S/390

Planning for the S/390 Open Systems Adapter (OSA-1, OSA-2) Feature

GC23-3870-08

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Note!

Before using this information and the products it supports, be sure to read the general information under "Notices" on page xiii.

| **Ninth Edition (June 1999)**

This is a major revision of GC23-3870-07.

This edition, GC23-3870-08, applies to the System/390 Open Systems Adapter feature, the Open Systems Adapter Support Facility Version 1 Release 2.0 (OSA/SF V1R2) for MVS/ESA (Program Number 5655-104), OS/390 Version 1 (Program Number 5645-001) OS/390 Version 2 (Program Number 5647-A01), OSA/SF for VM/ESA Version 2 Release 2.0, for VM/ESA 2.2.0 (5654-030), OSA/SF for VSE Version 2 Release 2 (part of VSE Central Functions 6.1.1, 5686-066) in VSE/ESA Version 2 Release 2.1 (5690-VSE), Version 2 Release 7 of OS/390 (5647-A01) and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters.

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IBM Mail Exchange: USIB6TC9 at IBMMAIL
Internet e-mail: mhvrcfs@us.ibm.com
World Wide Web: http://www.s390.ibm.com/s390/os390/

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About This Book

This book describes the Open Systems Adapter (OSA) from an OSA product perspective with the goal of helping you to define, install, and use an OSA. An OSA is an integrated S/390 hardware feature that combines the functions of an S/390 I/O channel with the functions of a network port to provide direct connectivity between S/390 applications and their clients on the attached network.

Planning information is also provided for the OSA Support Facility (OSA/SF). Although any OSA except an Asynchronous Transmission Mode (ATM) OSA-2 can be run in the TCP/IP Passthru mode without being customized through OSA/SF, it can do so with only limited function. OSA/SF is required for the full functions of the TCP/IP Passthru mode and any function of the other modes. In this book, the meanings of the OSA/SF parameters are discussed and the parameters are shown as they appear when displayed by the OSA/SF OS/2 interface (OSA/SF GUI) panels. Instructions for downloading OSA/SF GUI in an OS/390 or MVS/ESA environment are also provided. For other OSA/SF instructions, refer to the OSA/SF User's Guide for the each of the programming environments that OSA supports.

Who Should Use This Book

Planning for the installation and use of an OSA is a multi-dimensional task that incorporates planning for the OSA hardware I/O configuration, S/390 programs such as VTAM, TCP/IP, and eNetwork Communications Server for OS/390 (CS for OS/390), OSA modes, OSA/SF, and network planning. Usually, this planning activity requires the expertise of several people with complementing hardware, system, and network knowledge.

To assist you in organizing your OSA planning, task planning checklists are provided at the start of Chapter 2 (hardware), Chapter 3 (OS/390 and MVS/ESA), Chapter 4 (VM/ESA), and Chapter 5 (VSE/ESA). Task planning checklists are provided for each OSA mode of operation in Chapters 6 through 9. Chapter 10 describes the ATM LAN emulation client (LEC) platform that is required for an ATM OSA-2 to be run in the TCP/IP Passthru and SNA modes. Chapter 11 describes the OSA port parameters, and Chapter 12 describes two significant network management features that are supported by OSA.

Where to Find More Information

This book presents an OSA-centric perspective. To complete the system planning and to install either an OSA or OSA/SF, you will need to refer to other books as well because OSA is available on so many hardware platforms, supports so many network protocols, and can interact with so many programs on different S/390 operating systems.

Note: The following lists of books are definitely not exhaustive because it is only intended to point you to one or a small number of related manuals for each of the products discussed in this book. Note that the titles and order numbers of books that document other products are subject to change. Therefore, make sure that you check the IBM publications ordering system before ordering any of the books listed in this bibliography.

On the OSA and OSA/SF Information Units

The OSA planning guide and OSA/SF user's guides are listed in the following tables. The hardcopy formats of these books are published when significant function is added to OSA or a new release of OSA/SF is issued. These books are also available as files on softcopy bookshelves of the softcopy collection kits listed in the following tables. These files are updated periodically, depending on the cycle of the collection kit.

In addition to the OSA/SF user's guides, online help panels are available to supplement the online function panels that are presented by the OSA/SF OS/2 interface (GUI). These help panels include a set of “How To” instructions.

S/390 Hardware Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In Hardware Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870	IOA1PG*xx*	SK2T-5843	IOA390*xx*	IOA390*xx*
OSA/SF User's Guide	SC28-3872	IOASUG*xx*	SK2T-5843	IOA390*xx*	IOA390*xx*

For Networking Systems Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In Networking Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870	IOA1PG*xx*	SK2T-6012	IOA390*xx*	IOA390*xx*
OSA/SF User's Guide	SC28-3872	IOASUG*xx*	SK2T-6012	IOA390*xx*	IOA390*xx*

For OS/390 Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In OS/390 Collection Kit # (Note 1)	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870 (Note 2)	IOA1PG*xx*	SK2T-6700	IOA390*xx*	IOA390*xx*
OSA/SF User's Guide	SC28-1855 (Note 2)	IOASUG*xx*	SK2T-6700	IOA390*xx*	IOA390*xx*

Notes:

1. The OS/390 collection kit, which is distributed with OS/390, is also available on the Internet through the OS/390 home page *(http://www.s390.ibm.com/os390).* Double-click on the Library icon. The *OS/390 Information Roadmap* should help you locate the OSA planning guide and OSA/SF user's guide.
2. GC23-3870 and SC28-1855 are distributed on the OSA/SF bookshelf in the OS/390 softcopy collection kit. These books can be ordered separately in hardcopy. GC28-1855 is the OS/390 equivalent of SC23-3872. SC23-3872 is listed below in the MVS/ESA section, and is distributed with the OSA/SF for MVS/ESA licensed program.
3. The *Program Directory for IBM Open Systems Adapter Support Facility for MVS/ESA (5655-104) and OS/390 (5645-001)* is distributed on the OS/390 product tape.

For MVS/ESA Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In MVS/ESA Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870	IOA1PG*xx*	SK2T-0710	IOAMVS*xx*	IOAMVS*xx*
Using the System/390 Open Systems Adapter Support Facility for MVS/ESA	SC23-3872	IOAMUG*xx*	SK2T-0710	IOAMVS*xx*	IOAMVS*xx*

Notes:

1. *System/390 Open Systems Adapter Support Facility Licensed Program Specifications*, GC23-3871, is provided with the product in hardcopy only.
2. *Program Directory for IBM Open Systems Adapter Support Facility for MVS/ESA (5655-104) and OS/390 (5645-001)* is distributed with the OSA/SF for MVS/ESA licensed program.

For VM/ESA Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In VM/ESA Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870	IOA1PG*xx*	SK2T-2067	IOA1PG*xx*	IOAVMS*xx*
VM/ESA: Open Systems Adapter Facility User's Guide	SC28-1992	IOAVMS*xx*	SK2T-2067	IOAVUG*xx*	IOAVMS*xx*

Notes:

1. The *Program Directory for OSA/SF for VM/ESA V2R2* is distributed with VM/ESA 2.2.0.
2. The VM/ESA system softcopy collection kit is refreshed twice a year in the Spring and Fall, not quarterly.

For VSE/ESA Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In VSE/ESA Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
Planning for the System/390 Open Systems Adapter Feature	GC23-3870	IOA1PG*xx*	SK2T-0060	IOAVSE*xx*	IOAVSE*xx*
VSE/ESA Open Systems Adapter Facility User's Guide	SC28-1946	IOAVSE*xx*	SK2T-0060	IOAVSE*xx*	IOAVSE*xx*

Notes:

1. The *Program Directory for IBM VSE/ESA Version 2 Release 2.1* (5790-VSE) is available to VSE/ESA 2.2.1 users only. For later releases, use the VSE/ESA program directory.

On the Hardware Platforms that OSA Supports

- *Enterprise System/9000 Introducing the Library,* GA23-0373
- *Enterprise System/9000 S/390 9672 Parallel Transaction Server S/390 9672 Parallel Enterprise Server S/390 9674 Coupling Facility Input/Output Configuration Program User's Guide and ESCON Channel-to-Channel Reference,* GC38-0401, which is usually called the *IOCP Guide and Reference*
- *Enterprise System/9000 Enterprise System/3090 Processor Resource/Systems Manager Planning Guide,* GA22-7123
- *Enterprise System/9000 9121 511-Based Models Migration Guide,* SA24-4359
- *Enterprise System/9000 9121 511-Based Models Functional Characteristics and Configuration Guide,* GA24-4358
- *Enterprise System/9000 9121 511-Based Models Installation Manual—Physical Planning,* GC22-7087
- *Enterprise System/9000 9021 711-Based Models Installation Manual—Physical Planning,* GC22-7086
- *Enterprise System/9000 9021 711-Based Models Functional Characteristics and Configuration Guide,* GA22-7144
- *System/390 9672/9674 System Overview,* GA22-7148
- *System/390 9672 Parallel Transaction Server System/390 9672 Parallel Enterprise Server System/390 9674 Coupling Facility Installation Manual–Physical Planning,* GC22-7101
- *System/390 9672 Parallel Transaction Server System/390 9672 Parallel Enterprise Server System/390 9674 Coupling Facility Operations Guide,* GC38-3104 (Rx1,Rx2, Rx3) or GC38-3108 (Rx4)
- *Systems Assurance Product Review,* or SAPR guide, which is available for each hardware system and may be available from your OSA marketing representative.
- *Placement Report* and *CHPID Report* produced by the IBM Configurator (CFSYSTEM) which may be available from your OSA marketing representative.

On the S/390 Programs that OSA Supports

OS/390 Only

- *OS/390 Introduction and Release Guide,* GC28-1725
- *OS/390 Up and Running!,* GC28-1726
- *OS/390 TCP/IP OpenEdition: Configuration Guide,* SC31-8304
- *OS/390 V1R3 User's Guide,* SC28-1892
- *IBM Novell NetWare Services for OS/390 Installation,* SA22-7312
- *IBM Novell NetWare Services for OS/390 Concepts,* SA22-7313
- *OS/390 TCP/IP OpenEdition: User's Guide,* SC31-8305

OS/390 and MVS/ESA

- *MVS/ESA Hardware Configuration Definition: User's Guide,* SC33-6468
- *MVS/ESA SP 5 Planning: APPC Management,* GC28-1503
- *Using the Enterprise Systems Connection Manager Version 1 Release 3,* SC23-0425

VM/ESA

- *VM/ESA: General Information,* GC24-5745
- *VMSES/E: Introduction and Reference,* SC24-5747
- *VM/ESA: Planning Dynamic I/O Configuration, Version 2 Release 1,* GC24-5695
- *VM/ESA: Planning and Administration,* SC24-5750
- *VM/ESA: Connectivity Planning Administration and Operations,* SC24-5756
- *VM/ESA: CMS Application Development Guide,* SC24-5761
- *VM/ESA: CMS File Pool Planning, Administration, and Operation,* SC24-5751
- *VM/ESA: CP Command and Utility Reference,* SC24-5773
- *VM/ESA: CMS Command Reference,* SC24-5776
- *VM/ESA: CPIC Communications User's Guide,* SC24-5595

VSE/ESA

- *VSE/ESA General Information Introducing the System Version 2,* GC33-6626
- *VSE/ESA General Information Planning Aspects Version 2,* GC33-6628
- *VSE/ESA System Upgrade and Service,* SC33-6602
- *VSE/ESA Planning,* SC33-6603
- *VSE/ESA Installation,* SC33-6604
- *VSE/ESA Administration,* SC33-6605

TCP/IP

For a WWW list, see ***http://www.networking.ibm.com/tcm/tcmpubs/html***

- *TCP/IP Version 2 Release 2.1 for MVS: Planning and Customization,* SC31-6085
- *TCP/IP for MVS: Customization and Administration Guide, Version 3 Release 1,* SC31-7134
- *TCP/IP OpenEdition: Planning and Release Guide,* SC31-8303
- *TCP/IP OpenEdition: Configuration Guide,* SC31-8304
- *TCP/IP for VM: Planning and Customization Version 2 Release 3,* SC31-6082
- *TCP/IP for VSE User's Guide,* SC33-6601

OS/390 eNetwork Communications Server

- *OS/390 eNetwork Communications Server: IP Planning and Migration Guide, Version 2 Release 5*, SC31-8512
- *OS/390 eNetwork Communications Server: IP Configuration Guide*, SC31-8513. SC31-8513-01 contains information on IP multicast addresses.
- *OS/390 eNetwork Communications Server: High Speed Access Services User's Guide, Version 2 Release 5,* GC31-8676
- *OS/390 eNetwork Communications Server: Network Implementation Guide,* SC31-8563
- *OS/390 eNetwork Communications Server: SNA Resource Definition Reference,* SC31-8565
- *OS/390 eNetwork Communications Server: SNA Resource Definition Samples,* SC31-8566

VTAM

- *VTAM V3R4 Resource Definition Reference,* SC31-6438
- *VTAM V4R1 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference,* SC31-6427
- *VTAM V4R4 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference,* SC31-6498
- *VTAM V3R4 Resource Definition Reference,* SC31-6438
- *VTAM V4R1 Resource Definition Samples,* SC31-6428
- *VTAM V4R2 Resource Definition Samples,* SC31-6499
- *VTAM V4R2 for MVS/ESA VM/ESA, VSE/ESA Network Implementation Guide,* SC31-6494
- *VTAM V4R3 for MVS/ESA Network Implementation Guide,* SC31-6548
- *VTAM V4R4 Network Implementation Guide,* SC31-8370

NetView

- *TME 10 NetView for OS/390 V1R1 Application Programming Guide,* SC31-8223
- *TME 10 NetView for OS/390 V1R1 Installation and Administration Guide,* SC31-8236
- *NetView for MVS/ESA V3R1 Application Programming Guide,* SC31-8061
- *NetView for MVS/ESA V3R1 Installation and Administration Guide,* SC31-8043
- *NetView Installation and Administration Guide (VM) V2R3,* SC31-6181
- *NetView Installation and Administration Guide for VSE/ESA V2R3,* SC31-6182

LANRES/MVS

- *LAN Resource and Extension Services/MVS Guide and Reference,* SC24-5623
- *LAN Resource and Extension Services/MVS Configuration Files and Commands,* SC28-1578
- *Novell NetWare for SAA Administration Guide 1.3 Revision B*
- *Novell NetWare 3.12 System Administration Guide*

On the LANs and LAN Cables that OSA Supports

- *X3T9.5 ANSI FDDI Statement Management,* Revision 7.2, is the FDDI SMT standard
- *RFC 1231* is the TCP/IP protocol standard for IEEE 802.5 token-ring MIB
- *RFC 1398* is the TCP/IP protocol standard for managed objects for the Ethernet-like interface types
- *RFC 1483: Multiprotocol Encapsulation over ATM Adaptation Layer 5,* Section 4.1, Routed Encapsulation, is the standard used for the ATM IP Forwarding mode
- *Maintenance Information for ATM and FDDI Links,* SY27-0331
- *IBM Local Area Network Administrator's Guide*, GA27-3748
- *IBM FDDI Network Introduction and Planning Guide,* GA27-3892
- *Token Ring Network Introduction and Planning Guide,* GA27-3677
- *IBM Multisegment LAN Design Guidelines,* GG24-3398
- *IBM 8250/8260/8285 Planning and Site Preparation,* GA33-0285
- *IBM Cabling System Optical Fiber Planning and Installation Guide,* GA27-3943

- *Token-Ring Network Architecture Reference,* SC30-3374

On the ATM Network that OSA Supports

ATM technology is too broad a topic to cover in this book. The following information units are recommended as good starting points:

The following WWW Home Pages:

IBM Networking Home Page at http://www.raleigh.ibm.com
ATM Forum Home Page at http://www.atmforum.com
International Telecommunication Union Home Page at :http://www.itu.com

The ATM LAN Emulation Standard: Refer to *LAN Emulation Over ATM Version 1.0,* in the ATM Forum Technical Committee Specification In this book, the standard is referenced by the following identifiers:

- (1) ATM Forum Technical Committee User-Network Interface (UNI) Specification Version 3.1 - Interim Local Management Interface

  (1A) Physical Port Group
  (1B) ATM Layer Group
  (1C) ATM Statistics Group
  (1D) Network Prefix Table

- RFC 1695 - Definitions of Managed Objects for ATM Management Version 8.0 using SMIv2 (ATM Interface Configuration Parameters Group)
- RFC 1573 - Evolution of the Interfaces Group of MIB-II

  (3A) Interfaces Group - ATM Layer, further defined in RFC 1695, section 6.2.1
  (3B) Interfaces Group - AAL5 Layer, further defined in RFC 1695, section 8.3
  (3C) Interfaces Group - LAN Emulation Layer, further defined in the ATM Forum Technical Committee's document # 94–0737R3 entitled *LAN Emulation Client Management: DRAFT Version 1.0 Specification, Section 4.2*

- (4) ATM Forum Technical Committee's document # 94–0737R3 entitled *LAN Emulation Client Management: DRAFT Version 1.0 Specification,* (April 26, 1995)
  Actual MIB definitions in the LAN Emulation Client MIB Text

  (4A) Configuration Group
  (4B) Status Group
  (4C) Statistics Group
  (4D) Server Connections Group

ATM Forum publications can be requested from:

The ATM Forum
Worldwide Headquarters
303 Vintage Park Drive
Foster City CA 99404–1138
Tel 1–415–578–6860
Fax 1–414–525–0182

Additionally, refer to:

- *ATM User-Network Interface (UNI) Specification, Version 3.1,* SR28-5702, ISBN 0-13-225863-3, published by Prentice Hall PTR, Prentice Hall Inc.
- *ATM General Information Manual,* GA27-4089

- *Asynchronous Transfer Mode (Broadband ISDN) Technical Overview,* GG24-4330, IBM International Technical Support Organization, Raleigh Center
- *ATM Campus Introduction, Planning, & Troubleshooting,* GA27-4089
- *IBM 8250 Multiprotocol Intelligent Hub,* GA33-0285
- *IBM 8260 Multiprotocol Intelligent Hub,* GA24-4370

On the Communications Protocols that OSA/SF Uses

- *Multi-Platform APPC Configuration Guide,* GG24-4485
- *Communications Manager/2 V1.1 Network Administration and Subsystem Management,* SC31-6168
- *Communications Manager/2 V1 Workstation Installation Guide,* SC31-6169
- *TCP/IP Network Administration,* SR28-4853

Summary of Changes

Summary of Changes for GC23-3870-08

As updated June 1999.

This major revision includes:

- HPDT ATM Native mode is now available for the ATM OSA-2 feature for VM. Changes have been made in the following sections:
  - 4.2.2 on page 66.
  - 4.2.2.7 on page 68.
- The OSA/SF GUI is now available on Windows platforms including Windows 95, and Windows NT. Changes have been made in the following sections:
  - 3.1.3.2 on page 44.
  - 5.2.3.2 on page 86.

This book includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical like to the left of the change.

Summary of Changes for GC23-3870-07

Support for Parallel Enterprise Server Generation 5

OSA-2 supports the 9672 Parallel Enterprise Server - Generation 5 (page 18).

TCP/IP Passthru Mode

With the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA), and PQ16071 (VSE/ESA), OSA supports the following additions in the TCP/IP Passthru mode:

- The maximum number of Home IP addresses that you can specify in a Passthru OAT entry has expanded from 1 to 8 Home IP addresses if you use the expanded inbound Passthru OAT entry (page 104).A network client can therefore send IP packets across that data path to any of the Home IP addresses that you have specified. (A maximum of 16 Home IP addresses can be specified for all the Passthru entries for one OSA port concurrently.)
- Instead of being able to designate only one default inbound path, you can now specify that one inbound Passthru entry specifies the primary default data path and another inbound Passthru entry specifies the secondary default data path. The OSA will then forward inbound IP packets that have addresses unknown to it across the primary default data path and, if the primary default path is unavailable, across the secondary default data path (page 104).

In an eNetwork Communication Server for OS/390 (CS for OS/390) environment, OSA supports multicast IP addresses. OSA/SF displays the IP multicast addresses of the registered members of the multicast group for the OSA. Examples are shown in the appropriate GUI port panels in Chapter 12. For more information on IP multicast addressing, refer to the IP Configuration books listed in the bibliography.

HPDT MPC Mode

With the PTF resolution to OSA/SF APAR OW33393 in an OS/390 environment, the following additions are supported in the HPDT MPC mode:

- OSA/SF displays the S/390 Home IP address or addresses for a data path specified in an MPC OAT entry for a FDDI or FENET OSA port (page 124).
- A FENET OSA-2 supports the IPX protocol used by the Novell Directory Services (NDS) of NetWare Services for OS/390 and is discussed in Chapter 7. OSA/SF is required to customize the OSA in the mode.

ATM IP Forwarding Mode

With the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA), and PQ16071 (VSE/ESA), an ATM OSA-2 that is being run in the ATM IP Forwarding mode supports the following OSA/SF changes:

- The maximum number of Home IP addresses that you can specify in a Passthru OAT entry has expanded from 1 to 8 Home IP addresses, which means that multiple Home IP addresses can be associated with one inbound data path that you define for this mode. (A maximum of 16 Home IP addresses can be defined for one OSA port.)
- Instead of designating just one default inbound path, you can now designate one Passthru entry to specify the primary default path and another one to specify the secondary default path for inbound IP packets that have addresses unknown to the OSA (page 104).

Miscellaneous

- If the PTF resolution to OSA/SF APAR OW33393 (OS/390 or MVS/ESA), OW33394 (VM/ESA), or PQ16071 (VSE/ESA) is applied, the default peak cell rate for traffic on an ATM OSA-2 in the TCP/IP Passthru or SNA mode is 155.0 Mbps. Otherwise, it remains 25.6 Mbps.
- If the PTF resolution to OSA/SF APAR OW33393 (OS/390 or MVS/ESA), OW33394 (VM/ESA), or PQ16071 (VSE/ESA) is applied, there are fewer restrictions on the bit settings for a group MAC address (page 212).
- The checklists for installing or moving an OSA feature have been expanded in Chapter 2 and positioned directly behind the general checklists on page 15 so the two sets of hardware checklists are provided in succession to each other.
- The REXX Exec interface of OSA/SF now not only supports the customization of all OSA-2s, but allows you to bring an OSA under OSA/SF management from a central IOACMD command. Also, it lists all the OSA-2s in your system and provides a more flexible control of the OSA/SF customization task than was previously the case. These enhancements are mentioned on page 55, but for full information, refer to the appropriate *OSA/SF User's Guide,* whose titles are listed in the bibliography (page xv).
- If you are moving an OSA from one CHPID slot to another, it is recommended that you use the OSA/SF Copy Configuration function to copy the OSA's configuration of modes before the OSA is moved (page 16).
- The term default entry has replaced the less precise term of default LP (logical partition) in the expanded Passthru OAT entry and in OSA/SF presentation of any Passthru OAT entry. Default LP is still used in the basic Passthru entry, which is presented if the PTF resolution to OSA/SF APAR OW33393 (OS/390 or MVS/ESA), OW33394 (VM/ESA), or PQ16071 (VSE/ESA) has not been applied. To clarify the new terms and changes in this edition, several IP data transfer topics have been organized into one general discussion that starts on page 99.

