additional messages

PC9446E Error ejecting tape
Action: See additional messages

PC9447W No media found for the given drive
Reason: The media may already be ejected

PC9448E Drive not found
Reason: The drive was not found in the removable storage manager list.
Action: Contact FDR/UPSTREAM Tech Support.

PC9449E Eject information not found
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9450D Eject timed out.
Reason: The process will continue.

PC9451E Error getting object information
Action: See additional messages.

PC9452E Object not found
Action: See additional messages.

PC9453E Error getting pool information
Reason: If the additional messages indicate that the object is not found, you must create a storage pool named 'UPSTREAM' in Windows Computer Management.
Action: See additional messages.

PC9454E Error allocating new media
Action: See additional messages.

PC9455E Error mounting new media
Action: See additional messages.

PC9456E Error getting drive name mounting a new tape
Action: See additional messages.

PC9457E Improperly formatted GUID
Reason: The GUID is used to address remote storage manager objects, and must be 38 characters.
Action: Contact FDR/UPSTREAM Tech Support.

PC9458W Error occurred releasing a tape.

PC9459E Error ocurrred while mounting a tape.

PC9460W Error occurred unmounting a tape.

PC9461E Error occurred updating tape label.

PC9462E Error getting media info for %s

PC9463E Error getting partition list size
Reason: When allocating new media, there was an error determining the size of the list of existing partitions in the UPSTREAM pool.
Action: See additional messages.

PC9464E Error getting partition list
Reason: When allocating new media, there was an error getting the list of partitions in the UPSTREAM pool.
Action: See additional messages.

PC9465E Insufficient memory
Action: Free memory or close applications

PC9466E Media not found (%s)

Reason: Internal error.
Action: Call tech support.

PC9467E Error determining new VOLSER.
Reason: Internal error.
Action: Call tech support.

PC9468E Error getting PMID for media

Disk backup access errors.

PC9470E Insufficient memory.
Action: Close applications or free memory.

PC9471E Error opening backup file
Action: See additional messages.

PC9472E Error writing to backup file
Action: See additional messages.

PC9473E Error deleting backup file
Action: See additional messages.

PC9474E Error setting backup file position.
Action: See additional messages.

PC9475E Disk backup unexpected end of file in %s
Reason: Internal error.
Action: Call tech support.

PC9476E Disk backup file read length error
Reason: Internal error.
Action: See additional messages.

PC9477E Disk backup file read error
Reason: Internal error.
Action: See additional messages.

PC9478E Invalid length (%d) during read at %s in %s
Reason: Internal error.
Action: Call tech support.

PC9479E Invalid record length (%d) during read at %s in %s
Reason: Internal error.
Action: Call tech support.

PC9480E Invalid byte pointer (%u,%u) in %s
Reason: Internal error.
Action: Call tech support.

Restore errors.

PC9490E Insufficient memory
Action: Free memory or close applications.

PC9491E Insufficient memory
Action: Free memory or close applications.

PC9492E Insufficient memory
Action: Free memory or close applications.

PC9493E Invalid tape key length (%s)
Action: Contact FDR/UPSTREAM Tech Support.

PC9494E Invalid disk key length (%s)
Action: Contact FDR/UPSTREAM Tech Support.

PC9495E Error during a sorted restore

PC9496D Restore successful, sent %s files %s directories %s bytes

PC9497D Invalid record type (0x%x) ignored
Reason: Internal, non-fatal error
Action: Call tech support.

PC9498E Expected D record (%s)
Reason: Internal error.
Action: Call tech support.

PC9499E Expected F record (%s)
Reason: Internal error.
Action: Call tech support.

PC9500E Media doesn't match file index
Reason: Internal error.
Action: Call tech support. You should REINDEX or REGEN this media.

Intermediate host tape access errors.

PC9501E Bad length on the tape
Reason: This tape may not be usable.
Action: Contact FDR/UPSTREAM Tech Support.

PC9502E Bad record type on tape
Action: Verify that this is an UPSTREAM tape.

PC9503E Insufficient memory
Action: Close applications or free disk space.

PC9504E Error parsing tape catalog record
Action: See additional messages

PC9505E Bad tape record length
Action: Contact FDR/UPSTREAM Tech Support.

PC9506W Not C record
Reason: Repeating C records were supposed to follow the non-repeating C record. This is not a fatal error.

PC9507E Error parsing tape catalog repeated record
Action: See additional messages

PC9508E Error parsing tape file info record
Action: See additional messages

PC9509E Error build non-repeating catalog tape record
Action: See additional messages

PC9510E Error writing a record to tape.
Action: See additional messages

PC9511E Invalid record type (0x%x)
Reason: Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9512E Insufficient memory
Reason: Can't allocate write disk cache memory.
Action: Close programs or free memory.

PC9513E Can't convert media to binary
Reason: Internal error.
Action: Call tech support.

PC9514E Unknown record type (0x%x)
Reason: Internal error.
Action: Call tech support.

PC9515E Error reading first record
Action: See additional messages.

PC9516E Expected 'C' record, found %c record
Reason: Internal error. Indicates tape corruption.
Action: Call tech support.

Scheduler errors

PC9520I (Scheduler) Loading schedules from %s
Reason: Scheduler started.

PC9521E (Scheduler) Schedule file(s) in use by process #%s
Reason: Scheduler was not started.

PC9522E (Scheduler) Schedule file(s) not found in %s
Reason: Scheduler was not started.

PC9523E (Scheduler) Error creating Scheduler PID file: %s %s
Reason: Scheduler was not started.

PC9524E (Scheduler) Scheduler is stopping.
Reason: Scheduler was not started. Try later.

PC9525E (Scheduler) Scheduler is reloading schedules.
Reason: Scheduler was not started. Try later.

PC9526E (Scheduler) Scheduler is in unknown state.
Reason: Scheduler was not started. Try later.

PC9527I (Scheduler) No schedules found.
Reason: Scheduler was not started.

PC9528E (Scheduler) Error parsing parameters from:

PC9529E (Scheduler) Error processing schedule parameters from:

PC9530E (Scheduler) Schedule "%s" on %s: %s

PC9531I (Scheduler) FDR/UPSTREAM (schedule "%s") on %s finished %s

PC9532I (Scheduler) FDR/UPSTREAM started from "%s" on %s

PC9533E (Scheduler) FDR/UPSTREAM start failed

PC9534E (Scheduler) Error reading schedules

PC9535E (Scheduler) Error checking contingency for %s: %s

PC9536E (Scheduler) Error saving running schedules to %s: %s %s

PC9537E (Scheduler) Error reading saved schedules from: %s.

PC9538E (Scheduler) Wrong format or old version of save file: %s

PC9539E (Scheduler) Memory allocation error reading from save file: %s
Reason: Free memory and restart Scheduler.

PC9540I (Scheduler) Reloading new schedules from %s.

PC9541I (Scheduler) FDR/UPSTREAM (schedule "%s") on %s failed.

PC9542I (Scheduler) FDR/UPSTREAM (schedule "%s") on %s communication failed.
Reason: Check FDR/UPSTREAM log on the remote site.

PC9543I (Scheduler) Started %s, ended %s

PC9544E (Scheduler) Scheduler is stopped (or stopping).
Reason: Scheduler was not resumed. Try later.

PC9545E (Scheduler) Scheduler is stopped (or stopping).
Reason: Scheduler was not suspended. Try later.

PC9546E (Scheduler) Scheduler is stopped (or stopping).
Reason: Scheduler was not reloaded. Try later.

PC9547E (Scheduler) Error processing scheduler command.

PC9548I (Scheduler) Received command: '%s %s'

PC9549I (Scheduler) Command processed.

PC9550E (Scheduler) Unknown command.

PC9551E (Scheduler) Error deleting SchedulerID file..

PC9552I (Scheduler) Scheduler is stopped now.

PC9553I (Scheduler) All schedules resumed.

PC9554I (Scheduler) All schedules suspended.

PC9555I (Scheduler) Scheduler DISABLED.

PC9556E (Scheduler) Error processing scheduler info request.

PC9557I (Scheduler) Received 'show %s jobs' request.

PC9558E (Scheduler) Scheduler is stopped (or stopping).
Reason: No job information available. Try later.

PC9559I (Scheduler) Schedule "%s" resumed.

PC9560I (Scheduler) Schedule "%s" suspended.

PC9561I (Scheduler) Schedule to suspend not found.

PC9562I (Scheduler) Schedule to resume not found.

PC9563E (Scheduler) Scheduler is stopped (or stopping).
Reason: Scheduler was not unloaded. Try later.

PC9564I (Scheduler) Schedule to unload not found.

PC9565I (Scheduler) Schedule "%s" unloaded.

PC9566I (Scheduler) All schedules unloaded.

PC9567I (Scheduler) Schedule "%s" loaded.

PC9568I (Scheduler) Schedule to reload not found.

PC9569E (Scheduler) Schedule processing error:

PC9570I (Scheduler) Scheduled job skipped.

SAR tasking errors.

PC9600E Error getting socket from SAR
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9601E Error receiving initial request
Action: See additional messages.

PC9602E Insufficient memory
Reason: Error allocating task buffer.
Action: Close applications or free memory.

PC9603E Error occurred while getting initial task data
Action: See additional messages.

PC9604E No data to receive
Reason: There was no data pending in the initial receive from the remote. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9605E Error parsing start conversation
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9606E Error receiving task from remote
Reason: After receiving the start conversation, there was an error receiving the remote request.
Action: See additional messages.

PC9607E Unsupported task
Reason: The specified task is not currently supported.
Action: Request a supported task.

PC9608E Unsupported initial task
Reason: The specified task is not currently supported.
Action: Request a supported task.

PC9609D Host send performance test

PC9610D Host receive performance test

PC9611E Host send performance test

PC9612E Host receive performance test

PC9613D Security validation

PC9614E Security validation

PC9615D Performance test successful

PC9616D Security validation successful

PC9617D Registration request

PC9618D Inquire versions

PC9619E Inquire versions

PC9620E No tape drives found

PC9621E Drive selection during inquire versions

PC9622E User requested termination

PC9623E Error opening drive

PC9624E Unexpected end of tape/disk file

PC9625E Unexpected end of tape/disk media

PC9626E Unexpected tape record type

PC9627E Backup profile on tape does not match request

PC9628E Version on tape does not match request

PC9629D File inquiry

PC9630E Error occurred during file inquiry

PC9631E No files matched specification

PC9632D File inquiry sent %ld files (skipped %ld files)

PC9633D Restore request

PC9634E Error occurred during restore

PC9635D Restore successful, sent %ld files (skipped %ld files)

PC9636E File transfer not supported

PC9637E Too many duplicates
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.
Action: Contact FDR/UPSTREAM Tech Support.

PC9638E Insufficient memory
Reason: During the file sort there were too many files for the amount of available memory.
Action: Free memory and/or disk, close applications, or use the USDNOINQUIRESORT environment variable.

PC9639E Error parsing
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9640E Insufficient memory
Reason: During the restore there were too many files for the amount of available memory.
Action: Free memory and/or disk, close applications or specify a single version restore.

PC9641E Insufficient memory
Reason: During a file inquiry there were too many files for the amount of available memory.
Action: Free memory and/or disk, close applications or specify a single version restore.

PC9642E Unknown console task
Reason: The request was not known by this version of UPSTREAM.
Action: Verify that the console is running the same version of UPSTREAM as this facility.

PC9643D Regen process

PC9644E Error occurred during a regen

PC9645D Regen backup complete %ld files/dirs

PC9646D Regen tape complete %d backups %ld files/dirs

PC9647W Error sending status messages
Reason: The process will continue.

PC9648E Exceeded maximum mount retries

PC9649E Exceeded maximum mount retries (on secondary tape)

PC9650D Backup request

PC9651E Error occurred during backup

PC9652D Backup successful, received %s files, %s directories, %s bytes

PC9653E Insufficient memory
Reason: Could not allocate media list
Action: Free memory or close applications.

PC9654E Error occurred while initializing a new tape.

PC9655E Unexpected end of medium
Reason: The tape was too short to write tape header info.
Action: Retry with a longer tape.

PC9656E Error creating backup synchonization file
Reason: The backup profile is most likely in use.
Action: Retry later.

PC9657D Beginning backup, Profile %s, Version Date %s

PC9658D Backup broken but preserved
Reason: The backup had a communications error, but is being preserved for partial restores or a later restart.

PC9659E Backup failed.

PC9660E Error writing tape trailer

PC9661E Insufficient memory
Reason: While setting up for a file inquiry.
Action: Free memory or close programs.

PC9662E No backups found
Reason: No backups were found that matched the combination of backup profile and version date that you specified on the inquiry.
Action: Respecify.

PC9663E No files found that match inquiry request
Action: Respecify.

PC9664E Error occurred during registration.

PC9665E No registered clients found.

PC9666I Registration request successful

PC9667E Insufficient memory
Reason: While allocating a small amount of memory to begin mounting tapes or disk files.
Action: Close programs or free memory.

PC9668D Not a host formatted tape
Reason: Please insert the requested tape.