- The term LEC, which stands for LAN emulation client in the ATM UNI standards, is now used consistently in the OSA/SF GUI panels as well as the publications. A LEC port is used in the TCP/IP Passthru and SNA modes by an ATM OSA-2. (See Chapter 10.) Previously, LEC, LE, and logical, were used somewhat interchangeably.
- An example of IP data transfer in the HPDT ATM Native mode in support of the TCP/IP function of CS for OS/390 is provided on page 179.

Summary of Changes for GC23-3870-06

Fast Ethernet (FENET) OSA-2

The Fast Ethernet (FENET) OSA-2 (pages 39 and 227) allows direct attachment to either a 100 Mbps or 10 Mbps Ethernet LAN in either full- or half-duplex mode.

The FENET OSA-2 supports auto-negotiation, but not LP-to-LP communications. The LAN speed and duplex mode can be set using OSA/SF or the standalone support element or single object operations via the hardware management console. A FENET OSA-2 can be run in the TCP/IP Passthru, HPDT MPC, and SNA modes. OSA/SF support with the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) is required to support a FENET OSA-2 in the SNA and HPDT MPC modes.

OSA/SF APARs OW30222, OW30932, PQ11504

If the PTF to OSA/SF APAR OW30222 (OS/390 or MVS/ESA), OW30932, (VM/ESA) or PQ11504 (VSE/ESA) is applied, you can:

- Set the SNA logical link control (LLC) timers in milliseconds (page 140) rather than in timer ticks, which is required without this PTF.
- Set the number of outstanding I-format LPDU frames (N3 value) and the maximum transmit window (TW value) for an ATM or FENET OSA-2 (page 144).
- Set an expanded set of SNA session availability parameters (page 154).
- Set a local MAC address using OSA/SF for a port that is physically attached to a network (page 210).

  Note that you could already set the a MAC address using OSA/SF for an ATM OSA-2 physical port.
- Set the duplex mode for an Ethernet connection using OSA/SF.
- Receive unsolicited SNA network management data via OSA/SF for an ATM or FENET OSA-2 (page 197) that is being run in the SNA mode.

eNetwork Communications Server for OS/390 V2R5

OSA-2 supports the OS/390 eNetwork Communications Server for OS/390 V2R5. No changes are required to either OSA or OSA/SF. In this OSA-centric book, therefore, there is no need to discuss the eNetwork Communications Server except to take note:

- The OSA TCP/IP mode supports the OS/390 eNetwork Communications Server IP applications for LCS transfer.
- The OSA HPDT MPC mode supports the OS/390 eNetwork Communications Server High Speed Access Services (HSAS) and continues its HPDT UDP support on OS/390 R3 and R4.
- The OSA SNA mode supports the OS/390 eNetwork Communications Server SNA applications and continues its support for VTAM HPR.

- The OSA HPDT ATM Native mode, which can be run only on an ATM OSA-2, supports both OS/390 eNetwork Communications Server IP and SNA applications and continues to support VTAM for native ATM transfer.

For more information on the eNetwork Communications Server, refer to the books listed in the bibliography (page xix).

Summary of Changes for GC23-3870-05

- OSA-2 supports the Starterpak 3000 series (page 18).
- The TCP/IP Passthru mode is supported by VSE/ESA with TCP/IP for VSE/ESA 1.3 and the application of the PTF resolution for OSA/SF for VSE/ESA APAR PQ06993. See Chapter 5.
- For an ATM OSA-2, the maximum number of PUs that can be supported in the SNA mode is increased for the physical port from 255 to 2047 if the PTF resolution to the appropriate APARs have been installed. Also, the REXX interface can now be used for an ATM OSA-2 if the PTF resolution to the appropriate APAR is installed. See the requirements listed for OS/390, MVS/ESA, VM/ESA, or VSE/ESA in the chapters on these S/390 operating systems.
- OS/2-J is supported for OSA/SF for VM/ESA and OSA/SF for VSE/ESA as well as OSA/SF for OS/390 and MVS/ESA. See the requirements for VM/ESA and VSE/ESA in the chapters on these S/390 operating systems.
- The group size of an OAT entry, which was required user input at the OSA/SF REXX interface, is automatically supplied by OSA/SF if the PTF resolution to the proper APAR is applied: OW28283 (OS/390 and MVS/ESA); OW28966 (VM/ESA); PQ06993 (VSE/ESA).
- For IBM personnel, the OSA Home Page is available at URL *http//icpe.pok.ibm.com*. See page 19.

Summary of Changes for GC23-3870-04

- An ATM OSA-2 can now be attached to an ATM device that supports RFC 1483 routed encapsulation and be run in the ATM IP Forwarding mode in the OS/390 and MVS/ESA environments. Information is provided on page 45 (OS/390 requirements); page 49 (MVS/ESA requirements); and page 115 (OSA planning).
- Bandwidth can be reserved for virtual circuits in the HPDT ATM Native mode (page 36).
- VTAM High Performance Routing (HPR) over XCA is supported for by OSA in the OS/390 and MVS/ESA environments (page 45).
- The FDDI OSA-2 supports the High Performance Data Transfer Multipath Channel (HPDT MPC) mode (page 124) in the OS/390 environment.
- SNA session availability, or load balancing, support in the SNA mode (page 154) for FDDI OSA-2s and ENTR OSA-2 ports that are attached to different token-ring LAN segments is extended to VM/ESA (page 68) and to VSE/ESA (page 84).
- OSA-1 and LANRES/MVS mode information has been moved from the body of this book and placed in Appendix A.
- The book has been re-organized to allow faster retrieval and a number of minor technical and editorial amendments have been made to improve its accuracy and readability.

Summary of Changes for June 1997 Softcopy Update to GC23-3870-03

- The physical layer type parameter for selecting either SONET or SDH has been added to the ***ATM HPDT Native Settings*** panel (page 165).
- Several minor amendments have been made to the discussion on the HPDT ATM Native mode discussion in Chapter 4.

Summary of Changes for GC23-3870-03

- OSA-2 now supports the G-4 generation of CMOS machines.
- An OSA-2 can now be defined to VSE/ESA, starting with VSE/ESA 2.2.1 (Chapter 5).
- Planning information is provided for the reserved bandwidth (RB) support for an ATM OSA-2 in the HPDT ATM Native mode in either an OS/390 R3 or MVS/ESA environment. See page 163 and the softcopy update of this edition on the June 1997 OS/390 (SKT-6700), MVS/ESA (SK2T-0710), Networking Systems (SK2T-6012), and S/390 Hardware (SK2T-5843) system softcopy collection kits.
- Planning information is provided for the SNMP management support of an ATM OSA-2 in the HPDT ATM Native mode in an OS/390 R3 environment.
- Several technical and editorial amendments have been made to improve the readability of the book. Appendix F, which contained configuration worksheets, has been deleted because it was not being used.

Summary of Changes for March 1997 Softcopy Update to GC23-3870-02

- Planning information is provided for the HPDT ATM Native mode that is available in the OS/390 R3 and MVS/ESA environments with the PTF resolution to APAR OW21906.
- The maximum number of PUs supported by an OSA in the SNA mode is set to either 255 or 2047, depending on the requirements listed in the requirements section of each S/390 operating system.
- Enhanced SNA session availability parameters are now provided by OSA/SF for VM/ESA with the resolution of APAR OW24952.
- The OSA SNA mode does not support settable maximum window-in and maximum window-out timers These values are always 1 for window-in and 8 for window-out.
- IBM Language Environment (LE) for VM 1.6 (5688-198) is no longer required for an OSA-2 that is defined in a VM/ESA environment and being customized by OSA/SF for VM/ESA.
- If you are setting up and using the OSA/SF OS/2 (GUI) interface with OS/2 (not OS/2-J) and either the EHLLAPI (3270) or APPC communications protocol, Personal Communications 4.1 with the PTF resolution to APAR IC14272 can be used instead of OS/2 Communications Manager/2.
- Effective with EC E95874, a new token-ring (TR) wrap plug, P/N 08J5792, is provided.
- Several technical and editorial amendments have been made to improve the readability of the book.

Note: GC23-3870-03 will be published in hardcopy before it is appears in the June 1997 system softcopy collection kits. GC23-3870-03 will contain information on the relevant March 1997 announcements.

Summary of Changes for GC23-3870-02

- OSA-2 supports the IBM Enterprise Parallel Server – Generation 3. One OSA-2 is required on this platform. Up to eleven additional OSA-2s can be installed on it.
- OSA-2 supports the IBM Multiprise 2000 One OSA-2 is required on this platform. Up to five additional OSA-2s can be installed on it.
- OSA/SF for VM/ESA 2.2.0 is available as an VM/ESA facility on VM/ESA Version 2 Release 2.0 (Chapter 4).
- An ATM OSA-2 can be run in the SNA mode (page 185) when managed by OSA/SF Release 2 plus the PTF resolution to APAR OW21489.
- For FDDI OSA-2s that are attached to separate LAN segments or for ENTR OSA-2 ports that are attached to separate token-ring LAN segments, enhanced SNA session availability parameters are provided by OSA/SF with the resolution of APAR OW20205 in the OS/390 and MVS/ESA environments (page 154).
- OS/2-J is supported by OSA/SF V1R2 in the OS/390 (page 45) and MVS/ESA (page 49) environments with the application of the PTF resolution for APAR OW22537.
- Several amendments have been made to improve the readability of the book.

Summary of Changes for GC23-3870-01

Planning information for the ATM OSA-2 feature is provided. The Asynchronous Transmission Mode ATM OSA-2 feature is documented in the appropriate sections. These changes are identified by a change bar (|) in the left margin of the text. An ATM OSA-2 can be configured in the TCP/IP Passthru and SNA modes. For these OSA modes, an ATM OSA-2 provides up to two LAN emulation client (LEC), or logical, ports.

- An overview is provided in Chapter 1.
- ATM requirements inclusion of ATM-related items in planning checklists are provided in this edition.
- A discussion of the ATM OSA-2 hardware characteristics is provided in Chapter 2, starting on page 33.
- A discussion of the ATM OSA-2 LAN emulation client (LEC) settings is provided in Chapter 12, starting on page 185.
- Sample configuration worksheets are provided in the appendixes in this book.
- ATM Forum-compliant standards and ATM-related books are listed in the bibliography (page xxi).

Note: The ATM OSA-2 support of ATM LAN emulation in the OSA SNA mode, is documented in this edition for planning purposes. This support is not currently available on OSA/SF Release 2. It will be made available on OSA/SF Release 2 at a later date.

Through its two RJ-45 connections an ENTR OSA-2 now supports data transfer in full duplex mode between a host program and a client on a directly-attached Ethernet or token-ring LAN. See page 26.

Information on the OSA SNA mode has been expanded.

Information on the OSA TCP/IP Offload and NFS/FEP modes is removed. These two modes are not supported on OSA/SF Release 2.

Sections of the manual have been re-organized. As a result of the foregoing changes and comments from customers, which are always greatly appreciated, sections of the book have been re-organized to improve the readability and retrievability of the information.

Summary of Changes for GC23-3870-00

This book is available on the following system softcopy collection kits. The file names are listed on page xvi for:

- S/390 Hardware Collection Kit, SK2T-5843
- Networking Systems Collection Kit, SK2T-6012
- OS/390 Collection Kit, SK2T-6700
- MVS/ESA Collection Kit, SK2T-0710
- SystemView for MVS/ESA Collection Kit, SK2T-7206
- VM/ESA Collection Kit, SK2T-2067

The page and section numbers in the softcopy and hardcopy levels of this book pertain only to that level. These numbers may therefore not be identical in the hard- and softcopy formats.

OSA/SF is available on OS/390.

OSA now supports the OS/390 Release 1. This support includes supporting OSA/SF as an OS/390 base, non-exclusive element. OSA/SF for MVS/ESA is shipped as a stacked FMID on OS/390, but you should read the OSA/SF User's Guide listed for the system you are using (page xv). The OS/390 requirements are listed on page 45.

If you have a FDDI OSA-2, you may need an FCS-MIC jumper cable. See page 30.

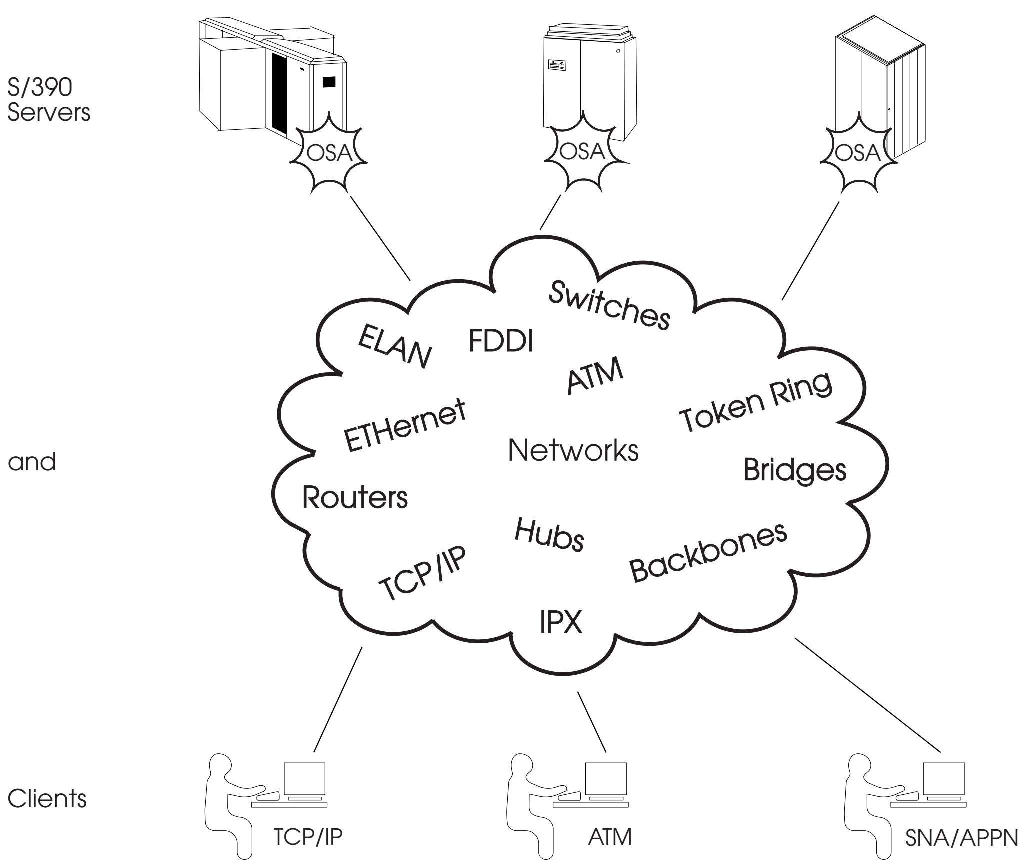
Some minor technical and editorial changes have been incorporated. These are not marked by a vertical line to the left of the change, deletion, or addition.

Chapter 1. What Is an Open Systems Adapter Feature?

The IBM System/390 (S/390) Open Systems Adapter (OSA) is an integrated hardware feature that allows the S/390 platform to provide **industry-standard connectivity** directly to clients on local area networks (LANs) and wide area networks (WANs). With OSA, an S/390 complementary metal oxide semiconductor (CMOS) central processing complex (CPC) or an Enterprise System/9000 (ES/9000) processor–is an **open systems platform** that brings S/390 resources directly to its attached networks. [1]

Depending on its feature code (FC) and port connection, an OSA supports direct attachment to an Ethernet LAN, a token-ring LAN, or a Fiber Distributed Data Interface (FDDI) LAN. The clients on the attached LAN can use the Transmission Control Protocol/Internet Protocol (TCP/IP), the Systems Network Architecture/Application Peer-to-Peer Networking (SNA/APPN) protocol, and, on an Ethernet LAN only, the Internet Packet Exchange (IPX) network protocol.

Instead of being attached directly to a LAN, the Asynchronous Transmission Mode (ATM) OSA-2 is attached to an ATM-based network. In two modes that are unique to this OSA, it provides data transfer in the IP and SNA protocols to clients that are also directly, or “natively,” attached to the network. In the same two modes that are used by the OSAs that are directly connected to LANs, the ATM OSA-2 also provides data transfer for IP and SNA clients that are attached to the so-called “legacy” Ethernet and token-ring LANs that, in turn, are bridged from the ATM network.



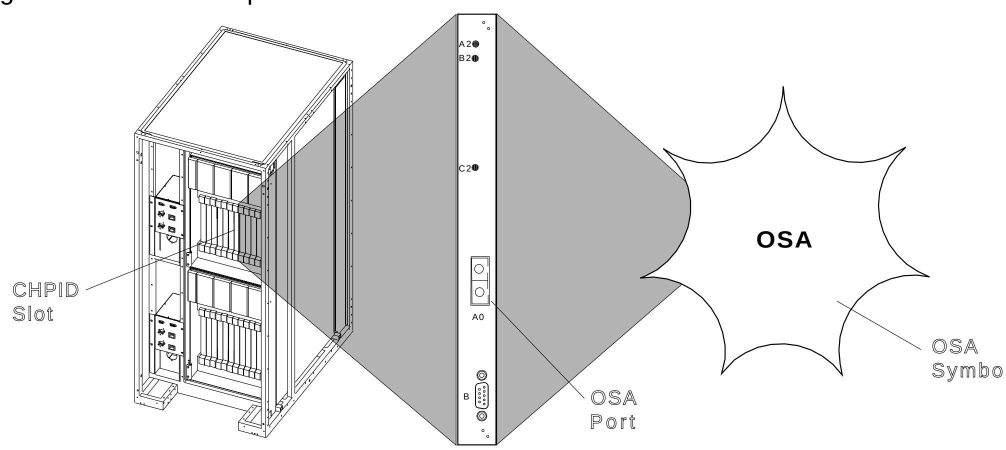
1 ES/9000 processors are supported by OSA-1s only, which are described in Appendix A.

1.1 OSA, Its Channel Identifier, and Its Ports

As an S/390 I/O channel, an OSA is identified in the S/390 hardware I/O configuration by its channel path identifier (CHPID). The CHPID equates with the physical position of the OSA on the S/390 platform on which it is installed. OSA-2 features are inserted directly into channel I/O slots.

As a unique type of S/390 channel, an OSA has one or more physical network adapters, or OSA ports. Depending on the OSA, its physical port or ports can be attached directly to a LAN or to an ATM switch. This integration of channel path with network port makes OSA a unique type of an S/390 channel: the OSA type.

The proximity of an OSA CHPID slot and OSA port, both integrated within an S/390 frame, is shown in the next figure. The bezel of this OSA, which has only one physical port, has been brought out of the CHPID slot toward the middle of the figure to show the OSA port. The multi-star symbol on the right is used throughout this book to represent an OSA.



Notes:

1. If an OSA is transferring data in its SNA mode of operation, which is introduced later in this chapter, the OSA also has one virtual port. This virtual port is used only if the OSA is being monitored by an SNA network management program such as NetView, via a Box Manager node for communications with that program.
2. Unique among the OSAs, an ATM OSA-2 can have up to two LAN emulation client (LEC) ports in addition to its single physical port. A LEC port is only used to provide LAN emulation client (LEC) services for SNA and IP clients on ATM “legacy” LANs.
3. Unique among OSA-2s, an ENTR OSA-2 has two physical ports, each of which can be connected to either an Ethernet LAN segment or a token-ring LAN segment. The other OSA-2s have only one physical port.

1.2 OSA Ports and Their Attached Networks

Each physical port on an OSA allows the S/390 to be attached to a LAN or WAN through a user-supplied cable. OSA-2s are introduced in the following sections according to the networks that they support. For more information on the hardware characteristics of the OSA-2 features, refer to Chapter 2. (OSA-1 features are described in Appendix A.)

Take note of the following points.

- Each of the ports that allow communications with clients on an Ethernet, token-ring, or FDDI LAN is shipped with a world-wide unique, or universal, media access control (MAC) address. You can use this MAC address to define the OSA port on the attached LAN or use the OSA Support Facility (OSA/SF) to create and activate a locally-administered MAC address (page 210).
- An Asynchronous Transmission Mode (ATM) OSA-2 is shipped with a unique end system identifier (ESI) that identifies its physical port to the ATM device to which the ATM OSA-2 is attached (page 210). An ATM OSA-2 is also shipped with two unique MAC addresses, one for each of its two LAN emulation client (LEC) ports.

1.2.1 Ethernet LAN Connections

An ATM OSA-2, Fast Ethernet (FENET) OSA-2, and Ethernet /Token-Ring (ENTR) OSA-2 allow the S/390 to communicate with its clients on an Ethernet LAN.

- An ATM OSA-2 (page 33) can be configured to provide LAN emulation client (LEC) services for up to two emulated LAN (ELAN) segments that can be either Ethernet ELANs or token-ring ELANs in its attached ATM-based network.
- A FENET OSA-2 (page 39) allows attachment to either a 100 Mbps or 10 Mbps Ethernet LAN. The single port on this OSA has an RJ-45 connector that supports both full- and half-duplex modes. Auto-negotiation is supported, but not identical source and destination MAC addresses. If the system is running in logically-partitioned (LPAR) mode, therefore, communications between the logical partitions (LP-to-LP) to which the OSA is defined are not allowed.
- An ENTR OSA-2 (page 26) allows attachment to a 10 Mbps Ethernet LAN. This OSA has two ports, either of which can be connected to an Ethernet or a token-ring LAN. Each port has three connectors, two of which can be used for an Ethernet connection, although only one connector can be used at a time. If a port is connected to an Ethernet LAN, both full- and half-duplex modes are supported.

1.2.2 Token-Ring LAN Connections

- An ENTR OSA-2 (page 26) has one connection on each port for direct attachment to a token-ring LAN. Attachment is through only one connector on an ENTR OSA-2 port. This is sometimes called the bottom RJ-45 connector.
- An ATM OSA-2 (page 33) can be configured to provide LAN emulation client (LEC) services for up to two emulated LAN (ELAN) segments for Ethernet or token-ring legacy LANs that are bridged from the ATM-based network to which the OSA is attached.

1.2.3 FDDI LAN Connections

A FDDI OSA-2 (page 30) has one port that can be connected either to a 100 Mbps single-ring or a dual-ring FDDI LAN. The FDDI LAN must conform to either ANSI X3T9.5 or ISO 9314.

1.2.4 ATM Network Connections

An asynchronous transfer mode (ATM) network is connection-oriented, not media-shared as is the case with LANs. The ATM switching technology provides the high bandwidths needed for simultaneous traffic of various types of data (voice, video, etc.) across the ATM connections, or virtual circuits.

An ATM OSA-2 (page 33) supports attachment to a 155 Mbps ATM device, such as an ATM switch or router. The ATM device must conform to the ATM User Network Interface (UNI) 3.0 or 3.1 requirements.

Services that are “native” on the ATM network are, for example, the connections created by the TCP/IP and SNA functions of the eNetwork Communications Server for OS/390 (CS for OS/390) and the VTAM High Performance Routing (HPR) capabilities that allow fast transmission of ATM cells.

For the Ethernet and token-ring ELANs that are bridged from the ATM network, the ATM OSA-2 provides LAN emulation client (LEC) services for Ethernet and token-ring LAN clients that are bridged from the ATM-based network.

1.3 OSA Modes of Operation

So far in this book, only the physical attributes of an OSA have been described: the channel path with its identifiers (CHPID), the ports, and the networks to which these ports can be attached. Through these entities, an OSA transfers data physically between S/390 programs, or servers, and their clients on the attached networks.