PC9669D Wrong tape. Expected VOLSER: %s, got %s
Reason: Please insert the requested tape.

PC9670E Error seeking to tape start
Action: See additional messages.

PC9671E No data on tape
Reason: End of media or end of file occurred on the first file entry.

Action: Bad tape - exclude this backup from your selection.

PC9672E Error reading profile info (%s)
Action: See additional messages.

PC9673I Using global configuration for profile %s

PC9674I Using default configuration for profile %s

PC9675E Database must be enabled
Action: Run the web configuration and enable the database.

PC9676I New tape label. VolSer: %s

PC9677I Updated tape label. VolSer: %s

PC9678I Remove backup request. Profile: %s, Version: %s

PC9679E Error occurred during remove backup.

PC9680I Remove backup successful.

File info package errors.

PC9700E Insufficient memory
Reason: While allocating memory for a FileInfo handle, there was insufficient memory.
Action: Free memory and/or disk, or close applications.

PC9701E Error creating database
Action: See file I/O messages.

PC9702E Error writing database header block
Action: See file I/O messages.

PC9703E Error deleting file info file
Action: See file I/O messages.

PC9704E Error writing backup description
Action: See file I/O messages.

PC9705E Error writing backup description
Action: See file I/O messages.

PC9706E No repeated list
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9707E Error creating database index
Action: See file I/O messages.

PC9708E Error allocating memory
Action: Close applications or free memory.

PC9709E Error writing file information
Action: See file I/O messages.

PC9710E Unqualified file name
Reason: During an index operation an unqualified file name was detected.
Action: Contact FDR/UPSTREAM Tech Support.

PC9711E Insufficient memory
Reason: There was insufficient memory adding an index entry to the directory list.
Action: Close applications or free memory

PC9712E Insufficient memory
Reason: There was insufficient memory adding an index entry to the directory list.
Action: Close applications or free memory

PC9713E Insufficient memory
Reason: There was insufficient memory adding an index entry to the files list.
Action: Close applications or free memory

PC9714E Error writing index header
Action: See file I/O messages.

PC9715E Error writing index directory entry
Action: See file I/O messages.

PC9716E Error writing index file entry
Action: See file I/O messages.

PC9717E Error opening file info file
Action: See file I/O messages.

PC9718E End of file in read of partial length
Action: Contact FDR/UPSTREAM Tech Support.

PC9719E Read data greater than the maximum
Action: Contact FDR/UPSTREAM Tech Support.

PC9720E End of file when expecting data
Reason: You may need to delete this file.
Action: Contact FDR/UPSTREAM Tech Support.

PC9721E Error reading file info header
Reason: You may need to delete this file.
Action: See additional messages.

PC9722E Invalid structure type
Action: Contact FDR/UPSTREAM Tech Support.

PC9723W Invalid header
Reason: The header fields do not match the file. The file will be used anyway.

PC9724E Invalid file version
Reason: The file info file has a greater version than supported by this version of the program.
Action: Upgrade this program.

PC9725E Error reading index header
Action: See additional messages.

PC9726E Index does not match the file info file
Reason: The file will be reindexed now.

PC9727W Index not completed
Reason: The file will be reindexed now.

PC9728E Error reading non-repeating description
Action: See additional messages.

PC9729E Error reading repeating description
Action: See additional messages.

PC9730E Error reading file info for reindex
Action: See additional messages.

PC9731E Error parsing file info during reindex
Action: See additional messages.

PC9732E Error searching for backups (first)
Action: See additional messages.

PC9733E Error searching for backups (next)
Action: See additional messages.

PC9734E Error adding file to index
Action: Free memory or close applications.

PC9735E Bad file info file name
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9736E Error deleting file info file
Action: See subsequent I/O messages.

PC9737E Error deleting directory index file
Action: See subsequent I/O messages.

PC9738E Error opening index of files
Action: Verify that you have both the directory and file index files for a given file info file.

PC9739E Error reading files index file
Action: See subsequent I/O errors.

PC9740W Files index file bad
Reason: An automatic reindex will be performed.

PC9741W File info data size too large
Reason: This file will be skipped (assumed to be bad).

PC9742E Error writing tape record.
Action: See additional messages.

PC9743E Insufficient memory
Action: Free memory or close applications.

PC9744E Insufficient memory
Action: Free memory or close applications.

PC9745E Insufficient memory
Action: Free memory or close applications.

PC9746E No backups found
Reason: No backups match the backup profile/version date combination that you specified.
Action: Respecify.

PC9747E Invalid file spec - No level above
Reason: Your file spec must include a slash or backslash.
Action: Respecify

PC9748E Occurred during directory search read

PC9749E Occurred during a file list (by index)

PC9750E Occurred during a file list (by entry)

PC9751E Occurred during file information processing

PC9752E Exceeded maximum number of tapes.
Action: You will need to increase the maximum number of tapes in the UPSTREAM configuration and then re-run your backup.

PC9753E Internal read error

PC9754E Error reading directory index file
Action: Reindex this backup.

PC9755E Error reading file index file
Action: Reindex this backup.

PC9756E Unexpected EOF reading file index file.
Action: Reindex this backup.

PC9757E Insufficient memory
Action: Free memory or close applications.

PC9758E Backup #%d not found
Reason: Internal error.
Action: Call tech support.

PC9759E Exceeded number of tapes (%u %u)
Reason: Internal error.
Action: Call tech support.

PC9760E Error reading tape entry from file info file.
Reason: Internal error.
Action: Call tech support.

PC9761E Error deleting file index file
Action: See subsequent I/O messages.

Garbage collection errors.

PC9800E Insufficient memory
Reason: Garbage collection can't be performed.
Action: Free memory or close applications.

PC9801I Releasing tape: %s (volser %s)

PC9802I Deleting backup. Profile: %s, Version date: %s

PlugIn errors

PC9900W (PlugIn) Can't load PlugIn
Reason: The specified PlugIn file cannot be loaded.
Action: Make sure the PlugIn is appropriate for the operating system you are using. If it is not, remove it from the PlugIn subdirectory.

PC9901W (PlugIn) Can't Load PlugIn Negotiate function
Reason: The specified PlugIn file does not have a fpbPlugInNegotiate function. The PlugIn is being unloaded.
Action: Make sure the DLL file is indeed a UPSTREAM PlugIn module. If it is not, remove it from the PlugIn subdirectory.

PC9902W (PlugIn) PlugIn negotiation process failed
Reason: The negotiation process for the specified PlugIn file failed. The PlugIn is being unloaded.
Action: Make sure the PlugIn is appropriate for the operating system you are using. If it is not, remove it from the PlugIn subdirectory. See additional messages for more information.

PC9903W (PlugIn) PlugIn version mismatch
Reason: The specified PlugIn file has a different version than US.EXE. The PlugIn is being unloaded.
Action: Obtain the version of the PlugIn module that matches the version of US.exe being used and copy it to the PlugIn subdirectory.

PC9904E (PlugIn) Can't allocate memory for a PlugIn
Reason: There is insufficient memory to allocate a PlugIn control block.
Action: See additional messages.

PC9905E (PlugIn) PlugIn for file spec not found
Reason: A file specification has referenced a PlugIn which is not loaded.
Action: See additional messages.

PC9906E (PlugIn) Invalid ACTION parameter for PlugIn
Reason: The ACTION parameter specified is invalid when used with a PlugIn.
Action: See additional messages.

PC9907E (PlugIn) Restore file specs use two or more PlugIns
Reason: The set of restore parameters has file specs that use two or more different PlugIns. A PlugIn restore may have any number of file specs, but all of the file specs must use the same PlugIn.
Action: Respecify.

PC9908E (PlugIn) Invalid BACKUPVERIFY
Reason: The ACTION parameter specified is invalid when used with a PlugIn.
Action: See additional messages.

PC9909E (PlugIn) Invalid CALCDASDSIZE
Reason: The CALCDASDSIZE parameter specified is invalid when used with a PlugIn.
Action: See additional messages.

PC9910E (PlugIn) Invalid FILETRANSFER
Reason: The FILETRANSFER parameter specified is invalid when used with a PlugIn.
Action: See additional messages.

PC9911E (PlugIn) Invalid LANWSNAME
Reason: The LANWSNAME parameter specified is invalid when used with a PlugIn.
Action: See additional messages.

PC9914E (PlugIn) Invalid NDS
Reason: The NDS file spec parameter specified is invalid when used with a PlugIn.
Action: Respecify.

PC9915E (PlugIn) Function not exported
Reason: A file handle is being used for a function which is not exported. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9916E (PlugIn) PlugIn mismatch
Reason: A file handle is for a PlugIn which is not the active one. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC9917E (PlugIn) Active PlugIn required
Reason: This function is using a PlugIn file handle but there is no active PlugIn. This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

WinAD PlugIn errors

PC10001E (WinAD) PLUGINPARAMETERS are invalid
Reason: One or more of the required parameters are missing or one or more of any of the parameters are invalid. The PLUGINPARAMETERS parameter follows.
Action: Supply a valid PLUGINPARAMETERS parameter, particularly the SERVER sub-parameter.

PC10003W (WinAD) Unable to determine status of NTDS server
Reason: The online status of the NTDS server as specified in the PLUGINPARAMETERS SERVER sub-parameter could not be determined. It will be assumed that the NTDS server is offline.

PC10004E (WinAD) The NTDS server is not online
Reason: The NTDS server as specified in the PLUGINPARAMETERS SERVER sub-parameter is not online. The NTDS server must be online to perform a backup.
Action: Make sure the NTDS server is booted in an Advanced Option mode other than “Directory Services Restore Mode” and then try the backup again.

PC10005E (WinAD) Invalid file spec type
Reason: Only include file specs may be specified for a backup or restore operation. Exclude and Migrate file specs are not allowed.
Action: Remove all Exclude and Migrate file specs from the backup or restore specification and try the backup or restore again.

PC10006E (WinAD) Too many WinAD file specs for server
Reason: More than one file spec using the WinAD PlugIn reference the same NTDS server.
Action: Make sure all of the file specs that use the WinAD PlugIn reference unique NTDS servers. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10007E (WinAD) Error setting default file spec parameters
Reason: One or more errors occurred while trying to set the default file spec parameters for a file spec using the WinAD PlugIn.
Action: Contact FDR/UPSTREAM Tech Support.

PC10008E (WinAD) The specified version was interrupted
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters was interrupted and cannot be used for a restore.
Action: Specify a different backup version from which to perform the restore.

PC10009E (WinAD) An error occurred reading file spec
Reason: An internal UPSTREAM error occurred while reading one of the file spec definitions for a backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10010E (WinAD) The specified version has bad file spec
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters has a file spec definition that is different than what was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10011E (WinAD) Invalid number of file specs for version
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not have exactly one file spec definition for the WinAD backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10012E (WinAD) A required DLL cannot be loaded
Reason: An error occurred while attempting to load a DLL. The name of the DLL follows. This DLL is required by the WinAD PlugIn (WinAD.dll) to perform NTDS backup and restore operations.
Action: The WinAD PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove WinAD.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10013E (WinAD) A DLL function cannot be loaded
Reason: One or more of the API functions exported by one or more of the DLLs required by the WinAD PlugIn could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10014E (WinAD) An error occurred preparing for backup
Reason: A NTDS error occurred while preparing to perform a backup operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC10015E (WinAD) Error getting DB file name list
Reason: A NTDS error occurred while getting the list of database file names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10016E (WinAD) Error getting log file name list
Reason: A NTDS error occurred while getting the list of log file names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10017E (WinAD) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.

PC10018E (WinAD) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10019E (WinAD) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10020I (WinAD) Truncating the NTDS transaction logs
Reason: The NTDS backup was successful. The NTDS transaction logs will now be truncated.

PC10021E (WinAD) Error truncating transaction logs
Reason: A NTDS error occurred while truncating the NTDS transaction logs after a successful backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10022I (WinAD) Truncating of NTDS transaction logs skipped
Reason: One or more errors occurred during an NTDS backup. The NTDS transaction logs will not be truncated.
Action: See additional messages.

PC10023E (WinAD) Error ending backup
Reason: A NTDS error occurred while ending the NTDS backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10024E (WinAD) Error registering NTDS restore
Reason: A NTDS error occurred while registering a NTDS restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10025E (WinAD) Error completing failed restore registration
Reason: A NTDS error occurred while completing a NTDS restore registration after a failed restore registration.
Action: Contact FDR/UPSTREAM Tech Support.

PC10026I (WinAD) Completing NTDS restore registration
Reason: A NTDS restore was registered successfully. The restore registration will now be completed.

PC10027E (WinAD) Error completing ok restore registration
Reason: A NTDS error occurred while completing a NTDS restore registration after a successful restore registration.
Action: Contact FDR/UPSTREAM Tech Support.

PC10028I (WinAD) The NTDS restore will not be registered

Reason: A NTDS error occurred while performing a restore. The NTDS restore registration will be skipped.
Action: Contact FDR/UPSTREAM Tech Support.

PC10029E (WinAD) Error ending restore
Reason: A NTDS error occurred while ending a NTDS restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10030W (WinAD) File(s) still open after backup
Reason: One or more NTDS backup connections were still open after the backup finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10031W (WinAD) File(s) still open after restore
Reason: One or more NTDS restore connections were still open after the restore finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10032E (WinAD) Invalid backup open file mode
Reason: An internal UPSTREAM error occurred while trying to open a WinAD PlugIn backup file with the wrong backup file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10033E (WinAD) Invalid restore open file mode
Reason: An internal UPSTREAM error occurred while trying to open a WinAD PlugIn restore file with the wrong restore file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10034E (WinAD) Invalid operation type
Reason: An internal UPSTREAM error occurred while trying to open a WinAD PlugIn backup file while in an invalid internal state.
Action: Contact FDR/UPSTREAM Tech Support.

PC10035E (WinAD) Can't parse server name
Reason: An internal UPSTREAM error occurred while trying to parse the NTDS server name from the PLUGINPARAMETERS value.
Action: Contact FDR/UPSTREAM Tech Support.

PC10036E (WinAD) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from a WinAD PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10037E (WinAD) Invalid whole record read request
Reason: An internal UPSTREAM error occurred while trying to read a whole buffer from a WinAD PlugIn file. than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10038E (WinAD) Error closing NTDS database or log file
Reason: A NTDS error occurred while closing a database or log file after reading from it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10039E (WinAD) Error opening NTDS database or log file
Reason: A NTDS error occurred while opening a database or log file to prepare for reading from it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10040E (WinAD) Error reading NTDS database or log file
Reason: A NTDS error occurred while reading a database or log file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10041E (WinAD) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10042E (WinAD) Can't bind to directory service
Reason: A NTDS error occurred while binding to the nearest directory service.
Action: Contact FDR/UPSTREAM Tech Support.

PC10043E (WinAD) Can't get site name
Reason: A NTDS error occurred while getting the name of the local site.
Action: Contact FDR/UPSTREAM Tech Support.

PC10044E (WinAD) Can't get list of servers for site
Reason: A NTDS error occurred while obtaining a list of DS servers in the local site.
Action: Contact FDR/UPSTREAM Tech Support.

PC10045E (WinAD) No servers in site
Reason: A list of DS servers in the local site was obtained from NTDS, but the list does not contain any server names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10046E (WinAD) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to a WinAD PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10047E (WinAD) Invalid backup header signature
Reason: An internal UPSTREAM error occurred while trying to validate the backup header signature in a WinAD PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10048E (WinAD) No NTDS database files in backup
Reason: An internal UPSTREAM error occurred while trying to validate the number of individual NTDS database files in a WinAD PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10049E (WinAD) An error occurred preparing for restore
Reason: A NTDS error occurred while preparing to perform a restore operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC10050D (WinAD) Error getting DB locations
Reason: A NTDS error occurred while getting the list database and log file locations.
Action: The WinAD.dll PlugIn will use the original file locations recorded in the backup. In most cases this will be ok.

PC10051E (WinAD) Insufficient memory for restore file map
Reason: While attempting to allocate memory for a restore file map, there was insufficient memory.
Action: Close applications or free memory.

PC10052E (WinAD) Invalid file header signature
Reason: An internal UPSTREAM error occurred while trying to validate a file header signature for a single NTDS file in a WinAD PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10053E (WinAD) Can't locate log file directory
Reason: A NTDS error occurred while type to locate the log file directory name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10054E (WinAD) Can't locate database file directory
Reason: A NTDS error occurred while type to locate the database file directory name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10055E (WinAD) Can't locate unknown file type directory
Reason: A NTDS error occurred while type to locate the directory name for a file with an unknown file type.
Action: Contact FDR/UPSTREAM Tech Support.

PC10056E (WinAD) Insufficient memory for DB name
Reason: While attempting to allocate memory for a database file name, there was insufficient memory.
Action: Close applications or free memory.

PC10057E (WinAD) Insufficient memory for new DB name
Reason: While attempting to allocate memory for a new database file name, there was insufficient memory.
Action: Close applications or free memory.

PC10058E (WinAD) Error creating NTDS database or log file
Reason: A NTDS error occurred while creating a database or log file to prepare for writing to it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10059E (WinAD) Error writing NTDS database or log file
Reason: A NTDS error occurred while writing a database or log file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10060I (WinAD) A NTDS log file was renamed

Reason: A NTDS log file was renamed in preparation for a restore. Following are the old log file name and the new log file name. The renamed log file should be deleted manually after a successful NTDS restore.

PC10061E (WinAD) Insufficient memory for backup context
Reason: While attempting to allocate memory for a backup context, there was insufficient memory.
Action: Close applications or free memory.

PC10062E (WinAD) Insufficient memory for restore context
Reason: While attempting to allocate memory for a restore context, there was insufficient memory.
Action: Close applications or free memory.

PC10063E (WinAD) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-WinAD PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10064E (WinAD) Can't get list of NTDS sites
Reason: A NTDS error occurred while obtaining a list of DS sites.
Action: Contact FDR/UPSTREAM Tech Support.

PC10065E (WinAD) Can't determine local site DN
Reason: A list of DS sites was obtained from NTDS, but the local site name was not found in this list.
Action: Contact FDR/UPSTREAM Tech Support.

PC10066E (WinAD) The NTDS server is not offline
Reason: The NTDS server as specified in the PLUGINPARAMETERS SERVER sub-parameter is not offline. The NTDS server must be offline to perform a restore.
Action: Make sure the NTDS server is booted in the "Directory Services Restore Mode" and then try the restore again.

PC10067E (WinAD) OS not Windows 2000 Server
Reason: The WinAD PlugIn is intended to be run on the Windows 2000 Server operating system only and the detected operating system is not Windows 2000 Server.
Action: Remove WinAD.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system really is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10068E (WinAD) Insufficient memory for read buffer
Reason: While attempting to allocate memory for a read buffer, there was insufficient memory.
Action: Close applications or free memory.

PC10069E (WinAD) Can't open the HKEY_LOCAL_MACHINE key
Reason: An error occured while registering the restore of the NTDS database files. The HKEY_LOCAL_MACHINE key for the computer could not be opened.
Action: Contact FDR/UPSTREAM Tech Support.

PC10070E (WinAD) Can't create the Restore in Progress key
Reason: An error occured while registering the restore of the NTDS database files. The SYSTEM\CurrentControlSet\ Services\NTDS\Restore in Progress key could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10071E (WinAD) Can't create the BackupLogPath value
Reason: An error occured while registering the restore of the NTDS database files. The BackupLogPath value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10072E (WinAD) Can't create the CheckpointFilePath value
Reason: An error occured while registering the restore of the NTDS database files. The CheckpointFilePath value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10073E (WinAD) Can't create the HighLog Number value
Reason: An error occured while registering the restore of the NTDS database files. The HighLog Number value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10074E (WinAD) Can't create the LogPath value
Reason: An error occured while registering the restore of the NTDS database files. The LogPath value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10075E (WinAD) Can't create the LowLog Number value
Reason: An error occured while registering the restore of the NTDS database files. The LowLog Number value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10076E (WinAD) Can't create the NTDS Database recovered value
Reason: An error occured while registering the restore of the NTDS database files. The NTDS Database recovered value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10077E (WinAD) Can't create the NTDS_RstMap value
Reason: An error occured while registering the restore of the NTDS database files. The NTDS_RstMap value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10078E (WinAD) Can't create the NTDS_RstMap Size value
Reason: An error occured while registering the restore of the NTDS database files. The NTDS_RstMap Size value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10079E (WinAD) Can't create the Parameters key
Reason: An error occured while registering the restore of the NTDS database files. The SYSTEM\CurrentControlSet\ Services\NTDS\Parameters key could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10080E (WinAD) Can't create the New Database GUID value
Reason: An error occured while registering the restore of the NTDS database files. The New Database GUID value could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10081E (WinAD) Can't create the New Database GUID
Reason: An error occured while attempting to create the New Database GUID.
Action: Contact FDR/UPSTREAM Tech Support.

PC10082E (WinAD) Can't create the New Database GUID string
Reason: An error occured while attempting to create the New Database GUID string.
Action: Contact FDR/UPSTREAM Tech Support.

PC10083W (WinAD) Use the SysState PlugIn instead
Reason: Starting with version 3.1.5 of FDR/UPSTREAM, the WinAD PlugIn should no longer be used to backup or restore a Windows 2000 Active Directory. The functionality of the WinAD PlugIn has been replaced by the new SysState PlugIn.
Action: Modify your backup and restore specifications to use the SysState PlugIn instead of the WinAD PlugIn.

NotesR5 plug-in errors

PC10101E (NotesR5) Notes not loaded
Action: See additional messages

PC10102E (NotesR5) Function load error
Action: See additional messages

PC10103E (NotesR5) Initialization error
Action: See additional messages

PC10104E (NotesR5) File open bad mode
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10105E (NotesR5) Insufficient memory
Reason: During Notes plug-in processing.
Action: Free memory and/or disk, or close applications.

PC10106E (NotesR5) Not a NotesR5 file
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10107E (NotesR5) Error getting Notes data directory
Reason: This is required for all UPSTREAM functions so, the plug in is disabled.
Action: See additional messages.

PC10108E (NotesR5) Error translating file name
Action: See additional messages.

PC10109E (NotesR5) Error creating database
Action: See additional messages.

PC10110E (NotesR5) Error opening database
Action: See additional messages.

PC10111E (NotesR5) Error in NSFBackupStart
Action: See additional messages.

PC10112E (NotesR5) Error in getting logging status
Action: See additional messages.

PC10113I (NotesR5) Database is not logged
Reason: Resulting backup file will not be recoverable.
Action: Use the notes administrator to make this a logged database or accept the inability to recover from transaction logs.

PC10114W (NotesR5) Circular logging
Reason: You have requested a notes backup with circular transaction logging. This will work, but UPSTREAM will not back up the transaction logs as they can not be recovered.
Action: Use the notes administrator to set standard logging or set LOGFILES=N in the plug-in parameters.

PC10115E (NotesR5) Error getting transaction log style
Action: See additional messages.

PC10116E (NotesR5) Error beginning archive log list
Action: See additional messages.

PC10117E (NotesR5) Invalid LOGFILES parameter
Reason: The form for LOGFILES is: LOGFILES=Y
Action: Respecify.

PC10118E (NotesR5) Error getting first log file
Action: See additional messages.

PC10119E (NotesR5) Error getting next log file
Action: See additional messages.

PC10120E (NotesR5) Error creating log file spec
Action: Contact FDR/UPSTREAM Tech Support.

PC10121E (NotesR5) Error copying to new spec
Action: Contact FDR/UPSTREAM Tech Support.

PC10122E (NotesR5) Invalid LOG parameter
Reason: This parameter should not be entered manually
Action: Respecify.

PC10123E (NotesR5) Can't restart Notes backup
Action: Start from the beginning

PC10124W (NotesR5) Restart not supported
Reason: UPSTREAM will disable restart for this backup.

PC10125E (NotesR5) LOGFILES ONLY defined with logs
Reason: You specified a LOGFILES ONLY specification and you already have logfiles specified.
Action: Respecify.

PC10126E (NotesR5) Log file invalid on direct restore
Reason: You can not select log files to be restored directly; you must use the log files plug in parameters option. The file will be skipped.
Action: Respecify.

PC10127E (NotesR5) Error translating log file name
Action: See additional messages.

PC10128E (NotesR5) Notes specified a log file not found
Action: Contact FDR/UPSTREAM Tech Support.

PC10129E (NotesR5) Wildcard in search
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10130E (NotesR5) Error getting change info size
Action: See additional messages.

PC10131E (NotesR5) Error taking database offline
Action: See additional messages.

PC10132E (NotesR5) Error starting apply of log changes
Action: See additional messages.

PC10133E (NotesR5) Error getting changed info
Action: See additional messages.

PC10134E (NotesR5) Error in applying changed info
Action: See additional messages.

PC10135E (NotesR5) Error deleting temporary file
Action: See additional messages.

PC10136E (NotesR5) Could not create temp file
Reason: The file name reported was the last name tried.
Action: See additional messages.

PC10137E (NotesR5) Inconsistant versions
Reason: The version of the Notes PlugIn does not match the version of UPSTREAM.
Action: Upgrade both to the latest version.

PC10138E (NotesR5) Server not logging
Reason: The server is not using transaction logging so your request to backup transaction logs can't be serviced.
Action: Turn on transaction logging on the server or turn off transaction logs for this backup.

PC10139E (NotesR5) Insufficient memory
Reason: While saving the transaction log file name, there was insufficient memory.
Action: Close applications or free memory.

PC10140D (NotesR5) No transaction logs to archive

PC10141W (NotesR5) No transaction logs to archive
Reason: There were no transaction logs to archive and you requested a transaction log only backup. No backup will be performed.
Action: Specify the FORCELOG=Y plug in parameter if you wish to guarantee that log file backups will always backup something.

PC10142E (NotesR5) Log file not found
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10143D (NotesR5) Can't determine if new backup needed
Reason: The following error was returned in a NSFIsNewBackupNeeded Notes call.
Action: See additional messages.