Because OSA supports the S/390 ESCON Multiple Image Facility (EMIF), the OSA's channel path can be defined as shared in a system that is in logically partitioned (LPAR) mode. As a consequence, an OSA can be customized to be run in some modes concurrently with different S/390 programs sharing access to its network ports.

In the following table, the OSA-2 features are correlated with the OSA modes and shows the S/390 environments in which the OSAs can be run in each mode. The requisites for each S/390 environment are listed in Chapter 3 (OS/390 and MVS/ESA), Chapter 4 (VM/ESA), Chapter 5 (VSE/ESA).

OSA-2 FEATURE

MODE	ENTR OSA-2	FDDI OSA-2	FENET OSA-2	ATM OSA-2
TCP/IP Passthru	OS/390, MVS/ESA, VM/ESA, VSE/ESA			
SNA				
HPDT MPC (IP)		OS/390		
HPDT MPC (IPX)	*These modes can run concurrently*		OS/390	
HPDT ATM Native				OS/390, MVS/ESA, VM/ESA
ATM IP Forwarding				OS/390, MVS/ESA

1.3.1 Modes for the IP Protocol

- All OSAs can be run in the TCP/IP Passthru mode (page 101) in all the system environments that OSA supports.

  If an OSA is being run in this mode, it serves as an IP passthrough agent as a LAN channel station (LCS). An OSA-2 can be run in this mode concurrently with either the HPDT MPC mode, the SNA mode, or with both modes.

- Only an ATM OSA-2 can be run in the ATM IP Forwarding mode (page 115) in the OS/390 and MVS/ESA environments that this OSA supports. This mode, which requires the exclusive use of the ATM OSA-2, supports one permanent virtual circuit (PVC).

- Starting with OS/390 V2R5, an ATM OSA-2 can be run in the HPDT ATM Native mode (page 163) to support the TCP/IP function of the eNetwork Communications Server for OS/390 (CS for OS/390). This mode requires the exclusive use of the ATM OSA-2.
- Starting with VM/ESA 2.4.0, an ATM OSA-2 can be run in the HPDT ATM Native mode (page 163) to support the TCP/IP function of the eNetwork Communications Server for VM/ESA. This mode requires the exclusive use of the ATM OSA-2.

1.3.2 HPDT MPC Mode for the IPX Protocol

- In an OS/390 environment that supports the Novell Directory Services (NDS) of the NetWare Services for OS/390, a FENET OSA-2 can be run in the High Performance Data Transfer Multipath Channel (HPDT MPC) mode to transfer data packets with the IP Exchange (IPX) protocol (page 131).
- A FENET OSA-2 being run in this mode can be run concurrently in either the TCP/IP Passthru or SNA mode, or concurrently in all three modes.

1.3.3 Modes for the SNA Protocol

- All OSAs can be run in the SNA mode (page 135) in all the system environments that OSA supports.

  If an OSA is being run in this mode, it serves as a passthrough agent for data transfer between the S/390 programs and their SNA network clients. To assist in SNA network management, the services of the OSA support facility (OSA/SF) allow you to change the settings of the logical link control (LLC) timers. For SNA clients on Ethernet or token-ring LANs, SNA session availability options are available

  In the SNA mode, a FENET OSA-2 automatically provides logical link control (LLC) status items to its managing OSA/SF together with support for the NetView program-to-program interface (PPI) for SNA event monitoring. An ENTR or FDDI OSA-2 supports event monitoring only through a VTAM box manager node. Depending on the level of OSA/SF that is installed, an ATM OSA-2 supports either the NetView PPI or the box manager node for SNA event monitoring.
- Only an ATM OSA-2 can be run in the HPDT ATM Native mode (page 163) and only in the OS/390 and MVS/ESA environments that this OSA supports. It supports ACF/VTAM and, starting with OS/390 V2R5, it supports the TCP/IP and SNA functions of the eNetwork Communications Server for OS/390 (CS for OS/390) in OS/390 and VM/ESA environments.

  In this mode, which requires the exclusive use of the ATM OSA-2, the ATM OSA-2 supports data transmission through both switched virtual circuits (SVCs) and permanent virtual circuits (PVCs).

1.4 S/390 OSA Definitions

An OSA must be defined in the system hardware I/O configuration and to the S/390 programs that use the OSA. The data paths between an OSA port and the S/390 programs with which the OSA communicates must also be defined to the OSA as entries in its OSA address table (OAT). In addition, some of the port traffic characteristics, which are preset when the OSA is shipped, can be altered through user input.

1.4.1 System Hardware I/O Configuration Definitions

In the S/390 environment, an OSA is identified in the system I/O configuration data set (IOCDS), or equivalent, as an OSA CHPID with one logical control unit and a variable number of logical devices. General guidelines are provided in Chapter 2 for the different OSA modes.

In most of the examples in this book, IOCP statements are used because their succinct format lends itself to the explanations in this book. Generally, however, you would use the same program for an OSA CHPID that you use for any other type of S/390 channel. For that information, refer to the system books listed in the bibliography. In an OS/390, MVS/ESA, and VM/ESA environment, an OSA channel can be reconfigured and its devices varied online. In a VSE/ESA environment, the OSA must be configured on and off through the standalone support element or through single object operations via the hardware management console.

Associate one logical control unit for each logical partition (LP) if the system is running in logically-partitioned (LPAR) mode or one control unit if the system is in basic mode. There is no physical control unit.

Associate a single or a pair of logical S/390 device numbers, depending on the OSA mode, for data transfer to be associated between the OSA port and a system image running in a logical partition (LP) if the system is running in logically-partitioned (LPAR) mode or for the system if it is running in basic mode. If the OSA is defined to be shared among LPs, the system images can share the logical devices.

Define one device for the OSA Support Facility (OSA/SF) in each LP or share it across the LPs to which the OSA is defined so you can use that program to customize, or configure, an OSA to be run in its modes of operation. (For the limited conditions in which an OSA can be run using the default OAT without being customized by OSA/SF, see the following discussion.) The device number for OSA/SF is called the OSAD device, which name is derived from its unique device type of OSAD, or the FE device, which name is derived from its unique unit address of `X'FE'`.

Associate one unit address (UA) with each device number. The unit address for the OSA/SF device must be `X'FE'`. The unit addresses for the device numbers used for data transfer must be the IBM-supplied default UAs if the OSA is to be run in its default TCP/IP Passthru mode configuration.

1.4.2 S/390 Program Definitions

An OSA must be defined to the S/390 programs, such as eNetwork Communications Server for OS/390 (CS for OS/390), TCP/IP, and VTAM, depending on the mode of operation in which the OSA is to be run. In this OSA-centric book, only the OSA-related parameters are discussed for these S/390 program definitions to provide a framework for your OSA and OSA/SF planning. For complete information on the S/390 program definitions, however, refer to the appropriate system books. The titles of some of these manuals are listed in bibliography, which is in the front of this book.

1.4.3 OSA Data Path Definitions

Each data path through an OSA in each OSA mode is specified by an entry in the OSA's address table (OAT), which is stored in the OSA's nonvolatile storage. Using OSA/SF, you can add, change, and delete OAT entries in an OAT for each of the OSA's modes of operation.

1.4.3.1 The Default OAT: Except for an ATM OSA-2, each OSA is shipped with an IBM-supplied default OAT that contains one pair of Passthru entries for each pair of inbound and outbound data paths through the OSA. These Passthru OAT entries, therefore, allow the OSA to be run in the TCP/IP Passthru mode either with or without the services of OSA/SF.

- Because an ENTR OSA-2 has two ports, its OAT therefore has 64 default Passthru entries to accommodate one read and one write data path for each port for 15 logical partitions plus an “LP=0” for a system running in basic mode or if the OSA CHPID is defined to be dedicated.
- Because the FDDI and FENET OSA-2s each have one port, their OATs have 32 default Passthru entries.
- Because an ATM OSA-2 uses its LAN emulation client (LEC) ports in the TCP/IP Passthru mode, which must be defined by user input to OSA/SF, this OSA is not shipped with a default OAT.

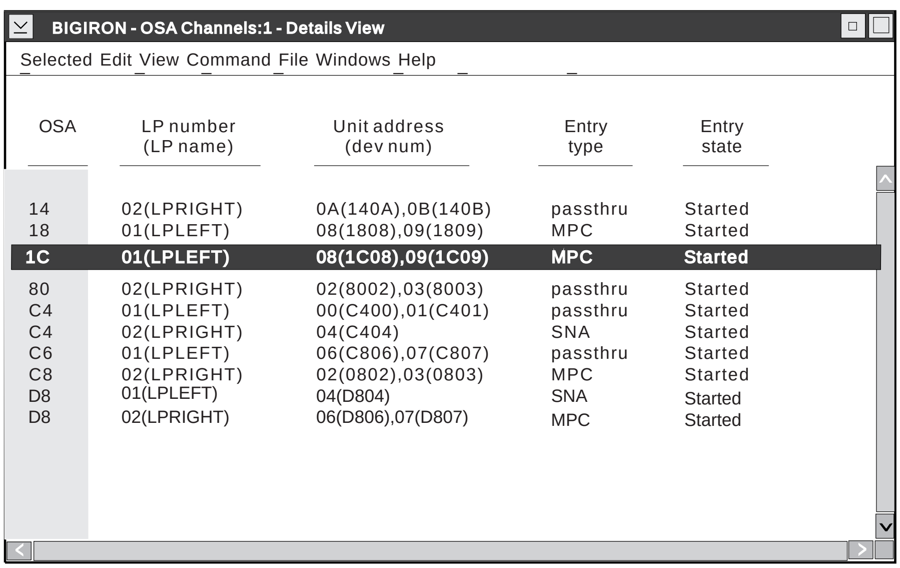
To define an ENTR, FDDI, or FENET OSA for a default TCP/IP Passthru mode configuration, that is, a configuration in the TCP/IP Passthru mode without customization through OSA/SF, you only have to define the OSA channel path with its pairs of associated device numbers and unit addresses in the system hardware I/O configuration (IOCDS). Use the same commands or programs that you would use for any channel path (CHPID).

Although the services of OSA/SF are not required for a default configuration, they are still recommended. Even in a default configuration, OSA/SF can still be used to obtain data that can assist you in determining the cause of OSA-related problems. In fact, OSA/SF even lets you reinstate the OSA's default OAT and then displays these default OAT settings for you.

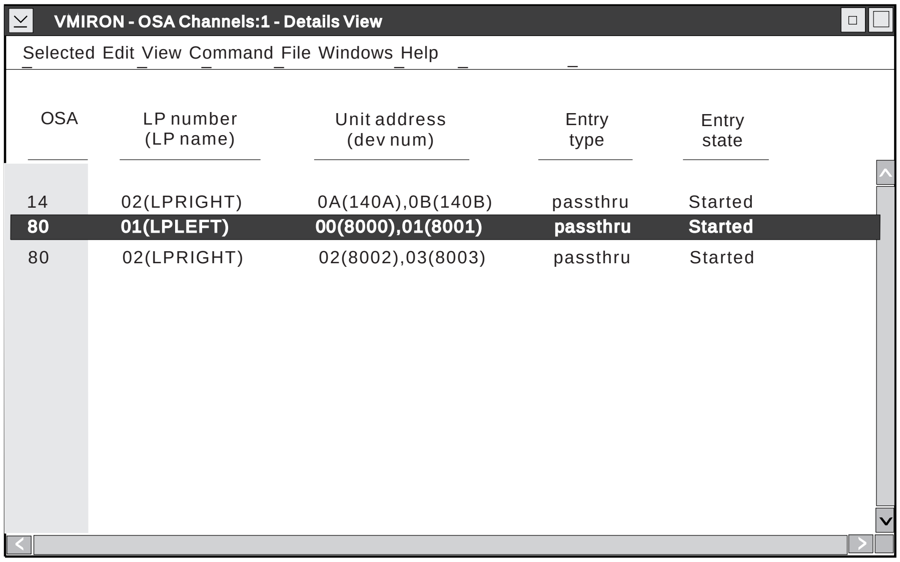
1.4.3.2 Format of an OAT and Its Entries: An OAT consists of a header and up to 220 entries, or rows, that are numbered 0 through 219. Each entry consists of a base segment and an extension. The format of the base segment is common to all entries and it is discussed in the next section. The format of an OAT entry's extension depends on the OSA mode in which the data path will be used. For this reason, the OAT entry extensions are described in subsequent chapters in this book, although they are introduced under **Entry type** on page 9.

1.4.3.3 An OAT Entry's Base Segment: The following figures show the ***OSA Channels–Details View*** panel, which is displayed by the OSA/SF OS/2 interface (GUI), of the base segments of the OAT entries used for the OSA CHPIDs that are used in the examples in this book. OSA/SF GUI displays the base segments of the OAT entries together for all the OSA CHPIDs being managed by the OSA/SF in the active host session.

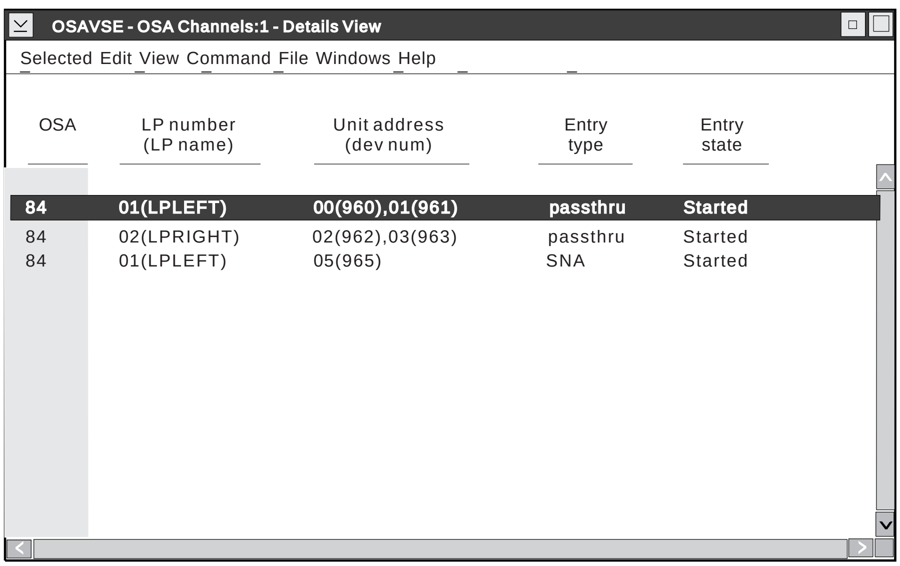
In the OS/390 environment, the OSA CHPIDs are used in this book that are shown in the following figure. With each CHPID, its associated device numbers are shown between parentheses preceded by the unit address that is associated with the device number.



In the VM/ESA environment, the OSA CHPIDs are used in this book that are shown in the following figure. With each CHPID, its associated device numbers are shown between parentheses preceded by the unit address that is associated with the device number.



In the VSE/ESA environment, the OSA CHPID in the following figure with its associated device numbers, each of which is shown between parentheses and preceded by its associated unit address, is used in this book.



Throughout this book, labeled, black arrows are used to draw your attention to certain parameters for which you will need to provide input The LP number, LP name, unit address, and device number are examples of these parameters that are required in an OAT entry, the system hardware I/O configuration, and the S/390 program that serves as the S/390 endpoint of the data path described by the OAT entry.

LP **LP number and LP name**

are the number and name of the logical partition associated with the data path specified by this OAT entry. Of course, this assumes the system is running in logically partitioned (LPAR) mode. If the system is running in basic mode, OSA/SF assumes an“ LP number” of 0.

UA **Unit address**

is displayed before each device number that is also displayed for the data path

Device number (dev num)
: is displayed as a 4-digit number that is padded with zeros if required and enclosed in parentheses. Note that the SNA mode requires only one read/write device. The other modes require separate read and write devices for the inbound and outbound data paths, respectively.

Group size
: specifies the number of entries required for both the inbound and outbound data paths between a S/390 program and its network clients. The group size is always automatically provided by OSA/SF GUI. It is automatically provided by the other OSA/SF interfaces if the PTF resolution to OSA/SF APAR OW28283 is applied (pages 45 and 49).

- Group size = 1 for an SNA OAT entry because the same device reads and writes.
- Group size = 2 for a Passthru or MPC OAT entry because one device reads and one writes.
  - The entry associated with the read, or even-numbered, device specifies the inbound data path and can be modified by user input to OSA/SF.
  - The entry associated with the write, or odd-numbered, device specifies the corresponding outbound data and is automatically created when the entry for the read device is specified.

Entry type
: indicates the type of extension for this OAT entry.

- An inbound/outbound pair of Passthru entries is required for each pair of read/write devices in the TCP/IP Passthru and ATM IP Forwarding modes.
- A single SNA entry is required for each read/write device in the SNA mode.
- An inbound/outbound pair of MPC entries is required for each pair of read/write devices in the HPDT ATM Native mode for an ATM OSA-2 and the HPDT MPC mode for a FDDI or FENET OSA-2.

Entry state
: indicates the device state. OSA/SF obtains the device status from the OSA.

1.4.3.4 Accessing an OAT: You can view, add, change, or delete an OAT entry by using the services, or tasks, of the OSA Support Facility (OSA/SF). These tasks are often referred to as “configuring” an OSA, but this means configuring an OSA in its mode of operation. It does *not* mean configuring the OSA in the system hardware I/O configuration.

You can use the OSA/SF REXX interface, the OSA/SF OS/2 interface (GUI), or, in an OS/390 or MVS/ESA environment only, the OSA/SF application programming interface (API). Instructions on how to set up OSA/SF, download the OSA/SF GUI, and use its commands, are provided in the appropriate OSA/SF user guides whose titles are listed in the bibliography starting on page xvi.

If you use the OSA/SF REXX interface, you use a locally-attached terminal for input: the TSO/E command line in an OS/390 or MVS/ESA environment; the CMS command line in a VM/ESA environment; and an IOACMD job in a VSE/ESA environment.

If you use OSA/SF GUI, you can avail yourself of the advantages of OS/2 and the workstation. Sample templates are provided in the OSA/SF IOASIOSAMP library for you to use. Furthermore, GUI can install a customized OSA mode image, or “OSA configuration”, automatically for you after you have created the image.

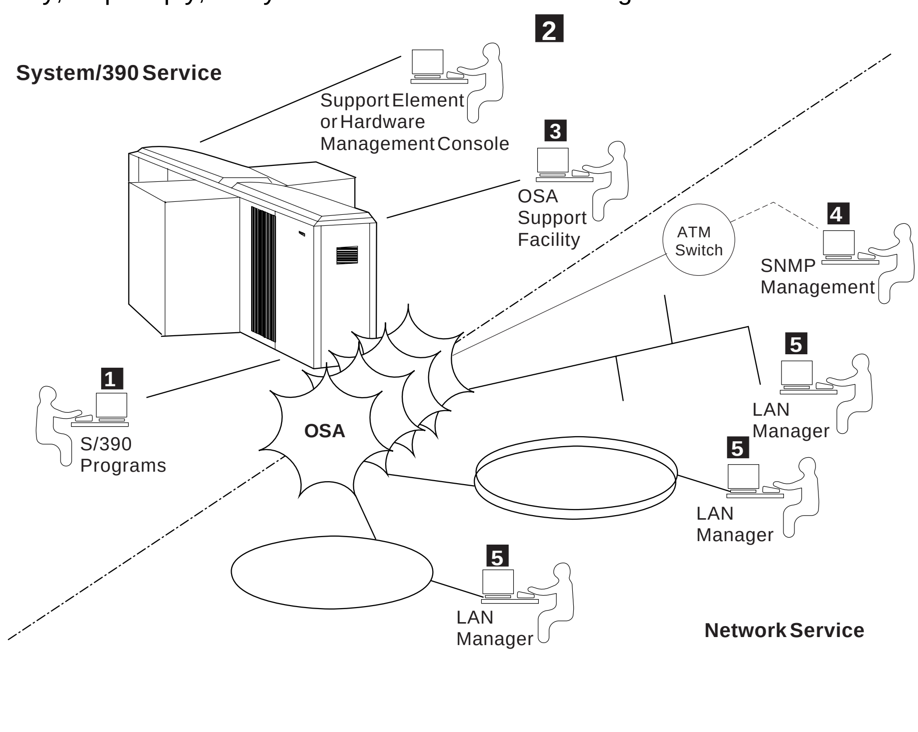
1.4.4 OSA Port Definitions

Each OSA is shipped with the set of IBM-supplied default port parameters that are listed in Chapter 12. Some of these port parameters are settable through OSA/SF or at the standalone support element or single object operations via the hardware management console, or at only one of these input devices. Some port parameters, however, are not settable through user input.

- The IBM-supplied default settings for port traffic and those parameters that can be altered, or changed by user input are described for each OSA port in Chapter 12.
- A number of port parameters can be set only if an OSA is being run in the SNA mode. These parameters, which can only be set with OSA/SF, can be used to enhance SNA session availability, to change the link level control timer values, and so on. A discussion on these SNA mode port parameters starts on page 140.
- User-provided settings to OSA/SF are *required* to establish a LAN emulation client (LEC) port that allows an ATM OSA-2 to be run in the TCP/IP Passthru or SNA mode to support legacy Ethernet and token-ring LAN clients that are bridged from the ATM-based network (Chapter 10).
- Optionally, you can use OSA/SF to define a local or group Media Access Control (MAC) address for a LAN port, including the two LEC ports on an ATM OSA-2 (page 210). You can also set a local MAC address for a physical OSA port, but not an ATM OSA-2 LEC port, using the standalone support element or single object operations via the hardware management console.

1.5 OSA's Panoply of Management Services

A *panoply* is an impressive array of protective elements that is designed to safeguard the well-being of the wearer. In its dual role as a S/390 channel and as a station or node in a network, an OSA is enveloped in an impressive array, or panoply, of System/390 and network management services.



1.5.1 OSA Management by S/390 Programs

1 Several S/390 programs provide management tools for the OSA channel. For full information, refer to the program manuals listed in the bibliography. However, here are two examples.

When an OSA is being run in the TCP/IP Passthru mode, OSA LAN station (port) data can be obtained at the TCP/IP host program by the simple network management protocol (SNMPv1 and SNMPv2), which recognizes address (ESI) of the physical port. The host program can access a management information base (MIB II) to obtain data about the OSA port interfaces.

If an OSA is being run in the SNA mode, the OSA can be managed either locally or by a remote network management program. For example, the NetView program can be used to monitor status and act on the alerts sent by the OSA.

1.5.2 Using the CMOS Hardware Management Console and Support Element

2 You can use single object operations via the hardware management console of the CMOS processor or, as appropriate, the standalone Support Elementi, for a number of OSA-related functions. For more information, refer to the hardware and system books listed in the bibliography (page xviii).

For example, data can be displayed about an OSA's physical port. You can also set a local media access control (MAC) address for a physical OSA port. (A local MAC address allows the port to be identified in a local naming convention for LAN stations and can continue to be used when one OSA is replaced by another OSA with a different universal MAC address.)

1.5.3 Using the OSA Support Facility (OSA/SF)

3 Although an OSA, except an ATM OSA-2, can be run in the TCP/IP Passthru mode without the services of OSA/SF, this program *must* be used to accomplish the following tasks:

- To customize a Passthru OAT entry so that it specifies the default data path to be used to transfer inbound IP data packets that have addresses unknown to the OSA.
- To allow an ATM OSA-2 to be run in any mode, including the TCP/IP Passthru mode.
- To allow the other OSAs to be run in any mode other than the TCP/IP Passthru mode in the limited conditions allowed by the default OAT settings.
- To copy an OSA/SF customization, or OSA mode configuration, from one OSA to another OSA.
- To obtain status information about the mode that is active on an OSA and about the current OSA port settings.
- To reinstate the OSA's default OAT settings and have them displayed or listed.