PC10144E (NotesR5) Invalid DBCHANGEDCHECK parameter
Reason: The form for DBCHANGEDCHECK is:
DBCHANGEDCHECK=Y
Action: Respecify.

PC10145I (NotesR5) Database not logged (%s)
Reason: This database is not logged and will be backed up fully.

PC10146I (NotesR5) Database DBIID changed (%s)
Reason: This database's DBIID changed since the last backup and will be backed up fully.

PC10150D (NotesR5) Setting up log backup
Reason: This may be somewhat time consuming and there will be no display during this process.

PC10152E (NotesR5) Error saving existing parameters
Reason: While setting up a backup using the NotesR5 PlugIn, there was an error saving your existing parameters.
Action: Verify your workpath is correct.

PC10153E (NotesR5) Error saving existing parameters
Reason: While setting up a backup using the NotesR5 PlugIn, there was an error saving your existing parameters.
Action: Verify your workpath is correct.

PC10154D (NotesR5) Error setting attributes
Action: See additional messages.

PC10155D (NotesR5) Error resetting file information
Action: See additional messages.

PC10156W (NotesR5) Error completing log backup
Reason: While attempting to notify Notes that the log file backup had completed, there was an internal error.
Action: See additional messages.

PC10157E (NotesR5) Can't restore log files only
Reason: Log files must be applied to specific restored Notes databases.
Action: Respecify.

PC10158E (NotesR5) Insufficient memory
Reason: While attempting to save a restored database name for later log file application, there was insufficient memory.
Action: Close applications or free memory.

PC10159W (NotesR5) Error bringing database online
Reason: There was a Notes error bringing the specified database back online after a DB restore.
Action: See Notes return code.

PC10160E (NotesR5) Insufficient memory
Reason: While attempting to allocate memory for the list of databases to pass to the Notes log recovery facility there was insufficient memory.
Action: Close applications or free memory.

PC10161W (NotesR5) Error bringing database online
Reason: There was a Notes error bringing the specified database back online after applying transaction logs following a restore.
Action: See Notes return code.

PC10162E (NotesR5) Error recovering databases from logs
Reason: There was a Notes error recovering the selected databases from the logs.
Action: See Notes return code

PC10163D (NotesR5) Recovery complete

PC10164E (NotesR5) Error setting field
Reason: During log file recovery there was an error setting one of the UPSTREAM fields.
Action: Contact FDR/UPSTREAM Tech Support.

PC10165E (NotesR5) Must not restore logs directly
Reason: You specified that the internal name for a transaction log file be restored. Transaction logs can only be restored by selecting transaction logs in the plug in parameters.
Action: Notes will restore the file when necessary. If you truly want to manually restore a transaction log, you can set the environment variable USNOTESALLOWLOGRESTORE to any value and rerun the restore request.

PC10166D (NotesR5) Beginning log file recovery
Reason: Subsequent restores are log files specified by Notes. For GUI 32-bit Windows, the restore dialogs will not be associated with the main window. This is due to the way that Notes requests log files and can not be avoided.

PC10167E (NotesR5) Error saving plug in parameters
Action: See additional messages.

PC10168W (NotesR5) Error in a pending log force
Reason: After completing the backup of the existing logs (which didn't require a force) when we attempt to restart the log search so that we can perform the force we got a Notes error.
Action: See additional messages.

PC10171E No non pending log entries
Reason: This is an internal FDR/UPSTREAM error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10172D (NotesR5) Error getting attributes
Action: See additional messages.

PC10173E (NotesR5) Recovery time specified wrong
Reason: You must specify recovery time as 14 numeric digits: YYYYMMDDHHMMSS.
Action: Respecify.

PC10174E (NotesR5) Recovery time specified wrong
Reason: The date is invalid.
Action: Respecify.

PC10175E (NotesR5) Recovery time can't be used
Reason: When attempting to convert the specified recovery time to Notes format, there was a non-specific Notes error.
Action: Respecify.

PC10176E (NotesR5) Recovery time bad
Reason: Recovery time specifies a time before 1/1/70.
Action: Respecify.

PC10177I (NotesR5) Using recovery time: %s

PC10178E (NotesR5) Directory environment missing
Reason: The "Directory" environment variable is missing from the NOTES.INI file and there is no NOTES_DATA_DIRECTORY environment variable.
Action: Set the NOTES_DATA_DIRECTORY environment variable to the main Domino data directory.

PC10179E (NotesR5) TRANSLOG_Path environment missing
Reason: The "TRANSLOG_Path" environment variable is missing from the NOTES.INI file or the environment.
Action: Set the TRANSLOG_Path environment variable.

PC10180E (NotesR5) No transaction logs found
Reason: If you delete or rename the Domino transaction log control file "nlogctrl.lfh", or make a major transaction log configuration change, the counter file that UPSTREAM uses will be out of sync with the existing transaction logs.
Action: Delete the file "LASTARCH.US" in the Domino transaction log directory and perform a new full backup.

PC10181E (NotesR5) Non log requires a destination
Reason: An active log or notes.ini file is backed up to a pseudo directory (a made up name). You must specify a proper destination. Note that active logs or the notes.ini file should only be restored in the event of a disaster.
Action: Respecify.

PC10182E (NotesR5) notes.ini not found in USNOTESINI
Reason: The USNOTESINI environment variable was set, but the notes.ini file was not found there.
Action: Properly specify USNOTESINI.

PC10183E (NotesR5) notesini not found
Reason: Since you specified a log file backup, UPSTREAM attempts to locate the notes.ini file. It looked for the USNOTESINI environment variable, it looked in the "Directory" notes environment variable, and it looked in the directory above that variable but was still unable to find the file.
Action: Specify USNOTESINI in your job stream or as an environment variable pointing to the fully qualified file name of the notes.ini file.

PC10184E (NotesR5) Error creating Notes archive file
Reason: There was an error creating the file used to hold the last backup archived.
Action: See additional messages.

PC10185E (NotesR5) Error opening Notes archive file
Reason: There was an error opening the file used to hold the last backup archived.
Action: See additional messages.

PC10186E (NotesR5) Error writing Notes archive file
Reason: There was an error writing to the file used to hold the last backup archived,
Action: See additional messages.

PC10187E (NotesR5) Error reading Notes archive file
Reason: There was an error reading the file used to hold the last backup archived,
Action: See additional messages.

PC10188I (NotesR5) Archive file not found.
Reason: UPSTREAM keeps track of the last archived log file in the following name. If UPSTREAM has yet to archive a log file, this is a normal message; otherwise this is an error and extra log files may be backed up.

PC10189E (NotesR5) LOGBACKUPPROFILE bad.
Reason: The LOGBACKUPPROFILE Notes R5 PlugIn parameter is an override for the backup profile if you are using multiple copies of UPSTREAM for your backups and the log file is backed up in another spec. This must follow the backup profile rules.
Action: Respecify.

PC10190D (NotesR5) User requested manual log restore
Reason: The user specified the USNOTESALLOWLOGRESTORE environment variable which allows an archive log to be restored. Normally, these are only restored when Notes requests them and then it is automatic.

PC10191I (NotesR5) Error opening to check DBIID
Reason: There was an error opening a database to check it's DBIID to determine if the file had changed. UPSTREAM will attempt to include it in the backup.

PC10192I (NotesR5) Error opening DBIID file for read
Reason: There was an error opening the UPSTREAM database's DBIID file.
Action: See additional messages.

PC10193I (NotesR5) Error opening DBIID file for write
Reason: There was an error opening the UPSTREAM database's DBIID file.
Action: See additional messages.

PC10194I (NotesR5) Error reading DBIID file
Reason: There was an error reading the UPSTREAM database's DBIID file.
Action: See additional messages.

PC10195I (NotesR5) Error writing DBIID file
Reason: There was an error reading the UPSTREAM database's DBIID file.
Action: See additional messages.

PC10196I (NotesR5) No prior logged backup for %s - it will be backed up now
Reason: The DBIID file was not found for this database. This is generally because this is a non-logged database. The database will now be backed up.

PC10197I (NotesR5) Error opening database to check DBIID
Reason: There was a Notes error opening the database to check the DBIID to determine if the database needs to be fully backed up. Thus, the full database will be backed up.

PC10198I (NotesR5) Error getting log info checking DBIID
Reason: There was a Notes error retrieving the log info for a database. Thus the full database will be backed up.

PC10199W (NotesR5) Error above for file: %s

WinCrypt PlugIn errors

PC10201E (WinCrypt) OS not Windows 2000
Reason: The WinCrypt PlugIn is intended to be run on the Windows 2000 operating system only and the detected operating system is not Windows 2000.
Action: Remove WinCrypt.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system really is Windows 2000, contact FDR/UPSTREAM Tech Support.

PC10202E (WinCrypt) A required DLL cannot be loaded
Reason: An error occurred while attempting to load a DLL. The name of the DLL follows. This DLL is required by the WinCrypt PlugIn (WinCrypt.dll) to perform encrypted backup and restore operations.
Action: The WinCrypt PlugIn is intended to be run on the Windows 2000 operating system only. If the operating system is not Windows 2000, remove WinCrypt.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000, contact FDR/UPSTREAM Tech Support.

PC10203E (WinCrypt) A DLL function cannot be loaded
Reason: One or more of the API functions exported by one or more of the DLLs required by the WinCrypt PlugIn could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10204E (WinCrypt) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10205E (WinCrypt) Error opening a file
Reason: An error occurred while attempting to open a file for encrypted raw file processing.
Action: Contact FDR/UPSTREAM Tech Support.

PC10206E (WinCrypt) Error creating a semaphore
Reason: A semaphore required for the processing of an encrypted file could not be created.
Action: Contact FDR/UPSTREAM Tech Support.

PC10207E (WinCrypt) Error starting a new thread
Reason: A new thread required for the processing of an encrypted file could not be started.
Action: Contact FDR/UPSTREAM Tech Support.

PC10208E (WinCrypt) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from an encrypted file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10209E (WinCrypt) Error reading a file
Reason: An error occurred while reading from an encrypted file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10210E (WinCrypt) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to an encrypted file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10211E (WinCrypt) Error writing a file
Reason: An error occurred while writing to an encrypted file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10212E (WinCrypt) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-WinCrypt PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10213E (WinCrypt) Error getting file Security Descriptor
Reason: An error occurred while attempting to get a security descriptor for an encrypted file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10214E (WinCrypt) Error setting file Security Descriptor
Reason: An error occurred while attempting to set a security descriptor for an encrypted file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10215E (WinCrypt) Error getting dir Security Descriptor
Reason: An error occurred while attempting to get a security descriptor for an encrypted directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC10216E (WinCrypt) Error setting dir Security Descriptor
Reason: An error occurred while attempting to set a security descriptor for an encrypted directory.
Action: Contact FDR/UPSTREAM Tech Support.

PC10217E (WinCrypt) Backup non-file data buffer to small
Reason: A buffer to be used for backing up the security descriptor for an encrypted file or directory is too small to hold the entire security descriptor.
Action: Contact FDR/UPSTREAM Tech Support.

PC10218E (WinCrypt) Restore non-file data buffer to small
Reason: A buffer containing a group of non-file data streams for an encrypted file or directory is too small to contain a complete stream header.
Action: Contact FDR/UPSTREAM Tech Support.

PC10219E (WinCrypt) Insufficient memory for SecDesc
Reason: While attempting to allocate memory for a security descriptor, there was insufficient memory.
Action: Close applications or free memory.

PC10220E (WinCrypt) Error (re)encrypting a directory
Reason: A directory on the backup was encrypted, but an error occurred while attempting to encrypt the directory after the directory was restored.
Action: Contact FDR/UPSTREAM Tech Support.

MSSQL PlugIn errors

PC10301I (MSSQL) Microsoft SQL Server Message
Reason: The following message was issued by the Microsoft SQL server in response to a SQL command.
Action: Determine if an error condition exists on the Microsoft SQL Server.

PC10302I (MSSQL) Microsoft SQL Server Error
Reason: The following error was issued by the Microsoft SQL server in response to a SQL command.
Action: Determine if an error condition exists on the Microsoft SQL Server.

PC10303E (MSSQL) Can't restore master database with others
Reason: A file spec was found which attempts to restore the master database along with files specs for other databases. This is not allowed. The master database must be restored by itself while the Microsoft SQL server is in single user mode and before any other databases are restored.
Action: Do not attempt to restore the master database with any other database.

PC10304E (MSSQL) Insufficient memory for row
Reason: While attempting to allocate memory for a row, there was insufficient memory.
Action: Close applications or free memory.

PC10305E (MSSQL) Insufficient memory for field
Reason: While attempting to allocate memory for a field, there was insufficient memory.
Action: Close applications or free memory.

PC10306E (MSSQL) Insufficient memory for table
Reason: While attempting to allocate memory for a table, there was insufficient memory.
Action: Close applications or free memory.

PC10307E (MSSQL) Error on SQL command
Reason: While processing a SQL command, an error occurred.
Action: Contact FDR/UPSTREAM Tech Support.

PC10308E (MSSQL) Insufficient memory for results
Reason: While attempting to allocate memory for a set of database query results, there was insufficient memory.
Action: Close applications or free memory.

PC10309E (MSSQL) Can't add a SQL command to buffer
Reason: While processing a SQL command, an error occurred which prevented the SQL command from being added to the SQL command buffer.
Action: Contact FDR/UPSTREAM Tech Support.

PC10310E (MSSQL) Can't send a SQL command to server
Reason: While processing a SQL command, an error occurred which prevented the SQL command from being sent to the Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10311E (MSSQL) Can't get login record
Reason: An error occurred while attempting to connect to a Microsoft SQL Server which prevented the allocation of login record.
Action: Contact FDR/UPSTREAM Tech Support.

PC10312E (MSSQL) Cant set Login ID in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10313E (MSSQL) Cant set Login Password in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10314E (MSSQL) Cant set trusted connection in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10315E (MSSQL) Cant set timeout in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10316E (MSSQL) Cant set DB-Library version in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10317E (MSSQL) Cant set host name in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10318E (MSSQL) Cant set application name in login record
Reason: An error occurred while building the login record required for opening a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10319E (MSSQL) Can't open a Microsoft SQL Server connection
Reason: An error occurred while attempting to open a connection to a Microsoft SQL Server. This connection failure may be due to an attempt to use a trusted connection (i.e. not supplying a SQL Server Login ID and Passord). In this case, retry the connection using an explicit connection by supplying a SQL Server Login ID and Password.
Action: Contact FDR/UPSTREAM Tech Support if an explicit connection does not work.

PC10320E (MSSQL) Can't close a Microsoft SQL Server connection
Reason: An error occurred while attempting to close a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10321E (MSSQL) Can't query the MASTER database
Reason: A error occurred while performing a query against a table in a Microsoft SQL Server MASTER database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10322E (MSSQL) One or more PLUGINPARAMETERS are invalid
Reason: One or more of the individual parameters in the PLUGINPARAMETERS parameter are invalid.
Action: Specify a correct PLUGINPARAMETERS parameter.

PC10323E (MSSQL) Invalid MERGE type
Reason: The merge type specified by the MERGE parameter is invalid. It must be a value other than 0.
Action: Contact FDR/UPSTREAM Tech Support.

PC10324E (MSSQL) Duplicate server/databases in file specs
Reason: Two or more file specs reference the same Microsoft SQL Server and database combination.
Action: Remove the duplicate server/database file spec. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10325E (MSSQL) Error setting default file spec parameters
Reason: An internal UPSTREAM error occurred while attempting to set a number of default file spec parameters.
Action: Contact FDR/UPSTREAM Tech Support.

PC10326E (MSSQL) Can't enumerate Microsoft SQL Servers
Reason: An error occurred while attempting to get a list of available Microsoft SQL Servers. If this message contains the text "dbserverenum return code = 2" then you have a problem with your SQL Server Client Network configuration. Make sure that you have the correct setting specified for SQL Client network library.
Action: Contact FDR/UPSTREAM Tech Support.

PC10327E (MSSQL) Database backup or restore error
Reason: One or more errors occurred while attempting to backup or restore a Microsoft SQL Server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10328I (MSSQL) Database backup or restore successful

Reason: A backup or restore of a Microsoft SQL Server database was successful. A number of messages or errors from the Microsoft SQL Server may follow, but any error conditions described may be safely ignored since it did not effect the backup or restore.
Action: You may want to examine the messages and errors from the Microsoft SQL Server to determine if an internal Microsoft SQL Server condition needs attention.

PC10329E (MSSQL) Can't parse Microsoft SQL Server version
Reason: An error occurred while attempting to parse the version information for a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10330E (MSSQL) A required DLL cannot be loaded
Reason: An error occurred while attempting to load a DLL. The name of the DLL follows. This DLL is required by the MSSQL PlugIn (MSSQL.dll) to access the Microsoft SQL Servers.
Action: Ensure that you are running FDR/UPSTREAM on a Microsoft SQL Server machine and that the NTWDBLIB.DLL file exists in a directory that is in the path. If you are running UPSTREAM on a Windows NT/2000 system that does not have Microsoft SQL Server installed on it, remove MSSQL.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If Microsoft SQL Server is installed, contact FDR/UPSTREAM Tech Support.

PC10331E (MSSQL) A DLL function cannot be loaded
Reason: One or more of the API functions exported by the NTWDBLIB.DLL required by the MSSQL PlugIn could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10332E (MSSQL) Can't open a semaphore
Reason: An operating system error occurred while attempting to open a semaphore needed for the proper operation of the MSSQL PlugIn.
Action: Contact FDR/UPSTREAM Tech Support.

PC10333E (MSSQL) Can't initailize the DB-Library interface
Reason: An error occurred while initializing the DB-Library interface.
Action: Contact FDR/UPSTREAM Tech Support.

PC10334E (MSSQL) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.

PC10335E (MSSQL) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10336E (MSSQL) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10337E (MSSQL) An error occurred reading a file spec
Reason: An internal UPSTREAM error occurred while reading the file spec information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10338E (MSSQL) A specified file spec cannot be found
Reason: A file spec specified by the FILES parameter does not exist.
Action: Specify a different file spec to be restored.

PC10339E (MSSQL) Insufficient memory for version
Reason: While attempting to allocate memory for a version, there was insufficient memory.
Action: Close applications or free memory.

PC10340E (MSSQL) An error occurred reading a file spec
Reason: An internal UPSTREAM error occurred while reading the file spec information for a full merge backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10341E (MSSQL) A full merge version cannot be found
Reason: A full merge version previous to the version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10342E (MSSQL) An error occurred reading full merge version
Reason: An internal UPSTREAM error occurred while reading the version information for a full merge backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10343E (MSSQL) Error on a 'use database' command
Reason: An error occurred while attempting to change the active Microsoft SQL Server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10344E (MSSQL) Can't get the database size
Reason: An error occurred while attempting to get the size of a Microsoft SQL Server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10345E (MSSQL) Can't parse the database size
Reason: An error occurred while attempting to parse the size of a Microsoft SQL Server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10346E (MSSQL) Invalid file mode
Reason: An internal UPSTREAM error occurred with the file mode while attempting to open up a named pipe.
Action: Contact FDR/UPSTREAM Tech Support.

PC10347E (MSSQL) Invalid PLUGINPARAMETERS parameter
Reason: The PLUGINPARAMETERS parameter is invalid.
Action: Specify a correct PLUGINPARAMETERS parameter.

PC10348E (MSSQL) Insufficient memory for file info
Reason: While attempting to allocate memory for a set of file information, there was insufficient memory.
Action: Close applications or free memory.

PC10349E (MSSQL) Can't start the backup/restore thread
Reason: An operating system error occurred while attempting to start another thread to issue a SQL server command to start a backup or restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10350E (MSSQL) The database is in use
Reason: A restore was started for a SQL server database that is currently in use by another process.
Action: Make sure the database is not in use before retrying the restore.

PC10351E (MSSQL) Can't get the connection process info
Reason: An error occurred while attempting to get the process informamtion for a connection to a Microsoft SQL Server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10352E (MSSQL) Can't open cluster
Reason: An error occurred while attempting to open the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10353E (MSSQL) Can't start cluster resource enumeration
Reason: An error occurred while attempting to start a cluster resource enumeration for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10354E (MSSQL) Can't enumerate cluster resource
Reason: An error occurred while attempting to enumerate a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10355E (MSSQL) Can't open cluster resource
Reason: An error occurred while attempting to open a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10356E (MSSQL) Can't get cluster resource properties
Reason: An error occurred while attempting to get the properties for a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10357E (MSSQL) Can't parse cluster resource property
Reason: An error occurred while attempting to parse the Name property value from the list of properties for a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10358E (MSSQL) Can't determine cluster node name

Reason: An error occurred while attempting to determine the name of the cluster node that the specified SQL Server virtual machine is hosted on.
Action: Contact FDR/UPSTREAM Tech Support.

PC10359E (MSSQL) Can't parse cluster resource property
Reason: An error occurred while attempting to parse the RemapPipeNames property value from the list of properties for a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10360E (MSSQL) Can't restore msdb database with others
Reason: A file spec was found which attempts to restore the msdb database along with files specs for other databases. This is not allowed. The msdb database must be restored by itself while the Microsoft SQL server is in single user mode and before any other databases are restored.
Action: Do not attempt to restore the msdb database with any other database.

PC10361E (MSSQL) Invalid Director request type received
Reason: A PlugIn Request Type was received from the Director which is invalid. The invalid PlugIn Request Type follows.
Action: Contact FDR/UPSTREAM Tech Support.

PC10362E (MSSQL) Can't get cluster resource state
Reason: An error occurred while attempting to get the state of a cluster resource for the specified cluster name.
Action: Contact FDR/UPSTREAM Tech Support.

WinQuota PlugIn errors

PC10401E (WinQuota) Can't create a quota object
Reason: An error occured while attempting to connect to the quota management subsystem.
Action: Make sure that you have the appropiate permissions to connect to the quota management subsystem.

PC10402E (WinQuota) Can't initialize a quota object
Reason: An error occured while attempting to access the quota information for the specified drive.
Action: Make sure that the specified drive is an NTFS5 drive and that you have the appropiate permissions to connect to the quota management subsystem for that drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10403E (WinQuota) Can't get quota state
Reason: An error occured while attempting to get the current quota state for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10404E (WinQuota) Can't get quota flags
Reason: An error occured while attempting to get the current quota flags for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10405E (WinQuota) Can't get default limit
Reason: An error occured while attempting to get the current quota limit for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10406E (WinQuota) Can't get default threshold
Reason: An error occured while attempting to get the current quota warning threshold for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10407E (WinQuota) Can't get Sid length
Reason: An error occured while attempting to get the length of a user's Sid for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10408E (WinQuota) Can't get Sid
Reason: An error occured while attempting to get a user's Sid for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10409E (WinQuota) Can't get user limit
Reason: An error occured while attempting to get a user's quota limit for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10410E (WinQuota) Can't get user threshold
Reason: An error occured while attempting to get a user's quota warning threshold for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10411E (WinQuota) Can't create an enumeration object
Reason: An error occured while attempting to access the user information for the specified drive
Action: Contact FDR/UPSTREAM Tech Support.

PC10412E (WinQuota) Can't set quota state
Reason: An error occured while attempting to set the quota state for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10413E (WinQuota) Can't set quota flags
Reason: An error occured while attempting to set the quota flags for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10414E (WinQuota) Can't set default limit
Reason: An error occured while attempting to set the default limit for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10415E (WinQuota) Can't set default threshold
Reason: An error occured while attempting to set the default warning threshold for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10416E (WinQuota) Can't create a user object
Reason: An error occured while attempting to access the quota information for a particular user to set the user's information.
Action: Contact FDR/UPSTREAM Tech Support.

PC10417E (WinQuota) Can't set user limit
Reason: An error occured while attempting to set a user's quota limit for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10418E (WinQuota) Can't set user threshold
Reason: An error occured while attempting to set a user's quota warning threshold for the specified drive.
Action: Contact FDR/UPSTREAM Tech Support.

PC10419E (WinQuota) Invalid PLUGINPARAMETERS parameter
Reason: The PLUGINPARAMETERS parameter is invalid.
Action: Specify a correct PLUGINPARAMETERS parameter.

PC10420E (WinQuota) Invalid file spec type
Reason: Only include file specs may be specified for a backup or restore operation. Exclude and Migrate file specs are not allowed.
Action: Remove all Exclude and Migrate file specs from the backup or restore specification and try the backup or restore again.

PC10421E (WinQuota) Duplicate drives in file specs
Reason: Two or more file specs reference the same drive.
Action: Remove the duplicate drive file spec. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10422E (WinQuota) Error setting default file spec parms
Reason: An internal UPSTREAM error occurred while attempting to set a number of default file spec parameters.
Action: Contact FDR/UPSTREAM Tech Support.

PC10423E (WinQuota) The specified version was interrupted
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters was interrupted and cannot be used for a restore.
Action: Specify a different backup version from which to perform the restore.

PC10424E (WinQuota) An error occurred reading file spec
Reason: An internal UPSTREAM error occurred while reading one of the file spec definitions for a backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10425E (WinQuota) The specified version has bad file spec

Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters has a file spec definition that is different than what was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10426E (WinQuota) Can't initialize the COM interface
Reason: An error occured while attempting to initialize the COM interface with the operating system.
Action: Contact FDR/UPSTREAM Tech Support.

PC10427E (WinQuota) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10428E (WinQuota) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10429E (WinQuota) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10430W (WinQuota) Backup files still open
Reason: One or more files are still open after backing up the quota information for the specified drives.
Action: Contact FDR/UPSTREAM Tech Support.

PC10431W (WinQuota) Restore file still open
Reason: One or more files are still open after restoring the quota information for the specified drives.
Action: Contact FDR/UPSTREAM Tech Support.

PC10432W (WinQuota) Data still pending
Reason: A set of quota information is still pending to be processed after a backup or restore operation of the quota information for the specified drives.
Action: Contact FDR/UPSTREAM Tech Support.