OSA/SF does not, however, provide commands to configure an OSA CHPID or to vary one of the CHPID's associated logical devices. In OS/390, OSA/SF runs as a base, non-exclusive element. In MVS/ESA, it runs as a licensed program. In VM/ESA, it runs as a VM/ESA facility starting with VM/ESA 2.2.0, and in VSE/ESA 2.2.1, it is a VSE/ESA central function.

OSA/SF can be accessed through:

- Its OS/2 or Windows interface, which is called the OSA/SF graphical user interface (OSA/SF GUI) in this book.

- A set of REXX Execs that the user accesses through whichever of the following that applies: Time Sharing Options Extensions (TSO/E) for OSA/SF for OS/390 and MVS/ESA; Conversational Monitor System (CMS) for OSA/SF for VM/ESA; and REXX jobs for OSA/SF for VSE/ESA.
- A user-written REXX Exec that calls the OSA/SF application programming interface (API).

Through the System Authorization Facility (SAF) interface of the system image on which it is running, OSA/SF lets you use the Resource Access Control Facility (RACF), or equivalent, to authorize or deny up to three levels of access to OSA/SF commands in an OS/390, MVS/ESA, or VM/ESA environment. In a VSE/ESA environment, you use the VSE/ESA access control table DTSECTAB.

1.5.4 ATM OSA-2 Network Management

4 Network monitoring information can be made available through the Simple Network Management Protocol (SNMP) with TCP/IP OpenEdition. In OS/390 R3, SNMP management is available for the HPDT ATM Native mode. Starting with OS/390 V2R5, SNMP management is available for an ATM OSA-2 in all the modes in which it can be run in an OS/390 environment.

1.5.5 OSA LAN Management

5 OSA supports the following types of LANs: Fiber Distributed Data Interface (FDDI), token ring, and Ethernet. As a LAN station, an OSA port responds to LAN-level requests from LAN Managers. For example, an OSA with a FDDI LAN attachment responds to station management (SMT) 7.2 frames for management of that port. A port with an Ethernet or token-ring LAN connection also responds to a set of commands that allows data about the port to be viewed at a LAN Manager. Some of these port parameters can be reset by an authorized OSA/SF user as well as by a LAN manager. It is therefore important that LAN management be done by one person or closely coordinated to avoid conflicting updates.

For an ATM or FENET OSA-2 that is being run in the SNA mode, OSA/SF reports a number of unsolicited alert conditions to the OSA/SF message log if the relevant OSA/SF APAR has been applied. In addition, it can collect and present logical link control (LLC) status about an ATM or FENET OSA-2 port being used in the SNA mode. For all OSAs being run in the SNA mode, SNA network management services, such as NetVie, are supported.

Chapter 2. OSA-2 Hardware Characteristics

In this chapter, the OSA-2 is described in the context of its hardware platforms, network protocols, requirements for user-supplied cabling, and the customer-supplied definitions in the system hardware I/O configuration (IOCDS).

- FC 5201, the ENTR OSA-2 (page 26), has two ports, each of which can be attached directly to a 10 Mbps Ethernet (EN), a 4 Mbps token ring, or a 16 Mbps token ring, LAN segment. An ENTR OSA-2 can be run in either the TCP/IP Passthru or SNA mode, or both modes concurrently.
- FC 5202, the FDDI OSA-2 (page 30), has one port, which can be attached to either a dual-ring or single-ring FDDI LAN. The FDDI OSA also supports an optional, optical bypass switch. A FDDI OSA-2 can be run in the TCP/IP Passthru, SNA, and HPDT MPC modes in any combination concurrently.
- FC 5204–5207, the ATM OSA-2 (page 33), has one physical port for attachment to an ATM switch or device. An ATM OSA-2 also has two LAN emulation client (LEC) ports that provide LEC services on emulated Ethernet or token ring LANs (ELANs) in the ATM-based network.

  An ATM OSA-2 can be run in the HPDT ATM Native mode exclusively, the ATM IP Forwarding mode exclusively, or in the TCP/IP Passthru and SNA modes either exclusively or concurrently with each other.
- FC 5208, the Fast Ethernet (FENET) OSA-2 (page 39), allows the S/390 to be attached to either a 100 Mbps or a 10 Mbps Ethernet LAN and be run in either half-duplex or full-duplex mode.

  A FENET OSA-2 supports auto-negotiation between the OSA and its attached hub, router, or switch, to set the LAN speed and duplex mode. This OSA can be run in the TCP/IP Passthru, SNA, and HPDT MPC modes in any combination concurrently.

2.1 Checklist for Hardware Planning

The following checklist should help you to prepare for the installation and operation of an OSA-2. Additional checklists preface the discussions on page 43 (OS/390 and MVS/ESA), page 65 (VM/ESA), page 81 (VSE/ESA), and the discussions on each OSA mode that are provided in later chapters in this book.

__ 1. For each OSA, decide in which OSA modes or modes it will be run concurrently. This decision determines which OSA-specific identifiers you will need to plan for. A FDDI and FENET OSA-2 can be run in the TCP/IP Passthru, HPDT MPC, and SNA modes concurrently; the other OSAs can be run in the TCP/IP Passthru and SNA modes concurrently. The HPDT ATM Native and ATM IP Forwarding modes each requires exclusive use of the ATM OSA-2.

__ 2. Decide how many OSAs will be installed on each platform. If availability is of paramount importance, ensure that any one OSA path does not become the single point of failure.

__ 3. Ensure that the hardware requirements are met that are described in this chapter and in the applicable preventive service planning (PSP) buckets. For more information, refer to the hardware books that are listed in the bibliography (page xviii) and your marketing representative.

__ 4. Ensure the site physical installation planning has been completed. See the hardware installation books listed in the bibliography (page xviii).

__ 5. Check the EC level of the hardware platform to ensure it meets OSA requirements. To check the EC level, follow the instructions for the standalone support element or single object operations via the hardware management console.

__ 6. If you are applying the PTF resolution to an OSA/SF APAR, make sure the OSA is at the proper code level (page 19).

__ 7. Determine whether the OSA will be installed concurrently (hot-plugged) during normal hardware operations. If so, take the considerations listed on page 15 into account.

__ 8. For the total number of OSAs, ensure their ports can handle the projected network traffic load. Also be mindful of the maximum number of users allowed for each OSA mode as described for each OSA and OSA mode.

For more information than is provided in this book, especially about redundant LAN paths, refer to *IBM Multisegment LAN Design Guidelines,* which is listed in the bibliography (page xx).

__ 9. Ensure the customer-supplied OSA cables are available, that space is allotted for their installation, and that they are connected properly at both ends.

__ 10. For each OSA port that is either directly attached to a LAN or logically attached to an ATM emulated LAN, make sure you know the active MAC address (page 210).

- If you plan to set a local MAC address, it is advisable to do so when the OSA is being installed. The reason for this is that the OSA channel path must be configured off from all the partitions to which it is defined, and then back on to all of them, before the change takes effect.
- If the PTF resolution to the proper OSA/SF APARs is applied, a local MAC address can be set with OSA/SF. See the requirements for each system in the following chapters.

  Otherwise, you can set a local MAC address only using the standalone support element or single object operations via the hardware management console.
- If you are specifying an ATM OSA-2 LEC port defined for a token ring emulated LAN (TR ELAN), an ENTR OSA-2 port connected to a token ring LAN, or a FDDI OSA-2 port for the SNA session availability options in the SNA mode (pages 140 and 151), you must define the same local MAC address for ports for which you have specified interdependent options.

__ 11. Define each OSA CHPID and its associated control unit and devices in the system hardware I/O configuration (IOCDS). Make sure these data items are provided to the personnel who define the CHPID to the S/390 system and to OSA/SF as well.

OSA CHPIDs for your CPC should be available in the *System Assurance Product Review* (SAPR) guide or the IBM Configurator (CFSYSTEM) *Placement Report* and *CHPID Report,* which should be available from your service representative.

__ 12. Review the OSA port parameters, especially the settable port parameters that are listed in Chapter 12 and, for the SNA mode, the SNA session availability options (pages 140 and 151).

__ 13. Each OSA mode places requirements for frame protocols and maximum number of users. See page 97 for the OSA modes that that use the IP protocol, page 135 for the SNA mode, and page 163 for the HPDT ATM Native mode.

- Logical level control (LLC) timers (T1, Ti, and T2) and the maximum I frames and transmit window counts (N3 and TW) can be set (page 140 and page 151).
- A FDDI OSA-2 port, an ENTR OSA-2 port that is attached to a token ring LAN, and an ATM OSA-2 LAN emulation client (LEC) port that is defined for a token ring emulated LAN (ELAN) can be used to enhance the availability of SNA sessions (page 140 and page 151).
- Unsolicited data on alertable conditions and solicited data on logical level control (LLC) status (page197) for an ATM or FENET OSA-2 is sent by OSA/SF if the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) is applied. Otherwise, alerts are can be made available through a Box Manager node (page 202).

__ 14. For an ENTR OSA-2 (FC5201), each of its two ports can be connected either to an Ethernet or a token ring LAN and that each port has three connectors on its bezel. Refer to the information that starts on page 26, especially:

- Keep the wrap plugs in case they are needed for service tests,
- If the bottom RJ-45 connector on an ENTR OSA-2 is connected to a a token ring LAN via a switch for full duplex communications and you specify an MTU size greater than 4K, make sure the token ring switch to which the OSA is attached can handle the maximum transmission unit (MTU), or maximum data packet size.
- Make sure the requirements for the duplex mode are met and that both ends of the link segment are set properly.

__ 15. For a FDDI OSA-2 (FC 5202), check the information starts on page 30, especially:

- Decide whether to use an optional, optical bypass switch. If so, plan to have the switch operational before the FDDI OSA is online (page 32).
- Check whether an FCS jumper cable will be needed (page 30).
- Make sure the FDDI OSA port is connected properly to either a single- or dual-ring FDDI LAN.

__ 16. For an ATM OSA-2 (FC 5204–5207), refer to the information that starts on page 33, especially:

- Make sure each ATM OSA-2 is attached to an ATM switch or device that is supported for the mode in which it will be run. Also ensure the documentation is available for the ATM switch and ATM network provider that is needed for the values you must enter.
- Check whether an FCS jumper cable will be needed.
- If the ATM OSA-2 is to be run in the TCP/IP Passthru or SNA mode, make sure the data items needed for the ATM LAN emulation client (ATM LEC) platform is available (page 185).

__ 17. For a FENET OSA-2 (FC 5208), refer to the information that starts on page 39, especially:

- Make sure the port is set for the proper LAN speed and duplex mode (page 40). Note that a FENET OSA-2 shows these settings on its bottom row of LED status lights.
- Make sure both ends of the link segment are set for auto-negotiation or at the same LAN speed and duplex mode.

2.2 Checklists for Installing or Moving an OSA

An OSA-2 feature can be installed concurrently, or “hot plugged” on the S/390 platform that the OSA supports. An OSA-2 feature can also be moved between CHPID slots on the same processor as long as both CHPID slots are valid for the OSA.

To define the OSA CHPID in the system hardware I/O configuration (IOCDS), you should generally follow the same guidelines that apply to other CHPIDs. Additionally, you may want to copy the OSA mode configuration of an OSA that is already installed. The following checklists should help you to organize this activity. Depending on your site requirements, of course, you may need to add, delete, or change some of the items on these lists.

2.2.1 Pre-Installation Checklist

__ 1. Make sure the OSA code level on the Support Element of the CMOS processor supports the functions that you want the OSA to perform (page 19).

__ 2. Make sure the pre-requisites and requisites are met for the modes in which each OSA will be run.

If OSA/SF is to be used, make sure that the PTFs to the relevant OSA/SF APARs are applied. Check the requirements listed in Chapter 3 (OS/390 and MVS/ESA), Chapter 4 (VM/ESA), or Chapter 5 (VSE/ESA).

Remember that:

- OSA/SF is required for an ATM OSA-2 to be run in any mode that it supports.
- OSA/SF is required for any other OSA to be run in any mode that the OSA supports except the TCP/IP Passthru mode.

  However, these OSAs can then be run in the TCP/IP Passthru mode only under the following limited conditions. Access to an OSA port cannot be shared among logical partitions, and the IBM-supplied default unit addresses must be defined in the system hardware I/O configuration (IOCDS). These values are `X'00'` and `X'01'` for the device pair defined for port 0. Since an ENTR OSA-2 has two ports, its default OAT is shipped with the IBM-supplied default unit addresses `X'02'` and `X'03'` for port 1 also.

__ 3. For an ATM OSA-2, make sure that the documentation for the ATM switch and network provider are available. If the ATM OSA-2 is to be run in the TCP/IP Passthru or SNA mode, also ensure that the proper LAN emulation server (LES) on the network is defined to each LAN emulation client (LEC) port to be used (page 185).

__ 4. For a FENET OSA-2, check whether the attached Ethernet hub, router, or switch supports auto-negotiation. If this is not supported, make sure the speed and duplex mode match the adapter (page 39).

__ 5. For an ENTR OSA-2, make sure the speed (10 Mbps) and duplex mode match the settings at the adapter (page 26).

Make sure the correct table is installed for each port and remember to remove the wrap plugs from those connectors not being used. For a new installation, make sure either you or the service representive selects “Autosense on next reset” from the OSA Advanced Facilities screen.

__ 6. Define the OSA channel path in the system hardware I/O configuration (IOCDS) as an OSA CHPID with its associated control unit. Associate the device numbers depending on the mode or modes in which the OSA will be run.

Remember that:

- It is especially important to define an OSA CHPID if the OSA is being installed concurrently, that is, if it is being “hot-plugged” into the system.
- If OSA/SF is to be used, make sure it is managing the OSA and that the OSAD device number with unit address `X'FE'` is defined.
- For devices defined for the TCP/IP Passthru mode, ensure the missing interrupt handler (MIH) is set off (0).

__ 7. If you plan to move an OSA feature to a different CHPID slot on the same CMOS processor, consider copying the OSA's configuration of modes (page 20) so that the new CHPID will be configured for those modes of operation. However, activate the copied configuration using the OSA/SF ***Activate No Install*** command. Do not instruct OSA/SF to download, or install, the copied configuration until after the OSA feature has been moved to its new CHPID slot.

__ 8. If the OSA is to be run in the TCP/IP Passthru mode:

- And if the default OAT is used (page 6), make sure the IBM-default unit addresses are associated with the device numbers that you define in the system hardware I/O configuration (IOCDS) (page 103).
- Update the TCP/IP profile to include a list of the authorized user IDs that can issue the Obeyfile command. A generalized format is shown below. For more information, refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xix).

  ```
  obey
  userid1 userid2 ...
  endobey
  ```

- Add the OSA to the TCP/IP profile now or after the OSA is installed.

  For information on the OSA-specific parameters in this book, see the discussion that starts on page 108. For complete information, see the TCP/IP and CS for OS/390 books listed in the bibliography (page xviii).

__ 9. If the OSA is to run in any other mode, ensure that the requirements for that mode are met as described in this book; that the device numbers are associated with the OSA CHPID properly; and that OSA/SF is available to use to customize the OSA. After the OSA is installed, use OSA/SF to activate and install the mode image on the OSA.

2.2.2 Installation Checklist

__ 1. Make sure that all the required planning is completed. For a minimum list, see the previous section.

__ 2. Call the IBM service representative to install or move an OSA feature.

__ 3. Make sure the service representative is provided with the IOCDS definitions, the setting of the duplex mode, if applicable, the speed settings, etc.

__ 4. Check whether the OSA-2 arrived with a miscellaneous equipment specification (MES). If so, the OSA physical installation instructions are included in the MES package.

If an MES does accompany the OSA, the OSA must not require the installation of other hardware, such as an IBB cable, that would prohibit concurrent installation.

2.2.3 Post-Installation Checklist

__ 1. Ensure that each OSA port is connected to the proper cable. Keep the wrap plugs in case they are needed for service tests.

For an ATM OSA-2 to be run in either the TCP/IP Passthru or SNA mode, ensure that the LAN emulation server (LES) for each emulated LAN is online (page 183).

__ 2. Bring the OSA channel path (CHPID) online as you would any other channel type. Refer to the hardware and system books listed in the bibliography (page xviii).

__ 3. Vary the OSA devices online that have been specified. If the devices do not come online automatically, they should be varied on manually, but **it may take up to 5 minutes for all the OSA devices associated with an OSA CHPID to come online.**

__ 4. If the OSA has been moved from another CHPID slot on the same CMOS processor and you copied its configuration of OSA modes, issue the OSA/SF ***Install*** command to download the copied configuration on to the OSA in its new CHPID slot.

__ 5. If the OSA is to be run in the TCP/IP Passthru mode:

- Add the OSA to the active TCP/IP profile or analogous TCP/IP statement by using the Obeyfile command against the active TCP/IP profile that was just updated with the OSA-2 device numbers. Refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xix).
- If the OSA has not yet been defined to TCP/IP, ensure that this is done. In this book, see page 108, but for complete information, refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xix).

__ 6. If the OSA is to be run in any mode other than the TCP/IP Passthru mode, ensure that all the definitions are in place that are described in subsequent chapters for that mode. Ensure the mode image, which has been customized by using OSA/SF, is installed and activated on the OSA. Refer to the appropriate *OSA/SF User's Guide* that is listed in the bibliography (page xv) for instructions.

__ 7. Notify operations personnel that the OSA can access the logical partitions (LPs) if the system is running in logically-partitioned (LPAR) mode or the system in basic mode for which it has been defined and customized.

2.3 OSA Channel Path Characteristics

As a S/390 I/O channel, an OSA feature is included in all the terms and conditions associated with any S/390 OSA hardware feature on the S/390 hardware platforms that it supports. An OSA is a field-installable feature.

2.3.1 OSA CHPID Slots

OSA-2 CHPID assignments depend on the total number of channels installed in the system. For more information that listed in the following table, refer to the hardware books listed in the bibliography (page xviii), and to the CHPID report provided by your account team.

Notes:

1. Check whether one OSA-2 is shipped automatically on a S/390 platform. If it is, the selection among an ATM, ENTR, FDDI, and FENET OSA-2 was made on the customer's order.
2. As with all CHPID positions, the CHPID of the required OSA-2 depends on the I/O configuration. However, an OSA-2 can be installed into any I/O channel slot that accepts an ESCON channel, parallel channel, or coupling link (coupling facility channel).
3. Each OSA-2 is assigned the first CHPID of the I/O slot in which it is installed. The remaining CHPIDs in that slot are not available for use by any channel of any type.

Hardware Platform	Maximum OSA CHPIDs per CPC
S/390 9672 Parallel Enterprise Server RA2, R12, R22, R32, R42, R52, R72, RA2 (FENET OSA-2 not supported.)	12 CHPIDs in modulo-4 in the range X'00' through X'7F'
S/390 9672 Parallel Enterprise Server R53, R63, R73, R83, RX3 (FENET OSA-2 not supported.)	12 CHPIDs in modulo-4 within the range X'00' through X'FF'
S/390 G3 Enterprise Server RA4, R14, RB4, R24, RC4, R34, R44, R54, R64, R74, R84, R94, RX4, RY4	12 CHPIDs in modulo-4 within the range X'00' through X'FF'
S/390 G4 Enterprise Server RA5, R15, RB5, R25, RC5, R35, R45, R55, R65, R75, R85, R95, RX5, RY5	12 CHPIDs in modulo-4 within the range X'00' through X'FF'
S/390 G5 Enterprise Server RA6, R16, RB6, R26, R36 RD6, R46, R56, R66, R76, R86, R96, RX6, RY6, R06	12 CHPIDs in modulo-4 within the range X'00' through X'FF'
S/390 G6 Enterprise Server X17...X97, XX7, XY7, XZ7, Z17...Z97, ZX7, ZY7, ZZ7	12 CHPIDs in modulo-4 within the range X'00' through X'FF'
S/390 Multiprise 2000 102, 103, 104, 105, 106, 107	6 CHPIDs in modulo-4 within the range X'00' through X'3F'
S/390 Multiprise 2000 115, 116, 124, 125, 126, 135, 1C5, 136, 146, 156	6 CHPIDs in modulo-4 within the range X'00' through X'7F'
S/390 Application StarterPak 3000 A10 A20	6 CHPIDs in modulo-4 within the range X'40' through X'5F'

Note: Some OSA-2 features are not available on some of the models listed above. For more information, refer to your IBM sales respresentative.

2.3.2 OSA Machine Type

Although you do not define an OSA channel by its machine type, it is worth noting that an OSA channel and device have the machine type of 9676. This information is stored in the OSA channel's node descriptor (ND) and the device node element descriptor (NED). These sources are used by some programs. For example, the ESCON Manager program displays the OSA machine type in its notebook page. OSA or 9676 is displayed in the type field. 001 (OSA-1), 002 (FDDI OSA-2 or ENTR OSA-2), 003 (ATM OSA-2), or 005 (FENET OSA-2) is displayed in the model field.

2.3.3 OSA Code Level

- For an OSA APAR, check the cover letter of the PTF resolution.
- Consult your service representative.

  Information on OSA is available on the *OSA PE Home Page* at URL *http://icpe.pok.ibm.com*. OSA levels are listed on *icpe.pok.ibm.com/lic.htm*. Also, look in RETAIN for document H00553 in the HSF (tip) database.
- For general information on EC levels of the CPC, refer to the hardware manuals listed in the bibliography and the applicable IBM preventive service planning (PSP) buckets, such as 9672DEVICE, 3000DEVICE, 2003DEVICE, and the OSA/SF PSP buckets that are listed for each S/390 system in the subsequent chapters.

2.3.4 OSA LED Status Indicators

Not Operational (Top Indicator)	Test Complete (Middle Indicator)	Offline Status (Third Indicator)	OSA Status
Off	Blinking	Off	OSA is operational; control unit and at least one port are online
Off	Blinking	On solid	OSA is operational, but control unit or port is not online
Off	Off	On solid	OSA channel path is offline
Off	Off	Off	Either no power to the OSA or severe hardware error detected
Blinking	Off	Off	Power-on self-test is running
On solid	Blinking	On or off	Hardware error detected
On solid	Not blinking	On or off	Severe hardware error; OSA stopped

Note: A FENET OSA-2 has three additional status indicators that are located in a horizontal row at the bottom of the bezel. These LEDs are listed on page 39.

2.3.5 OSA Configuration Data

Configuration can mean either channel path configuration as defined in the system hardware I/O configuration data set or the configuration of an OSA mode of operation as defined in the OSA address table (OAT).

2.3.5.1 Channel Path (CHPID) Configuration: To define an OSA channel path with its associated, logical control unit and devices, use the system commands and instructions that you would use for any other type of channel. As a S/390 channel path, an OSA must be defined in the system hardware I/O configuration data set (IOCDS). The OSA-related parameters are discussed starting on page 21. Note that the devices that are required depend on each mode of operation in which the OSA will be run.

2.3.5.2 OSA Address Table (OAT) Configuration: Each OSA has an OSA address table (OAT) in its non-volatile storage. Each entry in the OAT specifies a data path between a S/390 program that is running on a system image to which the OSA is defined and an OSA port. Each OSA, except an ATM OSA-2 is shipped with a default OAT as discussed on page 6.