PC10433E (WinQuota) Invalid open file mode
Reason: An internal UPSTREAM error occurred while trying to open a WinQuota PlugIn file for backup or restore with the wrong file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10434E (WinQuota) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10435E (WinQuota) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from a WinQuota PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10436E (WinQuota) Invalid whole record read request
Reason: An internal UPSTREAM error occurred while trying to read a whole buffer from a WinQuota PlugIn file. than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10437E (WinQuota) Can't get quota information
Reason: An error occured while attempting to get a set of quota information.
Action: See additional messages.

PC10438E (WinQuota) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to a WinQuota PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10439E (WinQuota) Can't set quota information
Reason: An error occured while attempting to set a set of quota information.
Action: See additional messages.

PC10440E (WinQuota) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-WinQuota PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10441E (WinQuota) Error getting domain computer names
Reason: An error occurred while attempting to get the list of computers in the current domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10442E (WinQuota) Error getting writable disk drives
Reason: An error occurred while attempting to get the list of writable disks for the following computer name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10443E (WinQuota) Invalid Director request type received
Reason: A PlugIn Request Type was received from the Director which is invalid. The invalid PlugIn Request Type follows.
Action: Contact FDR/UPSTREAM Tech Support.

MSESE PlugIn errors

PC10501E (MSESE) Error truncating transaction logs
Reason: An ESE error occurred while truncating the transaction logs after a successful backup.
Action: See additional messages.

PC10502W (MSESE) Can't get list of truncated log files
Reason: The truncation of the transaction log files was successful, but an ESE error occurred while attempting to get the list of truncated log file.
Action: See additional messages.

PC10503I (MSESE) A transaction log file was truncated
Reason: The following transaction log file was truncated after a successful backup:

PC10504E (MSESE) Can't close a database group after backup
Reason: An ESE error occurred while attempting to close a database group after backing it up.
Action: See additional messages.

PC10505E (MSESE) Can't save environment after restore
Reason: An ESE error occurred while attempting to save the restore environment after a restore.
Action: See additional messages.

PC10506E (MSESE) Can't complete a restore
Reason: An ESE error occurred while attempting to complete a restore.
Action: See additional messages.

PC10507E (MSESE) Can't close a restore
Reason: An ESE error occurred while attempting to close a restore.
Action: See additional messages.

PC10508E (MSESE) Can't rename a log file
Reason: A system error occurred while attempting to rename a transaction log file in preparation for a restore.
Action: See additional messages.

PC10509I (MSESE) A log file was renamed
Reason: In preparation for a restore the following transaction log file was renamed. You should manually delete this renamed file after the restore has finished successfully.
Action: See additional messages.

PC10510E (MSESE) A database group is not mounted
Reason: The following database group cannot be backed up because it is not mounted.
Action: Mount the database group before attempting to back it up.

PC10511E (MSESE) Can't open database group for backup
Reason: An ESE error occurred while attempting to open a database group to back it up.
Action: See additional messages.

PC10512E (MSESE) A database group database is mounted
Reason: The following database group cannot be restored because one or more of its databases are mounted.
Action: Dismount all of the databases for the database group before attempting to restore it.

PC10513E (MSESE) Can't open database group for restore
Reason: An ESE error occurred while attempting to open a database group to restore it.
Action: See additional messages.

PC10514E (MSESE) Can't get environment
Reason: An ESE error occurred while attempting to get the restore environment after starting a restore.
Action: See additional messages.

PC10515E (MSESE) Can't reopen a database group for restore
Reason: An ESE error occurred while attempting to reopen a database group to resume restoring to it.
Action: See additional messages.

PC10516E (MSESE) Can't close an application
Reason: An ESE error occurred while attempting to close an application after opening it to get the list of its database groups.
Action: See additional messages.

PC10517E (MSESE) Insufficient memory for server
Reason: While attempting to allocate memory for a server, there was insufficient memory.
Action: Close applications or free memory.

PC10518E (MSESE) Can't get list of servers
Reason: An ESE error occurred while attempting to get a list of ESE nodes which includes the list of ESE servers.
Action: See additional messages.

PC10519E (MSESE) Can't get list of applications
Reason: An ESE error occurred while attempting to get a list of applications for an ESE server.
Action: See additional messages.

PC10520E (MSESE) Insufficient memory for application
Reason: While attempting to allocate memory for an application, there was insufficient memory.
Action: Close applications or free memory.

PC10521E (MSESE) Can't get list of database groups
Reason: An ESE error occurred while attempting to get a list of database groups for an application.
Action: See additional messages.

PC10522E (MSESE) Insufficient memory for database group
Reason: While attempting to allocate memory for a database group, there was insufficient memory.
Action: Close applications or free memory.

PC10523E (MSESE) Insufficient memory for database
Reason: While attempting to allocate memory for a database, there was insufficient memory.
Action: Close applications or free memory.

PC10524I (MSESE) No log files were truncated
Reason: No transaction log files were truncated after a successful backup.

PC10525E (MSESE) Invalid PLUGINPARAMETERS parameter
Reason: The PLUGINPARAMETERS parameter is invalid.
Action: Specify a correct PLUGINPARAMETERS parameter.

PC10526E (MSESE) Invalid backup type
Reason: The backup type for an MSESE backup must be either First-time full, Full merge or Incremental merge.
Action: Specify a valid backup type.

PC10527E (MSESE) Duplicate parameters in file specs
Reason: Two or more MSESE file specs reference the same server/application/database group combination.
Action: Remove the duplicate server/application/database group file spec. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10528E (MSESE) Error setting default file spec parms
Reason: An internal UPSTREAM error occurred while attempting to set a number of default file spec parameters.
Action: Contact FDR/UPSTREAM Tech Support.

PC10529E (MSESE) A required DLL cannot be loaded
Reason: An error occurred while attempting to load a DLL. The name of the DLL follows. This DLL is required by the MSESE PlugIn (MSESE.dll) to access the ESE servers, applications and database groups.
Action: Ensure that you are running FDR/UPSTREAM on a Windows NT/2000 system and that the ESEBCLI2.DLL file exists in a directory that is in the path. If you are running UPSTREAM on a Windows NT/2000 system that does not have the ESEBCLI2.DLL file, remove MSESE.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the ESEBCLI2.DLL file exists on your system, ensure that it is in a directory that is in the path.

PC10530E (MSESE) A DLL function cannot be loaded
Reason: One or more of the API functions exported by the ESEBCLI2.DLL required by the MSESE PlugIn could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10531E (MSESE) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10532E (MSESE) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10533E (MSESE) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10534E (MSSQL) An error occurred reading a file spec
Reason: An internal UPSTREAM error occurred while reading the file spec information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10535E (MSSQL) A specified file spec cannot be found
Reason: A file spec specified by the FILES parameter does not exist.
Action: Specify a different file spec to be restored.
Action: Contact FDR/UPSTREAM Tech Support.

PC10536E (MSESE) Insufficient memory for version
Reason: While attempting to allocate memory for a version, there was insufficient memory.
Action: Close applications or free memory.

PC10537E (MSSQL) A full merge version cannot be found
Reason: A full merge version previous to the version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10538E (MSSQL) An error occurred reading full merge version
Reason: An internal UPSTREAM error occurred while reading the version information for a full merge backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10539E (MSESE) Can't close file opened for backup
Reason: An ESE error occurred while attempting to close a file after successfully opening it for backup.
Action: See additional messages.

PC10540E (MSESE) Can't close file opened for restore
Reason: An ESE error occurred while attempting to close a file after successfully opening it for restore.
Action: See additional messages.

PC10541E (MSESE) Can't find previous file information
Reason: A error occurred while attempting to resume a restore from a subsequent (non-full merge) backup version. This is probably caused by an error while attempting to restore from the full merge backup version.
Action: See additional messages.

PC10542E (MSESE) Found previous file information
Reason: An internal UPSTREAM error occurred while attempting to start a restore from a full merge backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10543E (WinQuota) Invalid open file mode

Reason: An internal UPSTREAM error occurred while attempting to open a MSESE PlugIn file for backup or restore with the wrong file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10544E (MSESE) Can't parse PLUGINPARAMETERS
Reason: An error occurred while parsing the PLUGINPARAMETERS while attempting to open a MSESE PlugIn file for backup or restore.
Action: Specify a correct PLUGINPARAMETERS parameter.

PC10545E (MSESE) Can't find specified database group
Reason: The server/application/database group combination specified on the PLUGINPARAMETERS parameter was not found at the beginning of a backup.
Action: Specify a different server/application/database group combination on the PLUGINPARAMETERS parameter.

PC10546E (MSESE) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10547E (MSESE) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from a MSESE PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10548E (MSESE) Invalid whole record read request
Reason: An internal UPSTREAM error occurred while trying to read a whole buffer from a MSESE PlugIn file. than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10549E (MSESE) Insufficient memory for DB header
Reason: While attempting to allocate memory for a DB header, there was insufficient memory.
Action: Close applications or free memory.

PC10550E (MSESE) Can't get log and patch file
Reason: An ESE error occurred while attempting to get a list of log and patch files to backup.
Action: See additional messages.

PC10551E (MSESE) Insufficient memory for file header
Reason: While attempting to allocate memory for a file header, there was insufficient memory.
Action: Close applications or free memory.

PC10552E (MSESE) Can't open ESE file for backup
Reason: An ESE error occurred while attempting to open an ESE file for backup.
Action: See additional messages.

PC10553E (MSESE) Insufficient memory for data block
Reason: While attempting to allocate memory for a data block, there was insufficient memory.
Action: Close applications or free memory.

PC10554E (MSESE) Can't read ESE file
Reason: An ESE error occurred while attempting to read data from an ESE file.
Action: See additional messages.

PC10555E (MSESE) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to a MSESE PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10556E (MSESE) Invalid header type on MSESE backup file
Reason: A MSESE backup file was found to have corrupt data. Expected to read a file header, but the data was not a file header.
Action: Contact FDR/UPSTREAM Tech Support.

PC10557E (MSESE) Insufficient memory for header
Reason: While attempting to allocate memory for a header, there was insufficient memory.
Action: Close applications or free memory.

PC10558E (MSESE) Unprocessed database files
Reason: An internal UPSTREAM error occurred while attempting to start a restore of a new ESE database. There were database files from the last database which were expected from the backup file, but were not yet restored.
Action: Contact FDR/UPSTREAM Tech Support.

PC10559E (MSESE) Can't add a database
Reason: An ESE error occurred while attempting to add a database to the restore environment during a restore.
Action: See additional messages.

PC10560E (MSESE) Mismatched database file names
Reason: An ESE error occurred while attempting to start a restore of a database. The ESE API returned a list of target database file names which did not match the list of database file names to be restored.
Action: See additional messages.

PC10561E (MSESE) Insufficient memory for DB file names
Reason: While attempting to allocate memory for a set of database file names, there was insufficient memory.
Action: Close applications or free memory.

PC10562E (MSESE) Invalid file type on MSESE backup file
Reason: A MSESE backup file was found to have corrupt data. A file header was read from the backup file which has an invalid file type.
Action: Contact FDR/UPSTREAM Tech Support.

PC10563E (MSESE) Next file is not a log or patch file
Reason: A MSESE backup file was found to have corrupt data. A file header was read from the backup file for a database file when a log or patch file was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10564E (MSESE) Next file is not a database file
Reason: A MSESE backup file was found to have corrupt data. A file header was read from the backup file for a log or patch file when a database file was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10565E (MSESE) Invalid database file name
Reason: A MSESE backup file was found to have corrupt data. A file header was read from the backup file for a database file whose name was not listed on the previous database header.
Action: Contact FDR/UPSTREAM Tech Support.

PC10566E (MSESE) Invalid log or patch file name
Reason: A MSESE backup file was found to have corrupt data. A file header was read from the backup file for a log or patch file with a improperly formatted file name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10567E (MSESE) Can't open ESE file for restore
Reason: An ESE error occurred while attempting to open an ESE file for restore.
Action: See additional messages.

PC10568E (MSESE) Can't open ESE file for restore
Reason: A system error occurred while attempting to open an ESE file for restore.
Action: See additional messages.

PC10569E (MSESE) Can't read ESE file
Reason: A system error occurred while attempting to write data to an ESE file.
Action: See additional messages.

PC10570E (MSESE) Can't read ESE file
Reason: An ESE error occurred while attempting to write data to an ESE file.
Action: See additional messages.

PC10571E (MSESE) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-MSESE PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10572E (MSESE) No ESE data
Reason: No server, application or database group information was returned by the ESE APIs. There is nothing to back up from or restore to.
Action: See additional messages.

PC10573E (MSESE) The log files were not truncated

Reason: The backup was not successful. The transaction log files were not truncated.
Action: See additional messages.

CertServ PlugIn errors

PC10601E (CertServ) PLUGINPARAMETERS are invalid
Reason: One or more of the required parameters are missing or one or more of any of the parameters are invalid. The PLUGINPARAMETERS parameter follows.
Action: Supply a valid PLUGINPARAMETERS parameter, particularly the SERVER sub-parameter.

PC10603W (CertServ) Unable to determine status of server
Reason: The online status of the Certificate server as specified in the PLUGINPARAMETERS SERVER sub-parameter could not be determined. It will be assumed that the Certificate server is offline.

PC10604E (CertServ) The server is not online
Reason: The Certificate server as specified in the PLUGINPARAMETERS SERVER sub-parameter is not online. The Certificate server must be online to perform a backup.
Action: Make sure the Certificate server service is started.

PC10605E (CertServ) Invalid file spec type
Reason: Only include file specs may be specified for a backup or restore operation. Exclude and Migrate file specs are not allowed.
Action: Remove all Exclude and Migrate file specs from the backup or restore specification and try the backup or restore again.

PC10606E (CertServ) Too many CertServ file specs for server
Reason: More than one file spec using the CertServ PlugIn reference the same Certificate server.
Action: Make sure all of the file specs that use the CertServ PlugIn reference unique Certificate servers. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10607E (CertServ) Error setting default file spec parameters
Reason: One or more errors occurred while trying to set the default file spec parameters for a file spec using the CertServ PlugIn.
Action: Contact FDR/UPSTREAM Tech Support.

PC10608E (CertServ) The specified version was interrupted
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters was interrupted and cannot be used for a restore.
Action: Specify a different backup version from which to perform the restore.

PC10609E (CertServ) An error occurred reading file spec
Reason: An internal UPSTREAM error occurred while reading one of the file spec definitions for a backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10610E (CertServ) The specified version has bad file spec
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters has a file spec definition that is different than what was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10611E (CertServ) Invalid number of file specs for version
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not have exactly one file spec definition for the CertServ backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10612E (CertServ) A required DLL cannot be loaded
Reason: An error occurred while attempting to load a DLL. The name of the DLL follows. This DLL is required by the CertServ PlugIn (CertServ.dll) to perform Certificate backup and restore operations.
Action: The CertServ PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove CertServ.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10613E (CertServ) A DLL function cannot be loaded
Reason: One or more of the API functions exported by one or more of the DLLs required by the CertServ PlugIn could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10614E (CertServ) An error occurred preparing for backup
Reason: A Certificate server error occurred while preparing to perform a backup operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC10615E (CertServ) Error getting DB file name list
Reason: A Certificate server error occurred while getting the list of database file names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10616E (CertServ) Error getting log file name list
Reason: A Certificate server error occurred while getting the list of log file names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10617E (CertServ) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.

PC10618E (CertServ) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10619E (CertServ) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10620I (CertServ) Truncating the Certificate server logs
Reason: The Certificate server backup was successful. The Certificate server transaction logs will now be truncated.

PC10621E (CertServ) Error truncating transaction logs
Reason: A Certificate server error occurred while truncating the Certificate server transaction logs after a successful backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10622I (CertServ) Truncating of Certificate server logs skipped
Reason: One or more errors occurred during an Certificate server backup. The Certificate server transaction logs will not be truncated.
Action: See additional messages.

PC10623E (CertServ) Error ending backup
Reason: A Certificate server error occurred while ending the Certificate server backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10624E (CertServ) Error registering Certificate server restore
Reason: A Certificate server error occurred while registering a Certificate server restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10625E (CertServ) Error completing failed restore registration
Reason: A Certificate server error occurred while completing a Certificate server restore registration after a failed restore registration.
Action: Contact FDR/UPSTREAM Tech Support.

PC10626I (CertServ) Completing Certificate server restore registration
Reason: A Certificate server restore was registered successfully. The restore registration will now be completed.

PC10627E (CertServ) Error completing ok restore registration
Reason: A Certificate server error occurred while completing a Certificate server restore registration after a successful restore registration.
Action: Contact FDR/UPSTREAM Tech Support.

PC10628I (CertServ) The Certificate server restore will not be registered
Reason: A Certificate server error occurred while performing a restore. The Certificate server restore registration will be skipped.
Action: Contact FDR/UPSTREAM Tech Support.

PC10629E (CertServ) Error ending restore

Reason: A Certificate server error occurred while ending a Certificate server restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10630W (CertServ) File(s) still open after backup
Reason: One or more Certificate server backup connections were still open after the backup finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10631W (CertServ) File(s) still open after restore
Reason: One or more Certificate server restore connections were still open after the restore finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10632E (CertServ) Invalid backup open file mode
Reason: An internal UPSTREAM error occurred while trying to open a CertServ PlugIn backup file with the wrong backup file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10633E (CertServ) Invalid restore open file mode
Reason: An internal UPSTREAM error occurred while trying to open a CertServ PlugIn restore file with the wrong restore file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10634E (CertServ) Invalid operation type
Reason: An internal UPSTREAM error occurred while trying to open a CertServ PlugIn backup file while in an invalid internal state.
Action: Contact FDR/UPSTREAM Tech Support.

PC10635E (CertServ) Can't parse server name
Reason: An internal UPSTREAM error occurred while trying to parse the Certificate server name from the PLUGINPARAMETERS value.
Action: Contact FDR/UPSTREAM Tech Support.

PC10636E (CertServ) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from a CertServ PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10637E (CertServ) Invalid whole record read request
Reason: An internal UPSTREAM error occurred while trying to read a whole buffer from a CertServ PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10638E (CertServ) Error closing Certificate server file
Reason: A Certificate server error occurred while closing a database, log or dynamic file after reading from it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10639E (CertServ) Error opening Certificate server file
Reason: A Certificate server error occurred while opening a database, log or dynamic file to prepare for reading from it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10640E (CertServ) Error reading Certificate server file
Reason: A Certificate server error occurred while reading a database, log or dynamic file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10641E (CertServ) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10646E (CertServ) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to a CertServ PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10647E (CertServ) Invalid backup header signature
Reason: An internal UPSTREAM error occurred while trying to validate the backup header signature in a CertServ PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10648E (CertServ) No Certificate server database files in backup
Reason: An internal UPSTREAM error occurred while trying to validate the number of individual Certificate server database files in a CertServ PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10649E (CertServ) An error occurred preparing for restore
Reason: A Certificate server error occurred while preparing to perform a restore operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC10650D (CertServ) Error getting DB locations
Reason: A Certificate server error occurred while getting the list of database and log file locations.
Action: The CertServ.dll PlugIn will use the original file locations recorded in the backup. In most cases this will be ok.

PC10651E (CertServ) Insufficient memory for restore file map
Reason: While attempting to allocate memory for a restore file map, there was insufficient memory.
Action: Close applications or free memory.

PC10652E (CertServ) Invalid file header signature
Reason: An internal UPSTREAM error occurred while trying to validate a file header signature for a single Certificate server file in a CertServ PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10653E (CertServ) Can't locate log file directory
Reason: A Certificate server error occurred while type to locate the log file directory name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10654E (CertServ) Can't locate database file directory
Reason: A Certificate server error occurred while type to locate the database file directory name.
Action: Contact FDR/UPSTREAM Tech Support.

PC10655E (CertServ) Can't locate unknown file type directory
Reason: A Certificate server error occurred while type to locate the directory name for a file with an unknown file type.
Action: Contact FDR/UPSTREAM Tech Support.

PC10656E (CertServ) Insufficient memory for DB name
Reason: While attempting to allocate memory for a database file name, there was insufficient memory.
Action: Close applications or free memory.

PC10657E (CertServ) Insufficient memory for new DB name
Reason: While attempting to allocate memory for a new database file name, there was insufficient memory.
Action: Close applications or free memory.

PC10658E (CertServ) Error creating Certificate server file
Reason: A Certificate server error occurred while creating a database, log or dynamic file to prepare for writing to it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10659E (CertServ) Error writing Certificate server file
Reason: A Certificate server error occurred while writing a database, log or dynamic file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10660I (CertServ) A Certificate server log file was renamed
Reason: A Certificate server log file was renamed in preparation for a restore. Following are the old log file name and the new log file name. The renamed log file should be deleted manually after a successful Certificate server restore.

PC10661E (CertServ) Insufficient memory for backup context
Reason: While attempting to allocate memory for a backup context, there was insufficient memory.
Action: Close applications or free memory.

PC10662E (CertServ) Insufficient memory for restore context
Reason: While attempting to allocate memory for a restore context, there was insufficient memory.
Action: Close applications or free memory.

PC10663E (CertServ) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-CertServ PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10666D (CertServ) The Certificate server is offline
Reason: The Certificate server as specified in the PLUGINPARAMETERS SERVER sub-parameter is offline. This will

prevent the CertServ.dll PlugIn from determining the proper locations to which to write the database and log files.
Action: The CertServ.dll PlugIn will use the original file locations recorded in the backup. In most cases this will be ok.

PC10667E (CertServ) OS not Windows 2000 Server
Reason: The CertServ PlugIn is intended to be run on the Windows 2000 Server operating system only and the detected operating system is not Windows 2000 Server.
Action: Remove CertServ.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system really is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10668E (CertServ) Insufficient memory for read buffer
Reason: While attempting to allocate memory for a read buffer, there was insufficient memory.
Action: Close applications or free memory.

PC10669E (CertServ) Error getting dynamic file name list
Reason: A Certificate server error occurred while getting the list of dynamic file names.
Action: Contact FDR/UPSTREAM Tech Support.

PC10670E (CertServ) Can't shutdown Certificate server
Reason: A Certificate server error occurred while attempting to shutdown the Certificate server. The server must be offline in order to perform the restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10671E (CertServ) Can't load MPR.DLL
Reason: An error occurred while attempting to load the MPR.DLL.
Action: Contact FDR/UPSTREAM Tech Support.

PC10672E (CertServ) Can't load a MPR.DLL function
Reason: An error occurred while attempting to load a function . from the MPR.DLL.
Action: Contact FDR/UPSTREAM Tech Support.

PC10673E (CertServ) Can't open a network enumeration
Reason: An error occurred while attempting to start an enumeration of the servers in the local domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10674E (CertServ) Can't enumerate a network server
Reason: An error occurred while enumerating the servers in the local domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10675W (CertServ) Use the SysState PlugIn instead
Reason: Starting with version 3.1.5 of FDR/UPSTREAM, the CertServ PlugIn should no longer be used to backup or restore the Certificate Services database. The functionality of the CertServ PlugIn has been replaced by the new SysState PlugIn.
Action: Modify your backup and restore specifications to use the SysState PlugIn instead of the CertServ PlugIn.

Cluster PlugIn errors

PC10701E (Cluster) The ClusApi.dll cannot be loaded
Reason: An error occurred while attempting to load the ClusApi.dll, This DLL is required by the Cluster PlugIn (Cluster.dll) to perform Cluster database backup and restore operations.
Action: The Cluster PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove Cluster.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10702E (Cluster) A ClusApi.dll function cannot be loaded
Reason: One or more of the functions exported by ClusApi.dll could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10703E (Cluster) The NETAPI32.dll cannot be loaded
Reason: An error occurred while attempting to load the NETAPI32.dll, This DLL is required by the Cluster PlugIn (Cluster.dll) to perform Cluster database backup and restore operations.
Action: The Cluster PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove Cluster.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10704E (Cluster) A NETAPI32.dll function cannot be loaded
Reason: One or more of the functions exported by NETAPI32.dll could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10705E (Cluster) The MPR.dll cannot be loaded
Reason: An error occurred while attempting to load the MPR.dll, This DLL is required by the Cluster PlugIn (Cluster.dll) to perform Cluster database backup and restore operations.
Action: The Cluster PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove Cluster.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10706E (Cluster) A MPR.dll function cannot be loaded
Reason: One or more of the functions exported by MPR.dll could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10707E (Cluster) PLUGINPARAMETERS are invalid
Reason: One or more of the required parameters are missing or one or more of any of the parameters are invalid. The PLUGINPARAMETERS parameter follows.
Action: Supply a valid PLUGINPARAMETERS parameter, particularly the SERVER sub-parameter.

PC10708E (Cluster) Invalid file spec type
Reason: Only include file specs may be specified for a backup or restore operation. Exclude and Migrate file specs are not allowed.
Action: Remove all Exclude and Migrate file specs from the backup or restore specification and try the backup or restore again.

PC10709E (Cluster) Too many Cluster file specs for server
Reason: More than one file spec using the Cluster PlugIn reference the same Cluster server.
Action: Make sure all of the file specs that use the Cluster PlugIn reference unique Cluster servers. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10710E (Cluster) Error setting default file spec parameters
Reason: One or more errors occurred while trying to set the default file spec parameters for a file spec using the Cluster PlugIn.
Action: Contact FDR/UPSTREAM Tech Support.

PC10711E (Cluster) The specified version was interrupted
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters was interrupted and cannot be used for a restore.
Action: Specify a different backup version from which to perform the restore.

PC10712E (Cluster) An error occurred reading file spec
Reason: An internal UPSTREAM error occurred while reading one of the file spec definitions for a backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10713E (Cluster) The specified version has bad file spec
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters has a file spec definition that is different than what was expected.
Action: Contact FDR/UPSTREAM Tech Support.