You can customize the entries of an OAT, or “configure” an OSA in its modes of operation using OSA/SF. The OSA/SF customization, or configuration, parameters are discussed in detail for each OSA mode in Chapter 6 (IP protocol), Chapter 7 (HPDT MPC mode in the IPX protocol), Chapter 8 (SNA mode), and Chapter 9 (HPDT ATM Native mode). OSA/SF can also be used to customize an OSA port for its traffic parameters as discussed in Chapter 12. SNA mode port parameters are discussed on pages 140 and 151.

You can also copy an OAT's configuration using OSA/SF if the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), and PQ11504 (VSE/ESA) has been applied. This means that you can duplicate one OSA's mode or modes of operation to another OSA or to the same OSA if that OSA is to be moved from one CHPID slot to another on the same processor. You must, of course, still define the OSA in the system hardware IOCDS, to the S/390 host programs, make any amendments to the OSA/SF panels, and activate the configuration for the new OSA.

2.3.6 CHPID Management Guidelines

- As an I/O channel with associated devices, an OSA is subject to the same problem determination procedures that apply to any other type of S/390 channel. For information on hardware procedures, refer to the books on each hardware platform that are listed in the bibliography.

  Although the high availabity with which OSA has been designed makes channel failure unlikely, such a possibility should be considered in the planning of your general management of an OSA in its network traffic.

  For example, by designing alternate connections for host-to-network and server-to-client traffic, you can prevent the OSA features in your enterprise from being candidates for single point of failure.

- If an OSA memory dump or trace is required for the resolution of a problem, this is generally identified in an OSA/SF message or the OSA console log that OSA/SF can be used to access.

  If and when you are directed by support personnel to do so, you can take a dump of an OSA using OSA/SF. For more information, refer to the OSA/SF user's guide listed in the bibliography (page xv).

- An OSA LAN port can be managed by the LAN management tools available to the LAN administrator.

  Note, however, that OSA/SF also provides many port statistics. In this book, these are listed in Chapter 12 as they would be presented by the OSA/SF GUI interface (OS/2 or Windows).

- If port diagnostics must be run, remember that an OSA is a S/390 channel type. The OSA CHPID must be configured online, and then LAN traffic to the port must be stopped.

  If OSA/SF is managing the OSA, the associated entries in its OSA address table, or OAT (page 7) is useful when ascertaining the status of the devices associated with the port.

- Some hardware failures are disruptive only to the port, and you would prefer to disable the port without configuring the channel off. You can do this using OSA/SF, the standalone support element or single object operations via the hardware management console. The OSA/SF commands and panels are described in the OSA/SF user's guides that are listed in the bibliography (page xv).

2.4 OSA IOCDS Definitions

Using the I/O configuration program that you would use for any S/390 channel path, define each OSA in the system hardware I/O configuration (IOCDS). The resource (page 22), CHPID (page 22), and control unit (CU) (page 24) are discussed in this chapter together with the OSAD device for communications with OSA/SF (page 25) and an introduction to OSA device management.

To describe the I/O configuration programs and components in detail for each S/390 system that OSA supports falls outside the scope of this book although an example is shown in this section using IOCP statements and other examples are shown in subsequent chapters. For complete information, however, refer to the IOCP, OS/390, MVS/ESA, VM/ESA, and VSE/ESA books listed in the bibliography (page xviii). (In an VSE/ESA environment, IOCP must be used.)

Labeled arrows are used throughout this book. This is done to draw attention to an OSA-related parameter. The following numbered arrows are used on the parameters that relate to the OSA's definition in the system hardware I/O configuration.

IOCP statements are used in the examples because their format is concise, not because they show complete statements nor because their use is recommended. The example is an ENTR OSA-2 with CHPID X'80' being run in the TCP/IP Passthru mode under OSA/SF management. Note that hexadecimal notation (for example, X'80') is generally shown as 80 because it is assumed that you know which channel subsystem values must be provided in hexadecimal notation and which, such as the count values, must be entered in decimal notation.

LP	Logical partition number	RESOURCE PART=((LPLEFT,1),(LPRIGHT,2))
chpid	Channel path	CHPID PATH=80,TYPE=OSA,SHARED
CU	Control unit	CNTLUNIT CUNUMBR=100,PATH=80,UNIT=OSA
dev#	Device number	IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA,UNITADD=00
UA	Unit address for a device number	
OSAD	OSAD (OSA/SF) device and UA	IODEVICE ADDRESS=(800F),CUNUMBR=100,UNIT=OSAD,UNITADD=FE

You can specify a unit address implicitly by the decimal count. If you are using the IBM-supplied default UAs, however, you can only do so if the last two digits of the lowest device number are 00.

2.4.1 Logical Partition (RESOURCE PART=)

- If the system is running in logically partitioned (LPAR) mode, specify the logical partition (LP) names and the LP numbers (LP #) in a RESOURCE PART= statement.
- In the examples in this book, the hypothetical processor has two logical partitions, LPLEFT (LP 1) and LPRIGHT (LP 2). In IOCP format, the LPs for the examples in this book would be specified in the RESOURCE statement as:

```
RESOURCE PART=((LPLEFT,1),(LPRIGHT,2))
```

2.4.2 OSA Channel Path (CHPID PATH=)

Define an OSA channel path as one of the following:

- Basic mode for a system that is running in basic mode. OSA/SF assumes an LP number of 0, so you must specify 0 to OSA/SF for OAT entries if the system is in basic mode.
- Dedicated (not shared) for a system that is running in logically-partitioned (LPAR) mode. Because the OSA is dedicated to one logical partition (LP), OSA/SF can determine that LP from the IOCDS and, therefore, needs no user input. For an OAT entry in this case, specify LP=0 to OSA/SF.
- Reconfigurable dynamically between LPs. OSA/SF can determine the active LP from the IOCDS and, therefore, needs no user input. For an OAT entry in this case, specify LP=0 to OSA/SF.
- Shared among the LPs. In this case, OSA/SF cannot determine the active LP and, therefore, requires you to enter the LP number if you create an OAT entry.

  In the examples in this book, an OSA channel path is always shared between LPLEFT and LPRIGHT, so you would specify in IOCP format:

```
CHPID PATH=80,TYPE=OSA,SHARED
```

```
                             4+5             CU
IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA
```

Notes:

1. It is advisable to define an OSA only to those LPs that will use the OSA.

   For an OSA that is defined as reconfigurable or shared, this can be achieved by defining a CHPID candidate list. The OSA will then be brought online after a Power-On Reset (POR) only to the LPs, or candidates, that are in the CHPID's candidate list.

   For complete information, refer to *IOCP User's Guide,* which is listed in the bibliography (page xviii).

   Suppose, however, that the processor used in the examples in this book had three LPs instead of two and that the OSA is still defined only to LPLEFT (LP 1) and LPRIGHT (LP 2). LPNOTOSA (LP 3) is not used by OSA.

   You would restrict the OSA to LP 1 and LP 2 in the candidate list that is shown in the following example. The LPs are specified in the initial access list '(LPLEFT,LPRIGHT)'. '(=)' specifies the candidate list.

```
                 LP
RESOURCE  PART=((LPLEFT,1),(LPRIGHT,2),(LPNOTOSA,3))

CHPID  PATH=80,TYPE=OSA,PART=((LPLEFT,LPRIGHT),(=))
```

2. Define the type as OSA except in a VM/ESA environment prior to VM/ESA 2.1. In VM/ESA Version 1, an OSA is recognized as a channel-to-channel adapter, or CTCA, so either do not specify the device type or define it as CTCA.

3. The OSA is listed in the channel type column of the IOPD status frames. ATM stands for an ATM OSA-2; ETH stands for an ENTR OSA-2 port that is attached to an Ethernet LAN; FDD stands for a FDDI OSA-2; FENET stands for a Fast Ethernet OSA-2 port; and TOK stands for an ENTR OSA-2 port attached to a token ring LAN.

   The IOPD status frame can be viewed using the standalone support element or single object operations via the hardware management console. Refer to the CMOS Operations Guides listed in the bibliography (page xviii).

4. Although the OSA machine type, which is 9676, is not specified to the channel subsystem, some programs display it (page 19).

5. For OSA/SF to manage an OSA, the OSA channel path must be operational and online to the LP in which the managing OSA/SF is running.

6. To obtain OSA channel status, use the system commands and services that are used for other S/390 I/O channel types.

   In addition, OSA/SF can present channel status about the OSAs under its management. OSA/SF gathers data from the channel subsystem, including the status of an OSA channel path, and lists this data in the base segments of the OAT entry that is associated with each unit address and partition number (page 6).

7. To configure an OSA channel on and off, use the same system commands and services that are used for other S/390 channel types.

   - In an OS/390 or MVS/ESA environment, you can use either the system commands directly or indirectly through the ESCON Manager Remove Chp and Restore Chp commands. ESCON Manager can also be used to display OSA channel, control unit, and device status.

- In a VM/ESA environment, use the Dedicate statement in the VM/ESA directory or instruct the system operator to enter the Attach command to dedicate each OSA device to the appropriate virtual machine.
- In a native VSE/ESA environment, use the standalone system element or single object operations via the hardware management console.

8. If an OSA CHPID that is online must be configured off, you must configure the CHPID off to all the partitions to which the OSA is defined. To bring the CHPID back online, it must be configured on to all the partitions to which it is defined in the hardware configuration.

   For example, you must do this if:

   - A local MAC address (page 210) is to take effect.
   - An OSA mode has been installed or changed on the OSA with the OSA/SF Install command in order for the OSA-mode configuration to be activated.
   - A FDDI OSA-2 optical bypass switch is to be made operational while the FDDI channel path is already operational.
   - Some port parameters you set using OSA/SF.

2.4.3 OSA Control Unit Number (CUNUMBR=)

Although there is no physical OSA control unit, you must assign a logical control unit to each OSA channel path to allow the OSA device numbers and unit addresses to be associated with the OSA port or ports.

Specify one control unit, setting the type to OSA, and specify only one path for this control unit. You do not need to specify the range of unit addresses because an OSA control unit recognizes unit addresses in the range X'00'–X'FE'.

In the following IOCP example, therefore, the UNITADD parameter for the OSA control unit is not specified. If you are using an HCD panel or a VM/ESA dynamic I/O configuration command, check the publications listed in the bibliography (page xviii) for complete information.

In HCD, for example, the unit address field defaults to 00 for a count of 255.

```
             CU             chpid
CNTLUNIT CUNUMBR=100,PATH=80,UNIT=OSA
```

2.4.4 OSA S/390 Device Numbers (IODEVICE=)

As with any S/390 channel path, you associate a number of S/390 logical device numbers with it for communications with the programs running in that LP (or system). There are no physical devices attached to an OSA.

Except for the devices used to communication with OSA/SF and through a Box Manager node with NetView, an S/390 logical device is defined for data transfer through an OSA port. Each OSA mode of operation has a requirement for either one or for an even/odd, read/write pair of devices per port. These device numbers are described on page 103 (TCP/IP Passthru mode), page 116 (ATM IP Forwarding mode), page 124 (HPDT MPC mode), page 138 (SNA mode), and page 165 (HPDT ATM Native mode).

As with any other CHPID, you would assign a block of device numbers that fits the configuration of your installation. In this book, a block of 16 devices has been assigned that is not only completely untypical, but includes devices for all the OSA modes, which no one OSA can support. These device numbers were chosen only to demonstrate all the OSA modes economically in the examples in this book. The format for the device numbers used in this book is *xxyy*, where *xx* is the CHPID and *yy* equates with the unit address for each device number with the exception of the OSAD device in which *yy* must be X'0F'.

2.4.4.1 Notes on Unit Addresses

1. Associate a unit address for each device number that you specify in the system hardware I/O configuration (IOCDS). In this book, the unit addresses are specified explicitly, but they can be specified implicitly as the last two digits of the corresponding device numbers. The difficulty with such implicit definition, however, is that you increase the likelihood of defaulting to an incorrect unit address.

2. You must specify the unit address to OSA/SF that you specified in the IOCDS. OSA/SF correlates the unit address with the appropriate OAT entry and device number. If an OSA mode requires an even/odd, read/write pair of device numbers, OSA/SF requires only the unit address of the even (lower) device number.

3. Specify a unit address from X'00' through X'FD' for any device except the OSAD device for communications between the OSA and OSA/SF.

4. Specify X'FE' as the unit address for the OSAD device for OSA/SF communications.

5. In the TCP/IP Passthru mode, it is recommended that you associate X'00' and X'01' as the unit addresses for the device pair for data transfer across port 0. For an ENTR OSA-2 that has two physical ports and an ATM OSA-2 that has two LAN emulation client (LEC) ports available for this mode, it is recommended that you associate X'02' and X'03' as the unit addresses for the device pair designated for data transfer data to port 1.

   In fact, you must specify these unit addresses if OSA/SF is *not* to be used to customize the OSA in this mode.

6. The following unit addresses are used in the examples in this book. These unit addresses equate with the last two digits of the corresponding device number with the exception of the device number used for communications between the OSA and OSA/SF. In the examples in this book, all the OSA channel paths are defined to be shared across logical partitions.

   - X'00'–X'03' for the two even/odd, read/write pairs of devices for data transfer across ports 0 and 1, respectively, in the TCP/IP Passthru mode.
   - X'04'–X'05' for the single device numbers needed for data transfer across ports 0 and 1, respectively, in the SNA mode.
   - X'06'–X'07' for the read/write device pair for data transfer across the single, physical port (port 0) of the FDDI or FENET OSA-2 being run in the HPDT MPC mode.
   - X'08'–X'09' for the read/write device pair for data transfer across the single, physical port (port 0) of the ATM OSA-2 being run in the HPDT ATM Native mode.
   - X'0A'–X'0B' for the read/write device pair for data transfer across the single physical port (port 0) of the ATM OSA-2 being run in the ATM IP Forwarding mode.
   - X'0E' for the device number for communications with NetView via the Box Manager node when an OSA is being run in the SNA mode.
   - X'FE' for the device number X'*xx*0F' for communications with OSA/SF in any OSA mode.

2.4.4.2 Notes on the OSA/SF (OSAD) Device:

1. To allow an OSA to communicate with OSA/SF, either specify a device number for that OSA to one logical partition or, by omitting the partition parameter, specify a device number that permits OSA/SF running in any partition in the same S/390 platform to communicate with the OSA.

2. Specify one device number with UNIT=OSAD and associate a unit address of X'FE' with this device number. This device is called the OSAD device in this book as a reminder that its type must be specified as OSAD. However, its other aliases are the FE device, diagnostic device, and OSA-agent device.

3. OSA/SF must be running in the system, but not necessarily in any of the partitions to which an OSA user device has been defined. OSA/SF must be able to access the OSAD device (page 53).
4. For example, you could specify device 800F for communications between an OSA CHPID and OSA/SF in the IOCP format as:

```
                       dev#                       OSAD     UA
IODEVICE  ADDRESS=(800F),CUNUMBR=100,UNIT=OSAD,UNITADD=FE
```

2.4.4.3 Notes on OSA Device Status

1. Use the regular system operating commands. Note that OSA/SF lists the device numbers in its OSA address table (OAT) entries.
   - In an OS/390 or MVS/ESA environment, you can also use the OSA/SF Get Table command, the OSA/SF GUI panels, and the ESCON Manager commands.
   - In a VM/ESA environment earlier than VM 2.1, an OSA device is listed or displayed as a channel-to-channel adapter (CTCA). Therefore, either do not define an OSA on those releases, allowing VM to define it implicitly as a CTCA, or define it explicitly as a CTCA.
2. ***Vary an OSA device off or on.*** Note that all the device numbers used for data transfer through a port must be varied off before traffic can be stopped through that port.
   - In an OS/390 MVS/ESA environment, you can use either the system commands directly (for example, VARY DEV ON|OFF) or indirectly through the ESCON Manager commands. ESCON Manager can also be used to display OSA device status.
   - In a VM/ESA environment, use the regular VM system commands that are used for other types of devices.
   - In a VSE/ESA environment, you can use the OFFLINE (*cuu/chpid*) and ONLINE (*cuu/chpid*) commands, but would more likely take the CHPID and its associated devices offline at the system hardware management console.

2.5 ENTR OSA-2 Feature (FC 5201)

An ENTR OSA-2 can be run in either the TCP/IP Passthru or SNA mode, or in both modes concurrently. Both these modes are available on all the S/390 platforms that OSA supports.

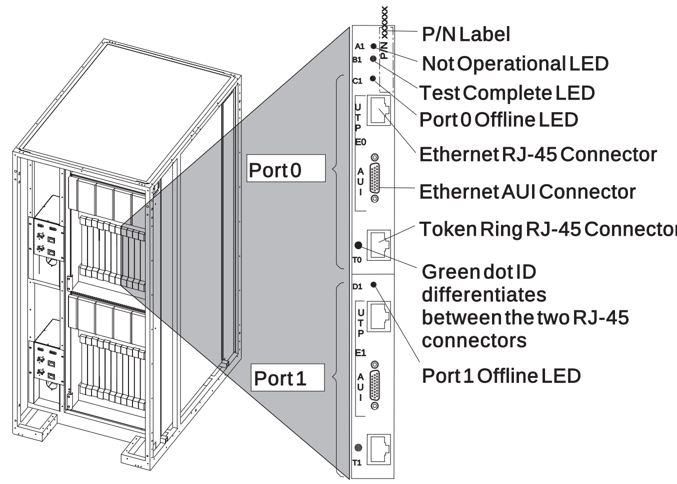
As the next figure shows, an ENTR OSA-2 (FC 5201) has two ports, one below the other. Each port has three connectors, only one of which can be plugged to a cable or wrap plug at a time. If more than one connector is plugged, the results are unpredictable. Keep all 6 wrap plugs available, however, in case they are needed for service tests.

For *each* port:

- The *top* RJ-45 connector attaches the port to an Ethernet LAN through an unshielded twisted pair (UTP) interface.
- The *middle* 15-pin “D” shell connector attaches the port to an Ethernet LAN through a standard attachment unit interface (AUI).
- The *bottom* 8-pin RJ-45 connector attaches the port to a token ring LAN through either a shielded twisted pair (STP) or an unshielded twisted pair (UTP) interface.

You should use strain relief (P/N 07H6824 for a maximum of 10 cables) to secure the cables at the tailgate of the frame.

The status conditions indicated by the LEDs are listed on page 19.



CMOS CPC   Bezel of an ENTR OSA-2

2.5.1 Notes on the Top Ethernet RJ-45 Connector

1. The Ethernet RJ-45 connector is the ***top*** connector on the bezel of each ENTR OSA-2 port. Provide a cable that does not exceed 100 m (328 ft). EIA/TIA categories 3, 4, and 5 of an unshielded twisted pair (UTP) cable can be used.

2. The Ethernet RJ-45 connector supports both half-duplex and full-duplex communications.

   When connected to a LAN, the port must be connected to a 10 Mbps Ethernet LAN that conforms to either the IEEE 802.3 (ISO/IEC 8802.3) standard or the Ethernet V2.0 specifications.

3. The Ethernet RJ-45 connector does not support auto-negotiation.

   Therefore, it is very advisable to make sure that both ends of the link segment between the ENTR OSA-2 and the switch, hub, or router, to which it is attached, are set for the same duplex mode. This is especially important if a converter is used on the link.

   You should also make sure that both ends of the link segment between a workstation and its port on the switch, hub, or router are set to the same duplex mode, especially if auto-negotiation is not supported. However, the mode on that link segment does not have to be the same as the mode on the link segment between the OSA port and its attachment.

4. Half-duplex is the default duplex mode in which data transfer is supported between logical partitions (LP-to-LP data transfer) as well as to and from devices on the LAN.

   For LP-to-LP communications, the connector must be attached to a LAN and defined to both logical partitions. Port-sharing must be defined for the OSA mode, which is to say, access to the port must be defined through OSA/SF to be shared between the two LPs in this mode.

5. For full-duplex communications:

   - The ENTR OSA-2 Ethernet RJ-45 connection must be set to full-duplex sensing.

     To do so, either you or the service representative must set the duplex mode on the Advanced Facilities panel of the standalone support element or single object operations via the hardware management console. For more information, refer to *9672 Operations Guide* listed in the bibliography (page xviii).

   - If the connector is attached to an Ethernet LAN, data can be transferred to devices on that LAN but not to another logical partition on the CPC, that is, LP-to-LP communications are not supported across the LAN.

   - If the connector is covered by a wrap plug, LP-to-LP communications are supported.

The port must be defined to both logical partitions. Port-sharing must be defined for the OSA mode, which is to say, access to the port must be defined through OSA/SF to be shared between the two LPs.

2.5.2 Notes on the Middle Ethernet AUI Connector

1. The Ethernet attachment unit interface (AUI) is the ***middle*** connector on the bezel of each ENTR OSA-2 port. It is a 15-pin subminiature “D” shell receptacle with a slide latch for cable retention.
2. You must provide a cable that does not exceed 50 m (164ft.) and which can be attached to a half-duplex 10 Mbps Ethernet LAN that conforms to the EIA/TIA categories 3, 4, or 5 of an unshielded twisted pair (UTP) cable.
3. Through this connector, the ENTR OSA-2 port is attached to a 10 Mbps Ethernet LAN, which must conform to either the IEEE 802.3 (ISO/IEC 8802.3) standard or the Ethernet V2.0 specifications.

   If the LAN conforms to the IEEE 802.3 standard:

   - A 26-gauge (AWG) wire can be used if the cable length does not exceed 20 m (65 ft. 6 in.)
   - At least a 22-gauge wire must be used for a cable length of 20–50 m (65 ft. 6 in.–164 ft.)
4. Depending on the type of MAU being used, the AUI supports the following connections:
   - 10BASE5, or the “thick” Ethernet
   - 10BASE2, or the “thin” Ethernet
   - 10BASET unshielded twisted-pair (UTP) Ethernet
   - Fiber optic ST or SMA connection
5. The AUI only supports the half-duplex mode even if it is connected through a converter to an RJ-45 port on the switch. It supports LP-to-LP communications.
6. The AUI connector supports LP-to-LP communications either when it is covered by a wrap plug or when it is attached to a LAN.

   For LP-to-LP communications, the port must be defined to both logical partitions. Port-sharing must be defined for the OSA mode, which is to say, access to the port must be defined through OSA/SF to be shared between the two LPs in this mode.

2.5.3 Notes on the Bottom RJ-45 Token Ring Connector

The single token ring connector is the ***bottom***, or lower RJ-45, connector, on the bezel of each ENTR OSA-2 port.

If this connector is being used, the Ethernet connectors on the same port cannot be used. Only one of the three connectors on each port can have anything plugged into it at a time. Otherwise, the results are unpredictable.

1. ***Autosensing the LAN speed:*** At initialization, the ENTR OSA-2 LAN adapter (port) auto senses and conforms to the speed of the token ring (4 Mbps or 16 Mbps) and whether communications are in full or half duplex. If no carrier is sensed on the ring, the adapter enters the ring at the speed of its last successful entry.
2. ***For half-duplex communications:***
   - Attach the port to a half duplex 4 Mbps or 16 Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.
   - between logical partitions (LP-to-LP data transfer) on the same CPC, either attach this connector to a LAN or cover it with a wrap plug.

For LP-to-LP communications, the port must be defined to both logical partitions. Port-sharing must be defined for the OSA mode, which is to say, access to the port must be defined through OSA/SF to be shared between the two LPs in this mode.

3. ***For full-duplex communications:***
   - Attach the port via a full duplex switch, such as the 8272 NWays Token Ring switch, to a 4 Mbps or 16 Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.
   - LP-to-LP communications are not supported.
   - Set the switch for full duplex communications. Do not set the ENTR OSA-2 port because it autosenses as stated above.
4. ***Cabling:*** Installation-dependent factors determine the cabling requirements for the token ring RJ-45 connector to the customer's token ring Multistation Access Unit (MAU or MSAU).

   The RJ-45 connector supports either a standard shielded twisted pair (STP) cable or an unshielded twisted pair (UTP) cable. For more information on these cables, refer to *Token Ring Network Introduction and Planning Guide,* which is listed in the bibliography (page xx).

   To attach the RJ-45 connector to an alternate connector type, you can use:
   - IBM P/N 60G1063 (RJ-45 to ICS data connector)
   - IBM P/N 60G1066 (RJ-45 8-pin to a 9-pin subminiature “D” shell receptacle)
5. ***Wrap plug:*** Starting with EC E95874, TR wrap plug, P/N 08J5792, is provided.

2.5.4 Frame Protocols and Maximum Number of Users

2.5.4.1 For an Ethernet LAN Connection

- ***In the TCP/IP Passthru mode,*** the maximum number of users depends on the maximum number that is supported by the S/390 TCP/IP program. The following Ethernet frame protocols are supported:

  Ethernet II using the DEC Ethernet V 2.0 envelope
  Ethernet 802.3 using the 802.2 envelope with SNAP
- ***In the SNA mode,*** the highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), or page 84 (VSE/ESA). If the maximum number of 2047 PUs is not supported, the maximum number supported is 255 PUs.

  The following Ethernet frame protocol is supported:

  Ethernet 802.2 LAN MAC (802.3 using the 802.2 envelope).

2.5.4.2 For a Token Ring LAN Connection: If you specify a maximum transmission unit (MTU), or maximum data packet size, greater than 4K for a token ring connection, first make sure that the MTU size is supported by the switch.

- ***In the TCP/IP Passthru mode,*** the maximum number of users depends on the maximum number supported by the S/390 TCP/IP program. The following token ring frame protocol is supported:

  Token ring 802.5 using the 802.2 envelope with SNAP
- ***In the SNA mode,*** the highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), or page 84 (VSE/ESA). If 2047 PUs are not supported, the maximum number is 255 PUs.

  The following frame protocol is supported:

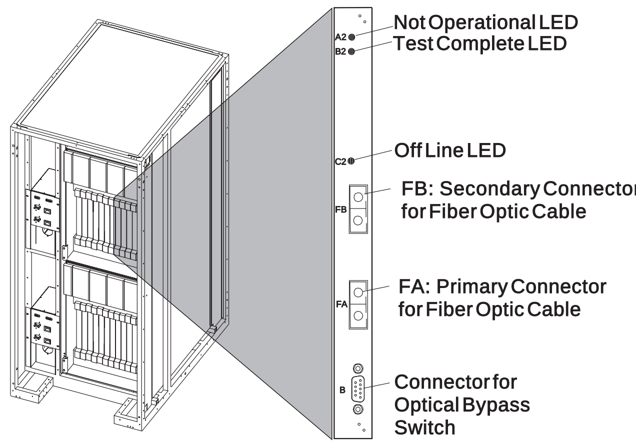
  IEEE 802.2 LAN MAC (802.5 using the 802.2 envelope).

2.6 FDDI OSA-2 Feature (FC 5202)

A FDDI OSA-2 can be run in the TCP/IP Passthru, SNA, and HPDT MPC modes concurrently in any combination in an OS/390 environment. It can be run in the TCP/IP Passthru and SNA modes concurrently in any combination in the other environments that OSA supports.

The upper (FA) and middle (FB) connectors on a FDDI OSA-2 card allow the card's FDDI port to support either one or two (for redundancy) FDDI paths. In the FDDI port parameters, these connectors are themselves called ports, *port a* and *port b*.

The status conditions indicated by the LEDs are listed on page 19.



2.6.1 Fiber-Optic Cabling

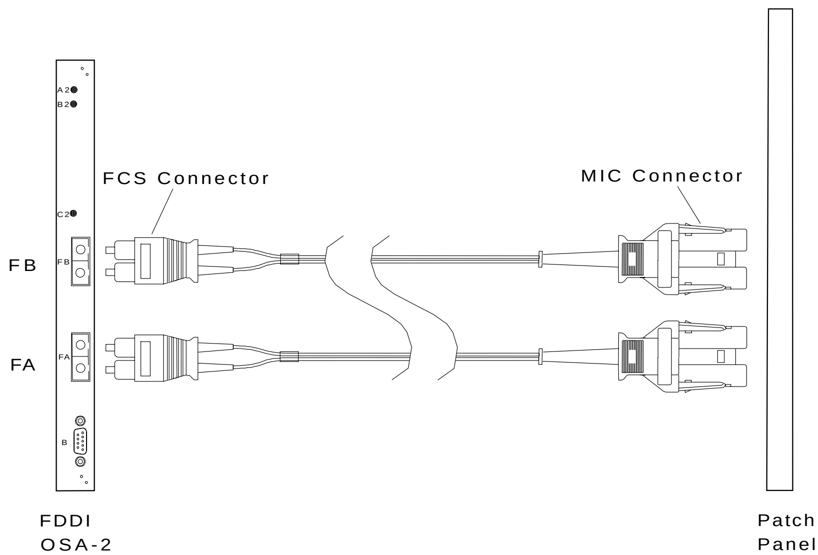
A FDDI OSA-2 feature (FC 5202 or 5203) consists of one card with one OSA LAN port. That port can be connected via user-supplied cabling either to a 100 Mbps single- or dual-attachment FDDI LAN. The FDDI LAN must conform to either the American National Standard Institute (ANSI) X3T9.5 specification or the International Standards Organization (ISO) 9314 specification.

Notes:

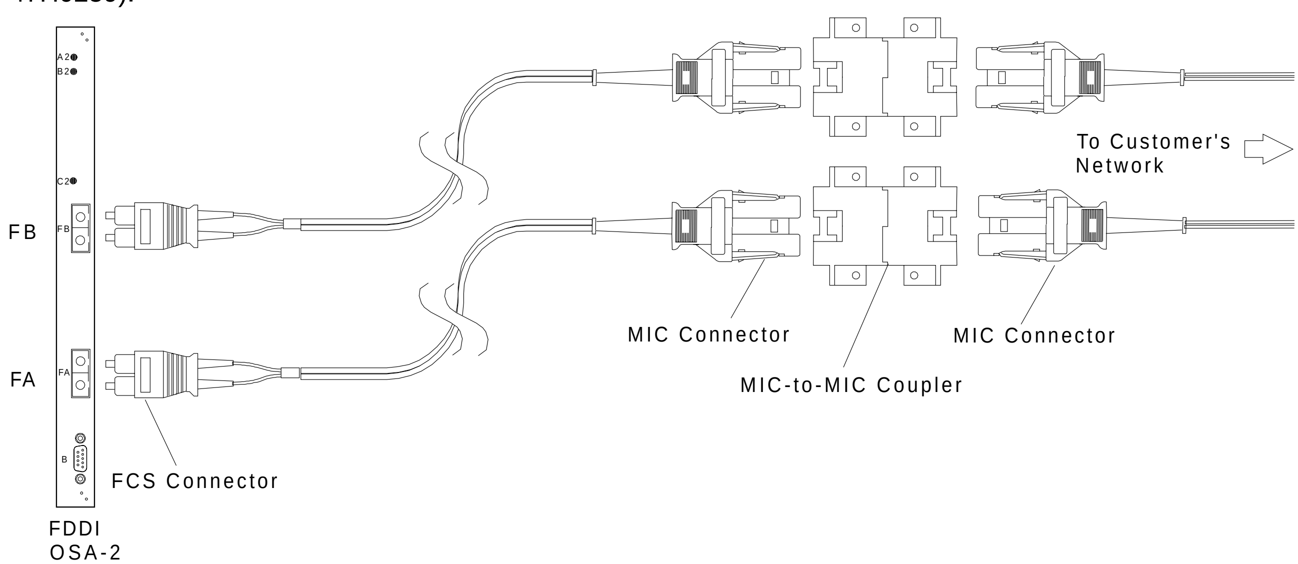
1. The cable part numbers (PNs) provided in this chapter are provided as examples only. For up-to-date and specific information, see your IBM representative and refer to *Maintenance Information for ATM and FDDI Links*, which is listed in the bibliography (page xx) or the appropriate Technical Service Letter (TSL). Fiber installation services are available from the IBM Availability Services (AS) division.
2. The OSA fiber optic modules are certified in the USA to conform to the requirements of DHHS 21 CFR subchapter J for Class 1 laser products. Elsewhere, they are certified to be in compliance with IEC 825 (first edition 1994) and CENELEC HD 482 (462???) S1 as a Class 1 laser product. These modules have been tested and approved to comply with International Class 1 laser product certification. Consult the label on each transceiver for laser certification numbers and approval information.
3. Two user-supplied, fiber-optic duplex cables, one for each connector, are needed for a dual-ring attachment. One fiber-optic duplex cable is required for a single-ring attachment.
4. The FDDI fiber-optic cables are attached directly to the transmitter and receiver of the FDDI OSA-2 to maximize the optical power budget that is available.
5. Use strain relief (P/N 07H6805) to secure the cable at the tailgate of the machine.
6. The recommended cross-section for the FDDI fiber-optic cable is 62.5/125 micron fiber.
7. On a FDDI OSA-2, a low-cost fiber channel standard (FCS) connector is used, rather than the standard Media Interface Connector (MIC) that is used on a FDDI OSA-1. The FCS connector, which is also called a duplex-SC connector, is defined in *ANSI Fiber Channel Physical and Signalling Interface (FC-PH)*.

8. LP-to-LP communications can be established if supported by the configuration of the system. Because these are site-dependent factors, LP-to-LP communications are not formally supported.
9. When you attach a FDDI OSA-2 to a FDDI LAN, check to see whether you will need to replace an existing network cable, which could typically be a MIC-to-MIC or MIC-to-ST (straight tipped) cable. Two scenarios that require an FCS-to-MIC jumper cable are described in the paragraphs that follow this list.
10. Remember to maintain transmit and receive orientation when introducing the new duplex jumper cable or coupler.

If a FDDI OSA-2 FCS connector is close enough to a MIC distribution (patch) panel, an FCS-to-MIC jumper cable of the same length can be used to replace a MIC-to-MIC jumper cable. Such a replacement is shown in the following figure. A 2 m (6.6 ft) IBM-supplied jumper cable (PN 47H0259) is available as one part of adapter kit PN 47H0260.



The same adapter kit (PN 47H0260) contains a MIC-to-MIC coupler (PN 92F9008), which allows you to attach the FDDI OSA-2 FCS connector to a MIC connector via the FCS-to-MIC jumper cable (PN 47H0259).



To attach a FDDI OSA-2 FCS connector to an ST patch panel, you could insert a SC duplex-to-ST adapter in the patch panel, such as PN 54G3381, and use an FCS-to-FCS cable of the appropriate length.

6.25 micron multimode jumper FCS-to-FCS cables with riser rated as low halogen are available as PNs 08H2777 through 08H2783 in the following lengths: 8m, 13m, 22m, 31m, 46m, 61m, and custom length. For example, PN 08H2780 is the 31m jumper cable.

2.6.2 Optical Bypass Switch

A customer-supplied, external, optional, optical bypass switch provides optical isolation from the attached FDDI LAN when such isolation is needed.

- If you order an optical bypass switch, take into account the requirements for the fiber-optic cables, which are listed in the preceding section, and the requirements imposed by the connector for the power lead, which is described in the next section.
- When cabling the switch to the FDDI connector, plan to make the switch operational before the OSA channel. Otherwise, you must configure the OSA channel and all its devices offline from all the partitions to which it is defined; make the switch operational, and then configure the OSA back online, or do a power on reset (POR).

2.6.2.1 FDDI OSA-2 Connector for the Power Lead:

The bottom connector on a FDDI OSA-2 allows the attachment of the power lead of the customer-supplied optional, optical bypass switch. This connector is a 9-pin subminiature “D” shell receptacle that uses 4–40 screw locks and has the following pin assignments:

D01 +5V to the secondary switch

D02 +5V to the primary switch

D03–D05 Ground

D06 Sense switch presence

D07–D09 No connection

2.6.2.2 Customer-Supplied Power Lead:

A power lead is typically part of the optical bypass switch. For the customer-supplied power lead:

- There must be a one-to-one (1:1) wiring, that is, pin 1 on the plug end is wired to pin 1 on the receptacle end.
- The length should not exceed 12.2 meters (12.2 m), or 40 feet (40 ft.) to assure proper voltage at the optical bypass switch.
- An extension cable can be used if the power lead is not long enough. The extension cable should be a 9-pin “D” shell plug-to-receptacle extension cable.
- An adapter cable can be made to match the power lead connector on a given switch to the FDDI OSA-2 connector for the power lead.

2.6.3 FDDI Frame Protocol and Maximum Users

In the TCP/IP Passthru and HPDT MPC modes, the maximum number of users depends on the maximum number that is supported by the S/390 TCP/IP endpoint. The following FDDI frame protocol is supported:

FDDI ANSI X3T9.5 using the 802.2 SNAP envelope

In the SNA mode, the highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), or page 84 (VSE/ESA). If 2047 PUs are not supported, the maximum number is 255 PUs.

The following frame protocol is supported:

IEEE 802.2 LAN MAC (ANSI X3T9.5 using the 802/2 envelope)

2.7 ATM OSA-2 Feature (FC 5204-5207)

An ATM OSA-2 can be run in the following modes:

- | The HPDT ATM Native mode in the OS/390, MVS/ESA, and VM environments. This mode requires the exclusive use of the ATM OSA-2. Data transfer is supported via VTAM or either the SNA or TCP/IP functions of CS for OS/390.

  | **Note:** Two host program product users sharing a single ATM feature in HPDT ATM Native mode can
  | not be activated at the same time.

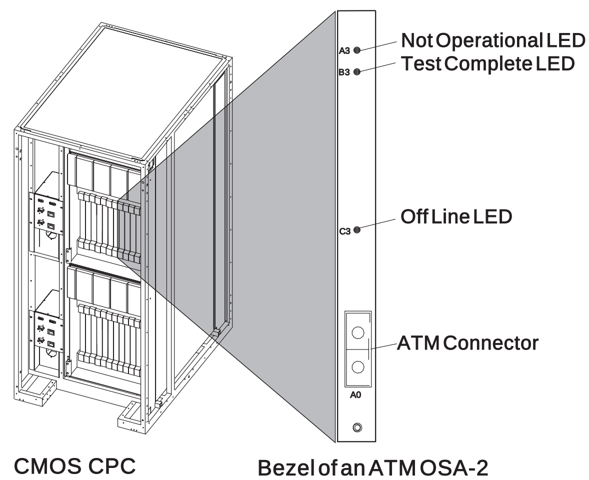
- The ATM IP Forwarding mode in the OS/390 and MVS/ESA environments This mode requires the exclusive use of the ATM OSA-2.
- The TCP/IP Passthru and SNA modes concurrently with each other and in any of the system environments that this OSA supports.

FC 5204 and FC 5206, which are not mutually available, are the multimode ATM OSA-2.

FC 5205 and FC 5207, which are not mutually available, are the single-mode ATM OSA-2.

Use strain relief (P/N 07H6805) to secure the cable at the tailgate of the machine.

The status conditions indicated by the LEDs are listed on page 19.



2.7.1 User-Supplied Cabling

Notes:

1. The OSA fiber optic modules are certified in the USA to conform to the requirements of DHHS 21 CFR subchapter J for Class 1 laser products. Elsewhere, they are certified to be in compliance with IEC 825 (first edition 1994) and CENELEC HD 482 S1 as a Class 1 laser product. These modules have been tested and approved to comply with International Class 1 laser product certification. Consult the label on each transceiver for laser certification numbers and approval information.
2. On an ATM OSA-2, as on a FDDI OSA-2, a low-cost fiber channel standard (FCS) connector is used rather than the standard Media Interface Connector (MIC).

   This FCS connector, which is also called a duplex-SC connector, and the cross-sections for the ATM OSA-2 multimode and single-mode cabling, are defined in *ANSI Fiber Channel Physical and Signalling Interface (FC-PH)*.
3. It is the customer's responsibility to provide the fiber optic cable that connects the ATM OSA-2 to the ATM device to which it is attached.
4. Fiber installation services are available from the IBM Availability Services (AS) division.

5. For more information on fiber cabling for an ATM OSA-2, see *Maintenance Information for ATM and FDDI Links* that is listed in the bibliography (page xx).

2.7.1.1 Cabling for FC 5204 and FC 5206 (Multimode ATM OSA-2)

Notes:

1. The recommended cross-section for cabling for either a FC 5204 or FC 5206 (multimode) ATM OSA-2 is 62.5/125 (inner/cladding) micrometer fiber.
2. The length of the multi-mode cable must not exceed 2,000 meters (about 1.25 miles).
3. Depending on your ordering requirements, you should order one of the following:
   - IBM FCS multimode (MS) plenum 62.5/125-micrometer fiber jumper cable assembly P/N 54G3372, which is available in the following standard lengths: 7 m (23 ft); 13 m (41 ft); 22 m (72 ft); 31 m (102 ft); 46 m (151 ft); 61 m (200 ft); and custom lengths.
   - One of the following: P/N 54G3373 for 7 m (23 ft) cable; P/N 54G3374 for 13 m (41 ft) cable; P/N 54G3375 for 22 m (72 ft) cable; P/N 54G3376 for 31 m (102 ft) cable; P/N 54G3377 for 46 m (151 ft) cable; P/N 54G3378 61 m (200 ft) cable; P/N 54G3379 for a custom-length cable.

2.7.1.2 Cabling for FC 5205 and FC 5207 (Single Mode ATM OSA-2)

Notes:

1. The cross-section for either a FC 5205 or FC 5207 (single mode) ATM OSA-2 is 9/125 (inner/cladding) micrometer fiber.
2. The length of the single-mode cable must not exceed 20,000 meters (about 12.5 miles).
3. Depending on your ordering requirements, you should order one of the following:
   - IBM FCS single mode (SM) plenum 9/125-micrometer fiber jumper cable assembly P/N 08H2774 that is available in the following standard lengths: 7 m (23 ft); 13 m (41 ft); 22 m (72 ft); 31 m (102 ft); 46 m (151 ft); 61 m (200 ft); and custom lengths.
   - One of the following: P/N 54G3409 for 7 m (23 ft) cable; P/N 54G3410 for 13 m (41 ft) cable; P/N 54G3411 for 22 m (72 ft) cable; P/N 54G3412 for 31 m (102 ft) cable; P/N 54G3413 for 46 m (151 ft) cable; P/N 54G3414 for 61 m (200 ft) cable; P/N 54G3415 for a custom-length cable.

2.7.2 Notes on ATM Virtual Circuits

In the connection-oriented ATM network, an ATM connection is equated with an ATM *virtual circuit*, which is discussed in this book only as a virtual circuit relates to customizing an ATM OSA-2 and defining it to a S/390 program, such as VTAM, TCP/IP, and CS for OS/390. For more information on ATM virtual circuits, refer to the books listed in the bibliography (page xviii).

Because so many parameters must match those established at the ATM switch, hub, or router to which the ATM OSA-2 is attached, ***it is essential that you are familiar with the product documentation of the ATM switch and, for a public network, the documentation of the network provider.***

2.7.2.1 Virtual Path and Virtual Channel Identifiers (VPIs and VCIs): Each virtual circuit is uniquely identified by a virtual path identifier (VPI) and a virtual channel identifier (VCI) within that virtual path.

- A *virtual channel* is a concept to describe the transport of ATM cells identified by a common and unique identifier (VCI) across a virtual circuit (ATM connection).
- A *virtual path* is a number of virtual channels that are bundled into the hierarchically greater unit of

virtual path. A virtual path is a concept of transport of ATM cells that belong to the virtual channels that are associated by a common virtual path identifier (VPI) value.

An ATM OSA-2 supports up to 2047 identifiers, each of which consists of one virtual path identifier (VPI) and one of the virtual channel identifiers (VCI) within that virtual path. The number of VPI+VCI values that an ATM OSA-2 supports is the result of the equation 2***n*–1. The exponent *n* is the sum of VPI+VCI *bit settings* that you must specify to the ATM OSA-2.

Take the following factors into account.

- For each OSA mode, specify the VPI and VCI bit settings using OSA/SF. The sum of these bit settings must range from 6 through 11.
- Check the specifications for VPI and VCI bit settings that are allowed by the ATM switch to which the ATM OSA-2 is attached.
- If the ATM switch supports 11 or more VCI bit settings, accept the ATM OSA-2 VPI bit setting defaults, which are VPI bits = 0 and VCI bits = 11.
- If the ATM switch supports 6–10 VCI bit settings, specify the same VCI bit setting to OSA/SF. (If the ATM switch supports 5 or fewer VCI bit settings, it is not supported by an ATM OSA-2.)
- If the ATM switch supports 6–10 VCI bit settings, also consider specifying 1–5 as the number of VPI bit settings as long as the sum of VPI+VCI bit settings does not exceed 11. Increasing the number of VPI bit settings can increase the range of VPI+VCI identifiers to its maximum number of 2047.
- The sum of VPI+VCI bit settings must not exceed 11 because (2**11)–1 = 2047, which is the maximum number of VPI+VCI values that an ATM OSA-2 supports.

2.7.2.2 Switched Virtual Circuits (SVCs)

- A switched virtual circuit (SVC) is identified dynamically by ATM signaling and supported in all the modes that are supported on an ATM OSA-2.

  There are two directions for data traffic. Across an SVC, the forward direction is outbound from the caller. The reverse, or backward, direction is inbound to the caller.
- In the HPDT ATM Native mode, define an SVC to VTAM or the SNA function of CS for OS/390 for SNA data transfer and to the TCP/IP function of CS for OS/390 for IP data packet transfer. Because an SVC is allocated dynamically, you do not define it to the OSA, but you must define it to VTAM. The number of SVCs that you can define depends on whether you define PVCs as well and for how many virtual circuits you reserve bandwidth. These factors are discussed on page 36.
- In the TCP/IP Passthru and SNA modes, all the virtual circuits are SVCs. A maximum number of 1000 SVCs is supported for each LAN emulation client (LEC) port. You do not define SVCs to OSA through OSA/SF, but you do define the VPI and VCI range (page 34) for the physical port and a peak cell rate for each LEC port being used. See Chapter 10.
- SVCs are not supported in the ATM IP Forwarding mode.

2.7.2.3 Permanent Virtual Circuits (PVCs)

- A permanent virtual circuit (PVC) is identified by pre-arrangement and is supported in the HPDT ATM Native and ATM IP Forwarding modes.

  There are two directions for data traffic. Across a PVC, the forward direction is outbound from the OSA. The reverse, or backward, direction is inbound to the OSA.
- Define a PVC to the ATM OSA-2 using OSA/SF and as a transmission group (TG) to the VTAM XCA node.

- In the HPDT ATM Native mode, you can define up to 256 PVCs. The total number of virtual circuits that you can define depends on how much bandwidth you reserve and across how many virtual circuits as discussed on page 36.
- In the ATM IP Forwarding mode, you define only one PVC so there is obviously no need to reserve bandwidth for it.
- PVCs are not supported in the TCP/IP Passthru and SNA modes.