PC10714E (Cluster) Error opening cluster
Reason: An error occurred while attempting to gain access to a cluster server to back up its database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10715E (Cluster) Error backing up cluster
Reason: An error occurred while attempting to backup a cluster server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10716E (Cluster) Error closing cluster

Reason: An error occurred while attempting to close access to a cluster server after backing up its database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10717E (Cluster) Error getting cluster node state
Reason: An error occurred while attempting to get the state of a cluster node (server).
Action: Contact FDR/UPSTREAM Tech Support.

PC10718E (Cluster) Cluster services not installed
Reason: The cluster server specified in the PLUGINPARAMETERS does not Cluster Services installed on it.
Action: Respecify the PLUGINPARAMETERS for a cluster server.

PC10719E (Cluster) Error restoring cluster
Reason: An error occurred while attempting to restore a cluster server database.
Action: Contact FDR/UPSTREAM Tech Support.

PC10720E (Cluster) Error starting server query
Reason: An error occurred while attempting to start a network enumeration of the servers in the current domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10721E (Cluster) Error getting list of servers
Reason: An error occurred while attempting to get a list of servers in the current domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10722E (Cluster) Error getting cluster server state
Reason: An error occurred while attempting to get the state of a cluster server.
Action: Contact FDR/UPSTREAM Tech Support.

PC10723E (Cluster) An error occurred on a version inquiry
Reason: An error occurred while performing a version inquiry operation to validate the specified backup version from which to restore.

PC10724E (Cluster) An error occurred reading specified version
Reason: An internal UPSTREAM error occurred while reading the version information for the specified backup version.
Action: Contact FDR/UPSTREAM Tech Support.

PC10725E (Cluster) The specified version cannot be found
Reason: The backup version specified by either the VERSIONDATE or LATESTVERSION parameters does not exist.
Action: Specify a different backup version from which to perform the restore.

PC10726E (Cluster) File(s) still open after backup
Reason: One or more Cluster server backup connections were still open after the backup finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10727E (Cluster) File(s) still open after restore
Reason: One or more Cluster server backup connections were still open after the restore finished.
Action: Contact FDR/UPSTREAM Tech Support.

PC10728E (CertServ) Invalid open file mode
Reason: An internal UPSTREAM error occurred while trying to open a Cluster PlugIn file with the wrong backup or restore file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10729E (Cluster) Can't parse server name
Reason: An internal UPSTREAM error occurred while trying to parse the Cluster server name from the PLUGINPARAMETERS value.
Action: Contact FDR/UPSTREAM Tech Support.

PC10730E (Cluster) Error creating temporary directory
Reason: An error occurred while attempting to create a temporary directory needed to perform a cluster database backup or restore operation.
Action: Contact FDR/UPSTREAM Tech Support.

PC10731E (Cluster) Cluster backup directory not created
Reason: An error occurred while attempting to backup the cluster server database. This is the first step in backing up the Cluster.bin file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10732E (Cluster) Error getting list of backup files
Reason: An error occurred while attempting to get the list of backup file for the cluster server that is to be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC10733E (Cluster) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10734E (Cluster) Invalid read file position
Reason: An internal UPSTREAM error occurred while trying to read from a Cluster PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10735E (Cluster) Invalid whole record read request
Reason: An internal UPSTREAM error occurred while trying to read a whole buffer from a Cluster PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10736E (Cluster) Invalid buffer size
Reason: An internal UPSTREAM error occurred while trying to read a file header into a buffer that is too small for it.
Action: Contact FDR/UPSTREAM Tech Support.

PC10737E (Cluster) Error opening cluster backup file
Reason: An error occurred while attempting to open one of the backup files for the cluster server database to be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC10738E (Cluster) Error reading cluster backup file
Reason: An error occurred while attempting to read one of the backup files for the cluster server database to be backed up.
Action: Contact FDR/UPSTREAM Tech Support.

PC10739E (Cluster) Invalid write file position
Reason: An internal UPSTREAM error occurred while trying to write to a Cluster PlugIn file at a position other than the current file position.
Action: Contact FDR/UPSTREAM Tech Support.

PC10740E (Cluster) Invalid file header signature
Reason: An internal UPSTREAM error occurred while trying to validate a file header signature for a single Cluster server file in a Cluster PlugIn backup file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10741E (Cluster) Error opening cluster restore file
Reason: An error occurred while attempting to open one of the restore files for the cluster server database to be restored.
Action: Contact FDR/UPSTREAM Tech Support.

PC10742E (Cluster) Error writing cluster restore file
Reason: An error occurred while attempting to write one of the restore files for the cluster server database to be restored.
Action: Contact FDR/UPSTREAM Tech Support.

PC10743E (Cluster) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-Cluster PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10744E (Cluster) Other cluster nodes still up
Reason: An error occurred while attempting to restore a cluster server database. One or more of the other cluster nodes in the cluster are still up and running. Either manually stop all of the other cluster nodes or specify FORCE=Y in the PLUGINPARAMETERS for the restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10745E (Cluster) Quorum disk not found
Reason: An error occurred while attempting to restore a cluster server database. The cluster cannot find a quorum disk with the same partition layout as the quorum disk described in the backup. The existing quorum disk must have a layout (number of partitions and offsets to each partition) identical to the layout stored in the backup. Either manually reconfigure the quorum disk to match the layout described in the backup or specify FORCE=Y in the PLUGINPARAMETERS for the restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10746W (Cluster) Use the SysState PlugIn instead
Reason: Starting with version 3.1.5 of FDR/UPSTREAM, the Cluster PlugIn should no longer be used to backup or restore the Cluster database.

The functionality of the Cluster PlugIn has been replaced by the new SysState PlugIn.
Action: Modify your backup and restore specifications to use the SysState PlugIn instead of the Cluster PlugIn.

SysState PlugIn errors

PC10801E (SysState) PLUGINPARAMETERS are invalid
Reason: One or more of the required parameters are missing or one or more of any of the parameters are invalid. The PLUGINPARAMETERS parameter follows.
Action: Supply a valid PLUGINPARAMETERS parameter, particularly the SERVER sub-parameter.

PC10802E (SysState) Invalid file spec type
Reason: Only include file specs may be specified for a backup operation. Exclude file specs are allowed only for a restore operation. Migrate file specs are not allowed.
Action: Remove all Exclude and Migrate file specs from the backup specification and try the backup again. Remove all Migrate file specs from the restore specification and try the restore again.

PC10803E (SysState) Too many SysState file specs for computer
Reason: A system state backup of a single computer must have either one include file spec or one exclude file spec but not both. A system state restore of a single computer must have only one include file spec and zero or more exclude file specs.
Action: Make sure the files specs agree with these rules. This may also be caused by the order in which you specified your file spec. Reorder your file specs so that all of the file specs which do not use PlugIns come before thost that do.

PC10804E (SysState) Error setting default file spec parameters
Reason: One or more errors occurred while trying to set the default file spec parameters for a file spec using the SysState PlugIn.
Action: Contact FDR/UPSTREAM Tech Support.

PC10805E (SysState) Insufficient memory for file spec info
Reason: While attempting to allocate memory for a file spec information block, there was insufficient memory.
Action: Close applications or free memory.

PC10806E (SysState) Insufficient memory for file names
Reason: While attempting to allocate memory for a list of system state file names, there was insufficient memory.
Action: Close applications or free memory.

PC10807E (SysState) Can't open remote registry
Reason: An error occurred while attempting to open the registry of the target computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC10808E (SysState) Can't open SystemStateFiles key
Reason: An error occurred while attempting to open the SOFTWARE\Innovation Data Processing\FDR/UPSTREAM\ SystemStateFiles key in the registry of the target computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC10809E (SysState) Can't read system state file names
Reason: An error occurred while attempting to read the FileNames value of the SOFTWARE\Innovation Data Processing\FDR/UPSTREAM\SystemStateFiles key in the registry of the target computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC10810E (SysState) Error getting domain computer names
Reason: An error occurred while attempting to get the list of computers in the current domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10811E (SysState) Error getting list of computers.
Reason: An error occurred while attempting to get a list of computers in the current domain.
Action: Contact FDR/UPSTREAM Tech Support.

PC10812E (SysState) OS not Windows 2000
Reason: The SysState PlugIn is intended to be run on the Windows 2000 operating system only and the detected operating system is not Windows 2000.
Action: Remove SysState.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system really is Windows 2000, contact FDR/UPSTREAM Tech Support.

PC10813E (SysState) Invalid open file mode
Reason: An internal UPSTREAM error occurred while trying to open a SysState PlugIn file with the wrong backup or restore file mode.
Action: Contact FDR/UPSTREAM Tech Support.

PC10814E (SysState) Insufficient memory for file handle
Reason: While attempting to allocate memory for a file handle, there was insufficient memory.
Action: Close applications or free memory.

PC10815E (SysState) Invalid file name query file handle
Reason: An internal UPSTREAM error occurred while trying to get the file name for a non-SysState PlugIn file.
Action: Contact FDR/UPSTREAM Tech Support.

PC10816E (SysState) Can't find file spec info
Reason: An internal UPSTREAM error occurred while trying to locate the internal file spec information for a file spec.
Action: Contact FDR/UPSTREAM Tech Support.

PC10817E (SysState) Invalid file spec
Reason: An internal UPSTREAM error occurred while trying to start a system state backup or restore. The file spec is invalid.
Action: Contact FDR/UPSTREAM Tech Support.

PC10818D (SysState) AD object USNs increased successfully
Reason: The USNs for all of the Active Directory objects were increased successfully to complete an authoritative restore. The file names listed below are the input and output files for the NTDSUTIL utility.

PC10819E (SysState) AD object USNs not increased
Reason: An error occurred while trying to increase the USNs of all of the Active Directory objects to complete an authoritative restore. The first file listed below contains the NTDSUTIL utility input and the second file contains the NTDSUTIL utility output,
Action: Contact FDR/UPSTREAM Tech Support.

PC10820E (SysState) The NETAPI32.dll cannot be loaded
Reason: An error occurred while attempting to load the NETAPI32.dll, This DLL is required by the SysState PlugIn (SysState.dll) to enumerate the computers in the local domain.
Action: The SysState PlugIn is intended to be run on the Windows 2000 Server operating system only. If the operating system is not Windows 2000 Server, remove SysState.dll from the PlugIn subdirectory of your main UPPSTREAM directory. If the operating system is Windows 2000 Server, contact FDR/UPSTREAM Tech Support.

PC10821E (SysState) A NETAPI32.dll function cannot be loaded
Reason: One or more of the functions exported by NETAPI32.dll could not be loaded.
Action: Contact FDR/UPSTREAM Tech Support.

PC10822E (SysState) Can't open USW2KAgt pipe to start backup
Reason: An error occurred while attempting to open the USW2KAgt named pipe to start the backup.
Action: Contact FDR/UPSTREAM Tech Support.

PC10823E (SysState) Can't open USW2KAgt pipe to start restore
Reason: An error occurred while attempting to open the USW2KAgt named pipe to start the restore.
Action: Contact FDR/UPSTREAM Tech Support.

PC10824E (SysState) Can't open USW2KAgt pipe to shutdown
Reason: An error occurred while attempting to open the USW2KAgt named pipe to shutdown the computer.
Action: Contact FDR/UPSTREAM Tech Support.

PC10825E (SysState) Can't open USW2KAgt pipe to get file size
Reason: An error occurred while attempting to open the USW2KAgt named pipe to get the size of one of the virtual PlugIn files.
Action: Contact FDR/UPSTREAM Tech Support.

PC10826E (SysState) Can't open USW2KAgt pipe to open a file
Reason: An error occurred while attempting to open the USW2KAgt named pipe to open one of the virtual PlugIn files.
Action: Contact FDR/UPSTREAM Tech Support.

PC10827E (SysState) Disaster Recovery not allowed
Reason: You may specify DISASTERRECOVERY=Y only when the entire system state is being restored. You are attempting to restore only a portion of the entire system state.
Action: Respecify the PLUGINPARAMETERS for the SysState PlugIn and try again.

PC10828E (SysState) Invalid Director request type received
Reason: A PlugIn Request Type was received from the Director which is invalid. The invalid PlugIn Request Type follows.
Action: Contact FDR/UPSTREAM Tech Support.

GroupWise PlugIn errors

PC10901E (GroupWise) Novell Profile required
Reason: You must specify a specially prepared Novell Profile for a GroupWise backups. It needs to point to the GroupWise TSA.
Action: Respecify.

PC10902E (GroupWise) Non-plugin file spec found
Reason: You can not mix plugin and non-plugin file specs with GroupWise backups. All specs must use the plugin, or none.
Action: Respecify.

PC10903E (GroupWise) File not found to get attributes
Reason: When UPSTREAM attempted to get the attributes for a given file, the file was not found.
Action: Contact FDR/UPSTREAM Tech Support.

PC10904E (GroupWise) Error resetting attributes
Action: See additional messages.

PC10905E (GroupWise) Set of file time not supported
Reason: SMS does not support explicitly setting a file time. Internal error.
Action: Contact FDR/UPSTREAM Tech Support.

PC10906E (GroupWise) Directory creation not supported
Reason: You must specify a restore to a directory which has been precreated or is stored on the backup.
Action: Respecify.

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