2.7.3 Notes on ATM Cell Rates

By specifying the ATM cell rates, you set the forward and backward, or reverse, bounds of ATM cell transmission between the ATM OSA-2 and the ATM device to which it is attached.

In the HPDT ATM Native and ATM IP Forwarding modes, you specify cell rates in ATM cells/second. In the TCP/IP Passthru and SNA modes, which require input to the LEC platform, you specify a peak cell rate in line speed (Mbps), which the LEC platform converts to cells/second. An ATM OSA-2 supports a line speed of 155 Mbps. Of this, up to 149.76 Mbps are available for ATM cells including the cell headers or 135.63 Mbps for ATM cells excluding the cell headers, that is, only the 48 payload bytes/cell.

2.7.4 Notes on the HPDT ATM Native Mode

The ATM OSA-2 must be attached to a 155 Mbps ATM switch that is compliant with ATM UNI 3.0 and 3.1 with or without ILMI and signaling. For example, the attachment can be to an 8260 Nways Multiprotocol Switching Hub or an 8285 Nways ATM Workgroup Switch. The ATM OSA-2 has been tested for interoperability with UNI 3.0 and 3.1 ATM and Forum-compliant LAN emulation 1.0 devices at places such as the University of New Hampshire.

Above all, make sure that your specifications to the ATM OSA-2 through OSA/SF and to the S/390 programs, such as VTAM and the TCP/IP function of CS for OS/390, are accepted by the ATM switch, hub, or router to which the ATM OSA-2 is attached and to the ATM network provider as stated in their documentation.

Determine the amount of bandwidth to reserve and for which of the defined virtual circuits.

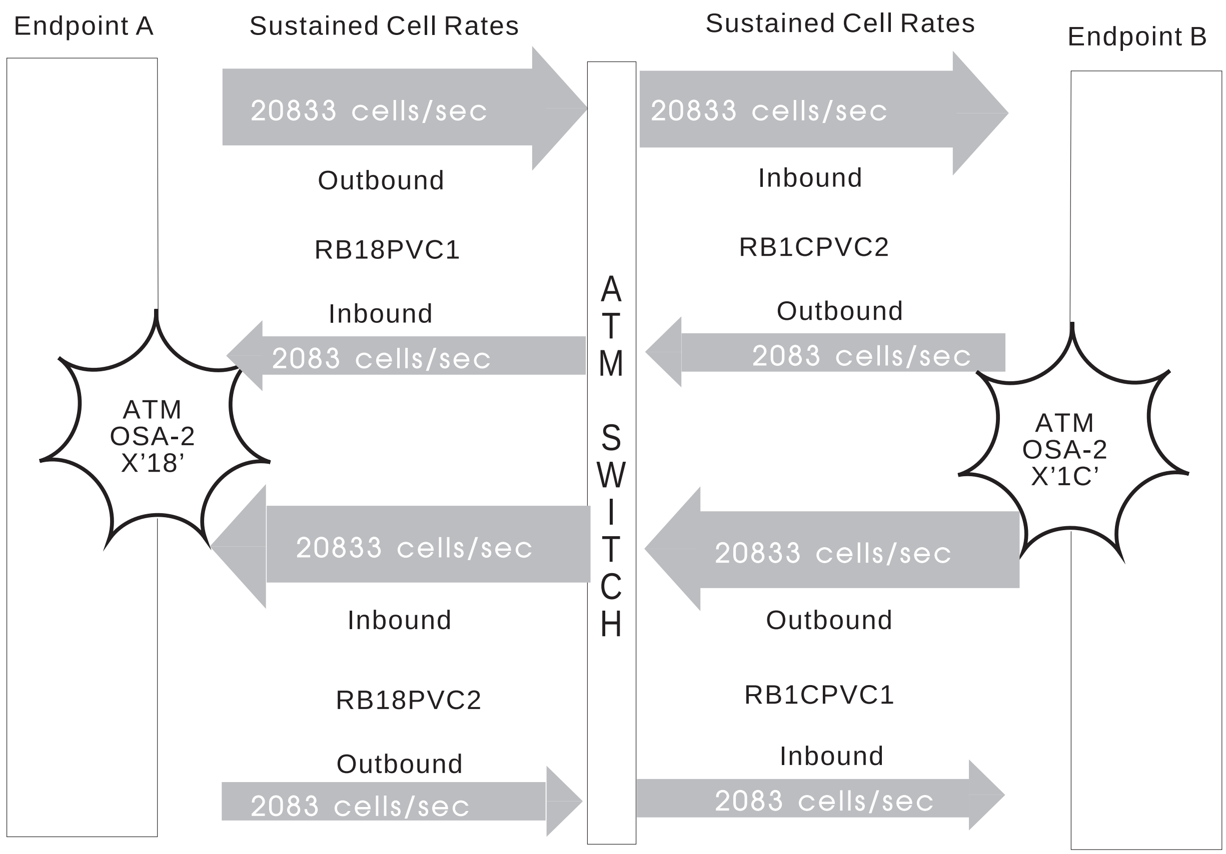
- Although you can reserve bandwidth for IP data transfer in this mode, note that the TCP/IP function of CS for OS/390 that serves as the S/390 endpoint does not utilize reserved bandwidth.
- For a reserved bandwidth (RB) virtual circuit, you must define the following:
  - An acceptable sustained cell rate if you want that bandwidth to be reserved for that virtual circuit.
  - An acceptable cell burst size if you specify a sustained cell rate. If you specify a 0 (zero) cell burst size, the peak cell rate is ignored.
  - An acceptable peak cell rate if you either do not specify a sustained cell rate or if you specify a sustained cell rate with a non-zero burst size.
- If you do not reserve bandwidth for a virtual circuit in the HPDT ATM Native mode, that virtual circuit is called a best-effort (BE) virtual circuit.

  For a BE virtual circuit, the ATM OSA-2 makes its best effort at allocating the traffic characteristics for the virtual circuit given the traffic characteristics of the other active virtual circuits. The traffic characteristics are not continuously available for a BE virtual circuit, and it is therefore recommended that you specify a peak cell rate at the maximum speed that the OSA accepts, which is 353,207 ATM cells.

If you are assessing the achieved rates, you should take the following factors into account:

- Whether large volumes of data traffic are flowing in both directions between two endpoints. See the discussion in the next section.
- The Capacity parameter value (page 176).
- The average CPU utilization. If it exceeds 80%, the effects of resource contention can show non-linear characteristics in throughput.
- The available storage, including real storage, ECSA, private storage, CSM, and so on, should be sufficient. The effects of insufficient storage, such as paging, can increase the CPU requirements or reduce the maximum achievable throughput, or cause both conditions to occur.

Fully bi-drectional virtual circuits are allowed to be specified with sustained cell rates. A fully bi-directional virtual circuit is one that carries equal volumes of traffic outbound from and inbound to the ATM OSA-2 port. If large volumes of traffic are required in both directions between two endpoints, however, it is strongly recommended that you divide the traffic flow over two virtual circuits to achieve the rated throughput. Each virtual circuit carries the bulk of traffic in one direction only as is shown in the following example.



Notes:

1. 1 MBps traffic of payload is required in both directions between endpoints A and B.

   `1 MBps / 48 (payload bytes/cell) = 20833 ATM cells/sec.)`

2. Two PVCs are defined and named RB18PVC1 and RB18PVC2.

   Between ATM OSA-2 X'18' and the ATM switch, the PVC named RB18PVC1 is defined with a sustained cell rate of 20833 cells/second outbound: a much smaller volume, 2083 cells/second inbound.

   The PVC named RB18PVC2 is defined with a 2083 cells/second outbound and 20833 cells

3. Between ATM OSA-2 X'1C' and the ATM switch, the PVC named RB1CPVC2 carries the bulk of the inbound traffic and RB1CPVC1 carries the bulk of the outbound traffic.

2.7.5 Notes on the ATM IP Forwarding Mode

- The ATM OSA-2 must be attached to an ATM device that supports RFC 1483 routed encapsulation. An example of an ATM device is the Cascade Communications Corp. B-STDX 8000 or 9000 Multiservice WAN Platform.
- You must specify IBMTR in the Link statement of the appropriate TCP/IP profile. In this mode, the ATM OSA-2 supports IEEE 802.2 LAN MAC (802.5 using the 802.2 envelope).
- In this mode, you can define only one virtual circuit, which must be a permanent virtual circuit (PVC). Obviously, all the available bandwidth is therefore available to that PVC. However, you must still decide whether to specify a sustained cell rate for the PVC. Make sure this specification is in accordance with the contract, documentation of the ATM device to which the ATM OSA-2 is attached, and the ATM network.

  Here are the possibilities:

  – Specify only a peak cell rate if data will be sent at the peak rate only.

  – Specify a sustained cell rate, a non-zero cell burst size, and a peak cell rate.

    The ATM OSA-2 will transfer data at the sustained cell rate and cell bursts of the specified size at the peak cell rate under the conditions of the contract, ATM device, or ATM network.

  – Specify a sustained rate, a 0 (zero) cell burst size, and a peak rate. The 0 cell burst size will negate the peak cell rate, so that the ATM OSA-2 will not exceed the sustained cell rate.

2.7.6 Notes on the TCP/IP Passthru and SNA modes

- The ATM OSA-2 can be connected to the same ATM switch to which it can be attached in the HPDT ATM Native mode. Since only switched virtual circuits (SVCs) are supported, however, the ATM switch must support ILMI and signaling.
- Clients must be attached to an Ethernet or token ring LAN that is bridged to the ATM-based network through an ATM emulated LAN (ELAN) services and supported by the ATM OSA-2 LAN emulation client (LEC) port that provides LEC services on that ELAN. See page 183 for more information.
- The same frame protocols are supported that are supported for the directly-attached Ethernet and token ring LANs on an ENTR OSA-2.
- The following maximum frame sizes are supported: 1516, 4544, 9234, and 18190 bytes. For more information, see page 188.

  OSA/SF presents the configured and actual maximum data frame size in each ATM OSA-2 LEC port's notebook page (page 221).
- In the SNA mode, the lowest of the following maxima determines how many PUs can be supported.

  – The highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), or page 84 (VSE/ESA).

  – If 2047 PUs are not supported, the maximum number is 255 PUs.

  – If 2047 PUs are supported, you must consider that not more than 1000 SVCs can be logically attached to the physical port (page 34). Furthermore, the number of unique MAC addresses on an emulated LAN cannot exceed 1000. If only one LEC port is active and multiple SAPs are defined over a single client's MAC address, however, up to 2047 connections can be logged on to that LEC port.

- In the TCP/IP Passthru mode, the maximum number of users is limited either by the maximum supported by S/390 TCP/IP or the maximum number of virtual circuits that can be defined.
- For the TCP/IP Passhru and SNA modes, specify a peak cell rate for each ATM OSA-2 LAN emulation client (LEC) port, not for the individual switched virtual circuits (SVCs) used in this OSA mode. Specify the peak cell rate in Mbps (line speed), not in ATM cells/second.

  If the PTF to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA), or PQ16071 (VSE/ESA) is applied, the IBM-supplied default peak cell rate is set to 155.0 Mbps, which is the maximum line speed that the ATM OSA-2 supports (page 188). Otherwise, the default is 25.6 Mbps.

2.8 Fast Ethernet (FENET) OSA-2 Feature (FC 5208)

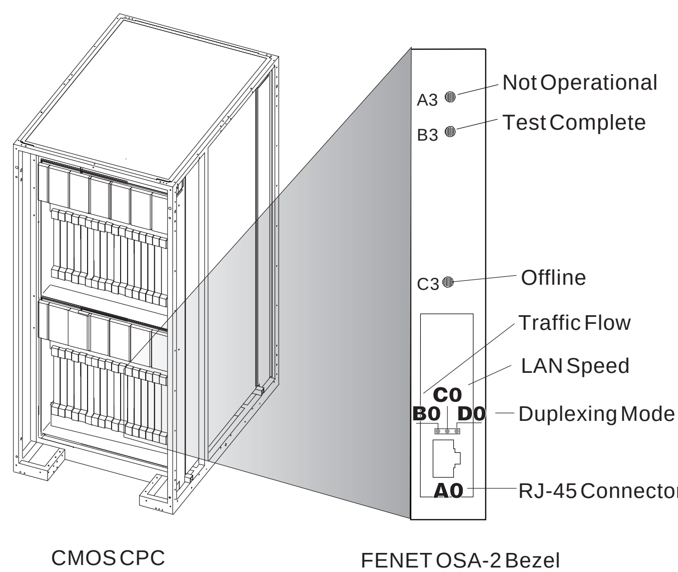
A Fast Ethernet (FENET) OSA-2 is supported on the CMOS processors that are supported by OSA (page 18) with the exception of the 9672 Parallel Enterprise Servers.

Through its single port, a FENET OSA-2 attaches the S/390 via an appropriate Ethernet hub, router, or switch to either a 100 Mbps or 10 Mbps Ethernet LAN and operates in either half- or full-duplex mode. A FENET OSA-2 supports auto-negotiation with its attached Ethernet hub, router, or switch. A FENET OSA-2 can be run in the TCP/IP Passthru mode, the SNA mode, and the HPDT MPC mode, in any combination concurrently. In the SNA mode, a FENET OSA-2 supports the unsolicited SNA management services that OSA/SF provides.

2.8.1 Notes on Cabling and LED Status Indicators

- Attach a FENET OSA-2 using an EIA/TIA category 5 unshielded twisted pair (UTP) cable that does not exceed 100 m (328 ft).
- Attach the FENET OSA-2 RJ-45 connector to an Ethernet hub, router, or switch that is appropriate for the LAN speed.
- Check the bottom row of LED status indicators for:

  B0 ON = Transmitting or receiving
  C0 ON = 100 Mbps OFF = 10 Mbps
  D0 ON = Full duplex OFF = Half duplex
- Check the three (A3, B3, C3) higher, vertical LED status indicators, which are explained on page 19.



2.8.2 Notes on Ethernet LAN Speeds

1. Either let the LAN speed default to auto-negotiation or set it explicitly. The LAN must conform either to the IEEE 802.3 (ISO/IEC 8802.3) standard or to the Ethernet V2.0 specifications.
2. If you let the LAN speed default to auto-negotiation, the FENET OSA-2 and the attached hub, router, or switch auto-negotiate the LAN speed setting between them.

   If the attached Ethernet hub, router, or switch does not support auto-negotiation, the OSA attempts to autosense the LAN speed and enters the LAN at that speed and defaults to half-duplex mode.
3. If you set the LAN speed explicitly, you can do so using OSA/SF, the standalone support element or single object operations via the hardware management console.

   If you set the LAN speed, this setting overrides the OSA's ability to auto-negotiate with its attached Ethernet hub, router, or switch.

   Note that it is not necessary to set the speed of the link segment between the OSA and the hub, router, and switch to the same LAN speed that is set between the hub, router, or switch and a workstation on the attached LAN.

2.8.3 Notes on Duplex Modes

1. Either let the duplex mode default to auto-negotiate or set it explicitly to either half- or full-duplex.
2. If you let the duplex mode default to auto-negotiation, the FENET OSA-2 and the attached hub, router, or switch, auto-negotiate the duplex mode between them.

   If the attached Ethernet hub, router, or switch does not support auto-negotiation, the OSA attempts to autosense the LAN speed and enters the LAN at that speed and defaults to half-duplex mode.
3. If you set the duplex mode explicitly, you can do so using OSA/SF, the standalone support element or single object operations of the hardware management console.

   If you set the duplex mode, this setting overrides the OSA's ability to auto-negotiate with its attached Ethernet hub, router, or switch. Make sure the OSA and hub, router, or switch to which it is attached are set at the same duplex mode.
4. LP-to-LP communications are not supported.

2.8.4 Comparisons between a FENET and ENTR OSA-2

Especially if you are switching a 10 Mbps Ethernet cable from an ENTR to a FENET OSA-2, take the following factors into account.

Function	FENET OSA-2	ENTR OSA-2
Ethernet LAN speeds	100 or 10 Mbps	10 Mbps only
Number of Ports (Note 1)	1 (port 0)	2 (ports 0, 1)
Ethernet Connector Type	RJ-45	RJ-45 and AUI
Category 5 cable	Required	Not required
Auto-negotiate	Supported	Not supported
Half-duplex	(Note 2)	Default
Full-duplex	Supported	Supported
LP-to-LP Communications	Not supported	(Note 3)
TCP/IP Passthru mode	Supported	Supported
HPDT MPC mode	Supported	Not supported
SNA mode Max PUs NetView	Supported 2047 PPI	Supported (Note 4) Box manager node
IOCDS Definitions	(Note 5)	(Note 5)
Problem Determination	(Note 6)	(Note 6)

Notes:

1. A FENET OSA-2 port can only be attached to an Ethernet LAN. An ENTR OSA-2 port can be attached to either an Ethernet or a token ring LAN.
2. The FENET OSA-2 defaults to half duplex mode only if the attached Ethernet hub, router, or switch cannot auto-negotiate and the duplex mode has not been set for the OSA. However, half-duplex communications are not supported if the port is covered by a wrap plug.
3. For the restrictions on LP-to-LP communications for an ENTR OSA-2 connector, see the discussion that starts on page 27.
4. A maximum number of 2047 PUs is supported by a FENET OSA-2 if the OSA is being run in the SNA mode. The maximum number of PUs supported by an ENTR OSA-2 is either 255 or 2047 depending on whether the PTF to the relevant APAR is applied.
5. IOCDS definition requirements are the same for the two OSAs. If you use the same values, however, remember that an ENTR OSA-2 has two ports available, but a FENET OSA-2 has only one port.
6. Service procedures are the same between the two OSAs. Remember, however, that a FENET OSA-2 has additional LED status indicators as shown on page 39.

2.8.5 OSA Modes of Operation

A FENET OSA-2 can be run in the TCP/IP Passthru mode (page 101), SNA mode (page 135), and HPDT MPC mode (page 124) in any combination concurrently.

2.8.5.1 With and Without OSA/SF Support

- For OSA/SF to manage a FENET OSA-2, the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) must be applied.
- With OSA/SF managing a FENET OSA-2, that OSA can be run in all the OSA modes that are supported by a FENET OSA-2.
- Without OSA/SF managing a FENET OSA-2, the OSA can be run only in the TCP/IP Passthru mode. To set the LAN speed or duplex mode without OSA/SF, you must use the standalone SE or the SE function of the system hardware management console.

  If a system is running in logically-partitioned (LPAR) mode and OSA/SF is not managing a FENET OSA-2, access to that OSA's port cannot be shared among the logical partitions (LPs) to which the OSA is defined. Nor can any Passthru OAT entry be designated as specifying a default data path through the OSA for routing an inbound IP packet with a S/390 Home IP address that is not recognized by the OSA.

2.8.5.2 TCP/IP Passthru Mode Requirements

- The maximum number of users depends on the maximum number that is supported by the S/390 TCP/IP program.
- The following Ethernet frame protocols are supported:

  Ethernet II using the DEC Ethernet V 2.0 envelope

  Ethernet 802.3 using the 802.2 envelope with SNAP
- The LAN speed and duplex mode are irrelevant to TCP/IP, so that program does not distinguish between a FENET and ENTR OSA-2.
- OSA/SF is not required under the conditions discussed in the preceding section on OSA/SF.
- For more information, see the programming requirements for each S/390 system in the subsequent chapters and the discussion on the TCP/IP Passthru mode that starts on page 101.

2.8.5.3 SNA Mode Requirements

- The Ethernet 802.2 LAN MAC (802.3 using the 802.2 envelope) frame protocol is supported.
- A maximum number of 2047 PUs per port are supported.
- The LAN speed and duplex mode are irrelevant to the S/390 program so that program does not distinguish between a FENET and ENTR OSA-2.
- For more information, see the programming requirements for each S/390 system in the subsequent chapters and the discussion on the SNA mode that starts on page 135.

2.8.5.4 HPDT MPC Mode Requirements: A FENET OSA-2 can be run in the HPDT MPC mode in an OS/390 environment. See the OS/390 requirements that start on page 45, the discussion on the HPDT MPC mode using the IP protocol that starts on page 124, and on the HPDT MPC mode using the IPX protocol that starts on page 131.

| **Note:** FENET OSA-2 does not support LP to LP communications in HPDT MPC mode. Separate FENET OSA-2 cards would be needed if communications is planned between two LPARs on the same CPC.

Chapter 3. OSA in an OS/390 or MVS/ESA Environment

An OSA can be defined to an OS/390 or MVS/ESA system image if the system is running in LPAR mode or to a system that is running in basic mode. The OSA CHPID and its associated devices can be defined to be shared across logical partitions. All the OSA modes are supported in an OS/390 environment. All the OSA modes except the HPDT MPC mode are supported in an MVS/ESA environment.

A significant difference between the OS/390 and MVS/ESA environments is the fact that many of the program requisites, including OSA/SF, are bundled as elements of OS/390, but are separate components on MVS/ESA. For example, OSA/SF runs as a base, non-exclusive element in OS/390 and as a licensed program on an MVS/ESA system image.

3.1 Task Planning Checklists

3.1.1 General OSA Planning

__ 1. Determine which OSA mode or modes will be used for each OSA. This decision underlies many of your planning activities. Remember that all the OSA modes are supported in an OS/390 environment. All the OSA modes except for the HPDT MPC mode are supported in an MVS/ESA environment.

__ 2. Ensure the system pre- and co-requisites are met that are listed on page 45 for the hardware requirements, page 45 for the programming requirements in an OS/390 environment, and page 49 for the programming requirements in an MVS/ESA environment.

__ 3. For each OSA, define its channel path and its associated control unit in the system hardware I/O configuration. Refer to the discussion that starts on page 22 and to the hardware I/O configuration books listed in the bibliography (page xviii).

__ 4. Define the OSA devices, port number, and other characteristics as needed for the routing protocols that you are using. Refer to page 52.

__ 5. Review the OSA port parameters that are listed in Chapter 12 to determine whether you want to change, or alter, any of their settable parameters. Especially consider defining a local MAC address (page 210) for an OSA port.

3.1.2 Planning for an OSA Without OSA/SF

Except for an ATM OSA-2, any OSA can be run without the services of OSA/SF but then only in the TCP/IP Passthru mode and then with the following limitations and conditions.

__ 1. Only the data paths specified in the IBM-supplied default OSA address table (OAT), which is described on page 6, can be used.

__ 2. In the system hardware I/O configuration, you must define a pair of device numbers for the TCP/IP Passthru mode (page 103) for each logical partition to which you want a data path to be defined in this mode. Associate the IBM-supplied default unit address with each device number (page25).

__ 3. Only those port parameters can be set which can be altered through the OSA frames presented at the standalone support element or single object operations via the hardware management console. For more information, refer to *SE Operations Guide* for the processor.

3.1.3 Planning for an OSA With OSA/SF

__ 1. Ensure the OSA/SF requisites are met that are listed in this chapter and in the OSA/SF for MVS/ESA and OS/390 program directory.

__ 2. Define a device number with unit address `X'FE'` in the system hardware I/O configuration for each OSA in the partition in which its managing OSA/SF will be running. This is called the OSAD device, the OSA/SF device, or the FE device. For more information, see page 25.

If the system is running in LPAR mode and if more than one instance of OSA/SF will be active concurrently, ensure that these devices are defined to be shared among the logical partitions to which the OSA is defined (page 22).

__ 3. Determine the span of control of each instance, or copy, of OSA/SF (page 53) being used to manage the OSA's mode or modes of operation. Also, decide which OSA/SF interface will be used (page 53).

__ 4. Plan for OSA/SF installation via SMP/E and its operations, which are introduced on page 54. For more information, refer to the OSA/SF for MVS/ESA and OS/390 program directory and the applicable OSA/SF User's Guide whose title is listed in the bibliography (page xv).

__ 5. If RACF is to be used to control user access to OSA/SF commands and data sets, plan the RACF profiles that are described on page 60 and in the RACF books listed in the bibliography.

Note: RACF is not required by OSA/SF, but if RACF is installed, it must be active when OSA/SF is active.

3.1.3.1 Planning for the OSA/SF OS/2 Interface (GUI):

__ 1. Establish a communications protocol between the workstation and host systems that you will use (page 56).

__ 2. Download OSA/SF OS/2 interface (GUI) files using Software Installer/2 (SI/2) and install them on the OS/2 platform as described in the appropriate OSA/SF user's guide listed in the bibliography (page xv).

| ### 3.1.3.2 Planning for the OSA/SF Microsoft Windows Interface (GUI)

| __ 1. Establish a communications protocol between the workstation and the host systems that you will
| use (page 56).

| __ 2. Download the self-extracting file, IOAWINST.EXE, onto the workstation.

| __ 3. Start IOAWINST.EXE, either by double-clicking the IOAWINST object in Windows Explorer, or by
| entering `IOAWINST` at a command prompt.

3.1.3.3 Planning for the OSA/SF REXX Interface: Because the OSA/SF REXX interface uses the TSO/E command line, it requires no special planning. This interface can be used to customize any OSA-2 defined in the system. Additionally, it provides a list of those OSA CHPIDs and allows you to define a managing OSA/SF for each one.

3.2 Requirements

3.2.1 Hardware Requirements

- An OSA attached to the appropriate network is required. The user-supplied cabling requirements are discussed for each OSA-2 in Chapter 2.
- If one of the OSA or OSA/SF APARs are applied that are listed under the programming requirements, make sure the minimum level of code that is stated in the PTF cover letter is installed for that APAR (page 19).
- An ATM OSA-2 is required for the HPDT ATM Native and ATM IP Forwarding modes, which are unique to this OSA, as well as for the TCP/IP Passthru mode and SNA modes for data transfer to clients on Ethernet and token-ring LAN clients that are bridged from the ATM-based network to which the ATM OSA-2 is attached.
- A FENET or FDDI OSA-2 is required to transfer IP data packets in the HPDT MPC mode. A FENET OSA-2 is required to transfer IPX data packets in that mode.

If OSA/SF for MVS/ESA and OS/390 is to be used, the following hardware is required.

- To install OSA/SF on the host, one of the following:
  - A 9-track 6250 bpi magnetic tape drive
  - An 18-track 34K 3480 tape cartridge drive
- To establish communications in order to install OSA/SF GUI, one of the following communication adapters that are supported by the operating system (OS/2 or Windows) and the microprocessor:
  - EHLLAPI for 3270 communications protocol
  - TCP/IP communications protocol
  - APPC, or CPI-C, protocol for a node that supports LU 6.2
- To install and use an OSA/SF GUI, the following is *recommended:*
  - A PC with a Pentium 200Mhz (orequivalent) processor, 32 MB RAM, and an SVGA display with resolution of 1–24x768x16 colors.

    You may be satisfied with OSA/SF GUI performance on the minimum processor required by your OS/2 or Windows operating system, but the GUI may not display correctly at a lesser resolution.

3.2.2 Programming Requirements

Only the *minimum program release levels* are listed. Service levels and higher release levels are assumed to be supported. With few exceptions, APARs and the PTFs required for their resolution are too transient to be maintained in this book. For that information, refer to the applicable program directory and to the relevant preventive service planning (PSP) buckets, such as 9672DEVICE, OSA110, and OSA120. Check IBMLink (Service level) and use the Upgrade and Subset values.

3.2.2.1 OS/390 Requirements

General

- OSA-2 supports OS/390 V1R1 and subsequent releases. These general notes are a summary of additional support items that have become available in subsequent OS/390 releases. Details on these items are listed on the following pages for each OSA mode.
  - The HPDT MPC mode was made available starting with OS/390 R3. In that release, however, only the HPDT capabilities for IP applications that use the User Data gram Protocol (UDP) are supported. Starting with R5, the HPDT MPC mode also supports the OS/390 High Speed Access Services (HSAS). Starting with R6, the HPDT MPC mode also supports IPX data packet transfer

across a FENET OSA-2 using the Novell Directory Services (NDS) of the Novell Network Services for OS/390.

  - The HPDT ATM Native mode requires a minimum of VTAM 4.4 to support SNA data transfer. With the availability of VTAM HPR over XCA and the eNetwork Communications Server (CS) for OS/390, an ATM OSA-2 supports them for SNA data packet traffic. Starting with R5, an ATM OSA-2 being run in the HPDT ATM Native mode also supports IP data packet transfer using the TCP/IP function of CS for OS/390.
  - Starting with OS/390 R6, an OSA-2 being run in the TCP/IP Passthru mode supports supports IP multicast addresses using the CS for OS/390. In all environments, OSA supports the IP unicast and broadcast network addresses in this mode. In the OS/390 environment, an ATM OSA-2 also supports IP unicast and broadcast addresses in the ATM IP Forwarding mode.

- For OSA-2, OS/390 Version 2, which starts with Release 4 (V2R4), is compatible with OS/390 Version 1 (R1, R2, R3). The product number starting with R2V4 is 5647-A01. The V1 product number for R1, R2, and R3, is 5645-001.
- For OSA/SF for MVS/ESA and OS/390 to provide management to an OSA defined to VM/ESA, the following are required.
  - VM/ESA 1.2.1 if OS/390 is running in one partition with VM/ESA running in another partition.
  - VM/ESA 2.1 if the OS/390 system is running as a guest in a VM/ESA environment.
- OSA/SF is required for all OSA modes on an ATM OSA-2 and for all OSA modes except the TCP/IP Passthru mode on any other OSA. Note that the PTF resolution to OSA/SF APAR OW28283 must be applied to use the OSA/SF REXX Exec for an ATM OSA-2.

  Without OSA/SF support, however, access to an OSA's port in the TCP/IP Passthru mode cannot be shared among the logical partitions (LPs) to which the OSA is defined. Nor can any of the Passthru OAT entries specify a default data path to be used for inbound IP packets with addresses unknown to the OSA.
- To make OSA/SF on OS/390 R2 or higher that is running in one logical partition compatible with OSA/SF running on OS/390 R1 in a different logical partition, install the PTF UW29943 resolution to APAR OW20763 on OS/390 R1.
- In addtion to the following OS/390 requirements, consider the optional system management services that are listed on page 51.

For an ATM OSA-2:

- The PTF resolution to OSA/SF APAR OW21489 is required for all OSA modes in which this OSA can be run.
- In the SNA mode, the PTF resolution to OSA/SF APAR OW30222 is required to support the following:
  - The expanded set of SNA session availability options by an ATM OSA-2 LAN emulation client (LEC) port that is defined for a token-ring emulated LAN (ELAN).
  - The logical link control (LLC) alerts that OSA/SF automatically logs in the OSA/SF message log.
  - To set the SNA LLC timers in seconds.
  - To set the N3 and TW counts.
- The PTF resolution to OSA/SF APAR OW30222 is required to allow an eNetwork Communications Server for OS/390 (CS for OS/390) to communicate with its ATM clients natively using an ATM OSA-2 that is being run in the HPDT ATM Native mode.
- With the application of the PTF resolution to VTAM APAR OW14043 and to OSA/SF APAR OW28666, a maximum PU limit of 2047 sessions is supported for the physical port. Otherwise, only up to 255 PUs are supported for either the physical or a LEC port.

If a maximum number of 2047 PUs is supported, however, also consider that an ATM OSA-2 can only support up to 1000 switched virtual circuits (SVCs) as logical attachments to its physical port and not more than 1000 unique MAC addresses on each emulated LAN (ELAN) for which it provides LAN emulation client (LEC) services. However, if only one LEC port is active and multiple SAPs are defined over a single client's MAC address, up to 2047 connections can be logged on to that LEC port.

For an ENTR or FDDI OSA-2:

- A maximum number of 2047 PUs per port is supported with the application of the PTF resolution to VTAM APAR OW14043 and to OSA/SF APAR OW23429. Otherwise, only a maximum number of 255 PUs is supported for each port.
- The expanded set of SNA mode port parameters is supported in the SNA mode with the PTF resolution to OSA/SF APAR OW30222. The basic set is supported if the PTF resolution to OSA/SF APAR OW20205 is applied.

For a FENET OSA-2:

- For any function, the PTF resolution to OSA/SF APAR OW30222 is required

  Note that if a FENET OSA-2 is being run in the SNA mode, it supports a maximum number of 2047 PUs for its port. The SNA LLC timers, N3 count, and TW count can be set. And, the NetView PPI is supported.

For the TCP/IP Passthru Mode:

- OSA/SF is required for an ATM OSA-2. It is not required for the other OSAs, but only if their default OAT entries (page 6) are used.
- To support multiple S/390 Home IP addresses in the same inbound Passthru OAT entry or to designate both primary or secondary inbound default paths for IP packets with destination IP addresses unknown to the OSA, the PTF resolution to OSA/SF APAR OW33393 is required.

For the SNA Mode:

One of the following is required.

- VTAM High Performance Routing (HPR) across XCA for which the PTF resolutions to VTAM APARs OW25950 and OW26732 are required.
- OS/390 V2R5 eNetwork Communications Server (CS for OS/390), whose requirements are listed in the CS for OS/390 books. Refer to the bibliography (page xix).

Additionally:

- OSA/SF is required. The PTF resolution to OSA/SF APAR OW30222 is required for the expanded set of SNA mode parameters (page 140) and the unsolicited logical link control (LLC) alerts from an ATM and FENET OSA-2 (page 197).
- NetView is optionally supported:
  - NetView 3.1 (5655-007) is required for an ATM or FENET OSA-2 to support the NetView program-to-program interface (NetView PPI). The PTF resolution to OSA/SF APAR OW30222 is also required. This PTF disallows concurrent support for the Box Manager node, which is required to support the NetView CSCF.
  - NetView 1.3 (5685-152) is required for the Box Manager node for the NetView CSCF. This is the only level of NetView support that is available on an ENTR or FDDI OSA-2. It is available on an ATM OSA-2 only if the NetView PPI is not supported. It is not available on a FENET OSA-2s.

For the HPDT ATM Native Mode:

- OSA/SF with the PTF resolution to OSA/SF APAR OW21906 is required plus one of the following:
  - VTAM 4.4 and, if SNMP management is to be used, TCP/IP OpenEdition.
  - CS for OS/390, whose requirements are listed in the CS for OS/390 books (page xix).
- For reserved bandwidth (RB) support, the PTF resolution to OSA/SF APAR OW24052 is required.
- With the PTF resolution to OSA/SF APAR OW1906, OSA/SF GUI support is provided. For support by the OSA/SF REXX interface, the PTF resolution to OSA/SF APAR OW28283 is required.
- The TCP/IP function of CS for OS/390 is supported in OS/390 Release 5.

For the ATM IP Forwarding Mode:

- OSA/SF with the PTF resolution to OSA/SF APAR OW28283 is required.
- To support Home IP addresses in the same inbound Passthru OAT entry or to designate both primary and secondary default Passthru entries for inbound IP packets with addresses unknown to the OSA, the PTF resolution to OSA/SF APAR OW33393 is required.

For the HPDT MPC Mode:

- OSA/SF with the PTF resolution to OSA/SF APAR OW28254 is required plus one of the following:
  - CS for OS/390, whose requirements are listed in the CS for OS/390 books that are listed in the bibliography (page xix).
  - VTAM 4.4 with the PTFs required for HPDT UDP support that are listed in the PTF for TCP/IP APAR PQ03737 plus the PTF resolution to TCP/IP APAR PQ03737. Also, the TCP/IP socket application using UDP must be able to access the network through the OSA-2.
- To support IPX data packet transfer starting with OS/390 R6, a FENET OSA-2 is required and the Network Directory Services (NDS) of the Novell Network Services for OS/390 (5655-B12). To view the IPX data items presented by OSA/SF, the PTF resolution to OSA/SF APAR OW33393 is required.
- For OSA/SF to present multiple S/390 Home IP addresses used in the transfer of IP data packet, the PTF resolution to OSA/SF APAR OW33393 is required.

For OSA/SF GUI (OS/2): Either OS/2 or OS/2-J is required.

If you use OS/2, OS/2 2.1 is required plus one of the following communications protocols:

- EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.
- TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
- APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

If you use OS/2-J, OS/2-J 3.0 (WARP) is required plus the PTF resolution to OSA/SF APAR OW22537 and one of the following communications protocols:

- EHLLAPI (3270), which requires Communications Manager/2-J 1.11 on the workstation being used and the MVS/TSO File Transfer Program V2, or APVUFILE (5799-PGY), running in the S/390.
- TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
- APPC (CPI-C), which requires Communications Manager/2-J 1.11 at the workstation being used.

For OSA/SF GUI (Windows):

- Microsoft Windows 95 4.00.950B (OSR2) or later, or Microsoft Windows NT 4.0 with Service Pack 3 or later.
- To establish GUI to server communications, ***one*** of the following is required:
  - EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.
  - TCP/IP, which requires TCP/IP 2.3 on the workstation.
  - APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

For OSA/SF API: A user-written REXX Exec is required.

The PTF resolution to OSA/SF APAR OW28283 provides two functions that were previously only available with OSA/SF GUI; namely, an ATM OSA-2 can be customized at this interface, and OSA/SF automatically enters the group size as an OAT entry parameter. (Without this PTF, you must input group size = 2 for all OSA modes except the SNA mode, which requires group size = 1.) For more information, see the OSA/SF user's guide listed in the bibliography (page xv).

3.2.2.2 MVS/ESA Requirements: MVS/ESA SP 4.3 is required as the minimum system level. Note that MVS/ESA SP 4.3 requires HCD 5.1 plus one of the following feature codes: 5890, 5891, or 5892. In addition to the following requirements, consider using the optional system management services listed on page 51.

To make OSA/SF 1.1 compatible with OSA/SF 1.2 when each OSA/SF is running in a different logical partition, install the PTF UW29943 resolution to APAR OW20763 on the earlier OSA/SF.

OSA/SF for MVS/ESA is program number 5655-104. OSA/SF is required for any OSA mode on an ATM OSA-2 and for any OSA mode except the TCP/IP Passthru mode on the other OSAs.

- A host editor to edit MVS/ESA datasets, for example, ISPF 3.5 (5685-054)
- One of the following, but note that the OpenEdition AD/Cycle C/370 Language Support feature of MVS/ESA SP 5.1 or the C/C++ Language Support feature of MVS/ESA SP 5.2 satisfies this prerequisite:
  - AD/CYCLE Language Environment (LE) 370 1.3 (5688-198).
  - C/370 Library 2.2 for MVS (5688-188). Make sure the PL/1 run-time libraries are included in the SIBMBASE dataset when the C/370 library is installed.
- If OSA/SF is providing management to an OSA defined to VM/ESA, VM/ESA 1.2.1 is required if MVS/ESA is running in one partition with VM/ESA in another partition. VM/ESA 2.1 is required if the MVS/ESA system image is running as a guest in a VM/ESA environment.
- If OSA/SF is to be accessed at the Time Sharing Options Extensions (TSO/E) command line, TSO/E 2.4 (5685-025) is required.
- If the OSA/SF OS/2, or GUI, interface is to be used, that interface requires either OS/2 or OS/2-J.

  If you use OS/2, OS/2 2.1 and one of the following communications protocols are required:

  - EHLLAPI (3270), which requires ACF/VTAM 3.4.2 for MVS/ESA and the 3270-PC File Transfer Program (5665-311) on the host plus one of the following on the workstation:

Personal Communications/3270 4.1 with the resolution to APAR IC14272 or Communications Manager/2 1.1.

  - TCP/IP, which requires TCP/IP 2.2.1 for MVS on the host plus TCP/IP 2.0 for OS/2 on the workstation
  - APPC, or CPI-C, which requires ACF/VTAM 3.4.2 for MVS/ESA on the host and one of the following on the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

  If you use OS/2-J, OS/2-J 3.0 (WARP) is required plus the PTF resolution to OSA/SF APAR OW22537 and one of the following communications protocols:

  - EHLLAPI (3270), which requires Communications Manager/2-J 1.11 on the workstation being used and the MVS/TSO File Transfer Program V2, or APVUFILE (5799-PGY), running at the host.
  - TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
  - APPC (CPI-C), which requires Communications Manager/2-J 1.11 at the workstation being used.

- To call the OSA/SF API, a user-written REXX Exec is required.

  The PTF resolution to OSA/SF APAR OW28283 provides two functions at the OSA/SF REXX Exec interface that were previously only available with OSA/SF GUI. An ATM OSA-2 can be customized at this interface, and OSA/SF automatically provides the group size as an OAT entry parameter. (Without this PTF, you must input group size = 2 for all OSA modes except the SNA mode, which requires group size = 1.)

For more information, see *Using the System/390 Open Systems Adapter Support Facility for MVS/ESA* that is listed in the bibliography (page xv).

For the TCP/IP Passthru mode:

- TCP/IP for MVS 2.2.1 (5735-HAL) is required.
- The PTF resolution to OSA/SF APAR OW33393 is required for an expanded Passthru OAT entry, which allows you to specify up to 8 Home IP addresses in the same inbound Passthru OAT entry and to designate both primary and secondary default Passthru entries for inbound IP packets with addresses unknown to the OSA.

For the SNA mode:

- ACF/VTAM 4.1 for MVS/ESA (5695-117), which supports SNA/APPN including the subarea network, is required. (Note that VTAM 4.1 requires a PTF. See the OSA/SF for MVS/ESA program directory.)
- For High Performance Routing (HPR) across XCA, the PTF resolutions to VTAM APARs OW25950 and OW26732 are required.
- The PTF resolution to OSA/SF APAR OW20205 is required for the basic set of SNA mode port parameters (page 151).
- The PTF resolution to OSA/SF APAR OW30222 is required for the expanded set of SNA mode port parameters (page 140).
- NetView requirements are the same as for the OS/390 system (page 47).
- On a FDDI or ENTR OSA-2, a maximum number of 2047 PUs per port is supported with the application of the PTF resolution to VTAM APAR OW14043 and to OSA/SF APAR OW23429. Otherwise, a maximum number of 255 PUs is supported per port.
- On an ATM OSA-2, the PTF resolution to OSA/SF APAR OW21489 is required.

With the application of the PTF resolution for VTAM APAR OW14043 and for OSA/SF APAR OW28666, a maximum number of 2047 PUs is supported for the physical port. Otherwise, a maximum number of 255 PUs is supported for the ATM OSA-2.

If a maximum number of 2047 PUs is supported, however, you must also consider that an ATM OSA-2 can only support up to 1000 switched virtual circuits (SVCs) as logical attachments to its physical port and not more than 1000 unique MAC addresses on each emulated LAN (ELAN) for which it provides LAN emulation client (LEC) services. However, if only one LEC port is active on an ATM OSA-2 and multiple SAPs have been defined over a single client's MAC address, up to 2047 connections can be logged on to that LEC port.

For the HPDT ATM Native mode:

- VTAM 4.4 is required.
- OSA/SF 1.2 with the PTF resolution to APAR OW21906 is required to support a best effort (BE) virtual circuit.
- The PTF resolution to OSA/SF APAR OW24052 is required to specify a sustained cell rate for a reserved bandwidth (RB) virtual circuit.
- TCP/IP OpenEdition is required to use IP SNMP management in this mode.

For the ATM IP Forwarding mode:

- The PTF resolution to OSA/SF APAR OW28283 is required.
- TCP/IP for MVS 2.2.1 (5735-HAL) is required.
- The PTF resolution to OSA/SF APAR OW33393 is required for an expanded Passthru OAT entry, which allows you to specify up to 8 Home IP addresses in the same inbound Passthru OAT entry and to designate both primary and secondary default data paths for inbound IP packets with addresses unknown to the OSA.

3.2.2.3 Other Management Services: In addition to the requirements for OS/390 or MVS/ESA, OSA operations can benefit from the following system management programs:

- To meet the security access facility (SAF) of the S/390 system on which OSA/SF is running, you can use one of the following:
  - OS/390 R3 Security Server feature.
  - RACF 1.9.2 on MVS/ESA (5740-XXH).
- NetView whose requirements are listed under the SNA mode requirements for OS/390 (page 47).
- To view status or reconfigure an OSA channel path or device using ESCON Manager, ESCON Manager 1.3 (5688-008) with PTF UN75973 can be used.
- To obtain resource utilization data about OSA channels, you can use either:
  - OS/390 R3 RMF feature.
  - RMF 5.1 for MVS/ESA (5655-084).

3.3 System Hardware I/O Configuration Definitions

Define an OSA channel with its associated logical control unit and logical devices in the system hardware I/O configuration as you would any other channel.

Notes:

1. Define an OSA channel path as type=OSA (page 22). Make sure you have the correct OSA CHPID. Associate one logical control unit (page 24) with each OSA CHPID.
2. If OSA/SF is to be used, define the OSAD device with its unit address of X'FE' (page 25).
3. Associate the device numbers and unit addresses according to the rules for each OSA mode in which the OSA will be run.
   - See page 24 for the general rules.
   - See page 103 for the device pairs required in the TCP/IP Passthru mode.

     All OSAs can be run in the TCP/IP Passthru mode. Although the services of OSA/SF are recommended for all OSAs even in the TCP/IP Passthru mode, they are only required for an ATM OSA-2 in this mode. An OSA can be run in the TCP/IP Passthru mode concurrently with the SNA mode, HPDT MPC mode, or both modes. The TCP/IP Passthru mode is described in Chapter 6. If an ATM OSA-2 is to be run in this mode, you must also define one or both of its LAN emulation client (LEC) ports, which are described in Chapter 10.
   - See page 138 for the SNA mode.

     All OSAs can be run in the SNA mode, and they all require the services of OSA/SF in this mode. An OSA can be run in the SNA mode concurrently with the TCP/IP mode, the HPDT MPC mode, or both modes. The SNA mode is described in Chapter 8. If an ATM OSA-2 is to be run in this mode, you must define one or both of its LAN emulation client (LEC) ports, which are described in Chapter 10.
   - See page 124 for the HPDT MPC mode.

     Although both a FDDI and a FENET OSA-2 can be run in the HPDT/MPC mode to transfer data packets using the IP protocol, only a FENET OSA-2 can be used to transfer data packets using the IPX protocol. The other OSAs cannot be run in the HPDT MPC mode. The HPDT MPC mode for IP protocol is described in Chapter 6 and for IPX protocol in Chapter 7.
   - See page 165 for the HPDT ATM Native mode and page 116 for the ATM IP Forwarding mode.

     Each of these two modes requires the exclusive use of the ATM OSA-2, which must be attached to an ATM-based network. None of the other OSAs can be attached to an ATM network. The HPDT ATM Native mode is described Chapter 9. The ATM IP Forwarding mode is described in Chapter 6.

3.4 S/390 Programming Definitions

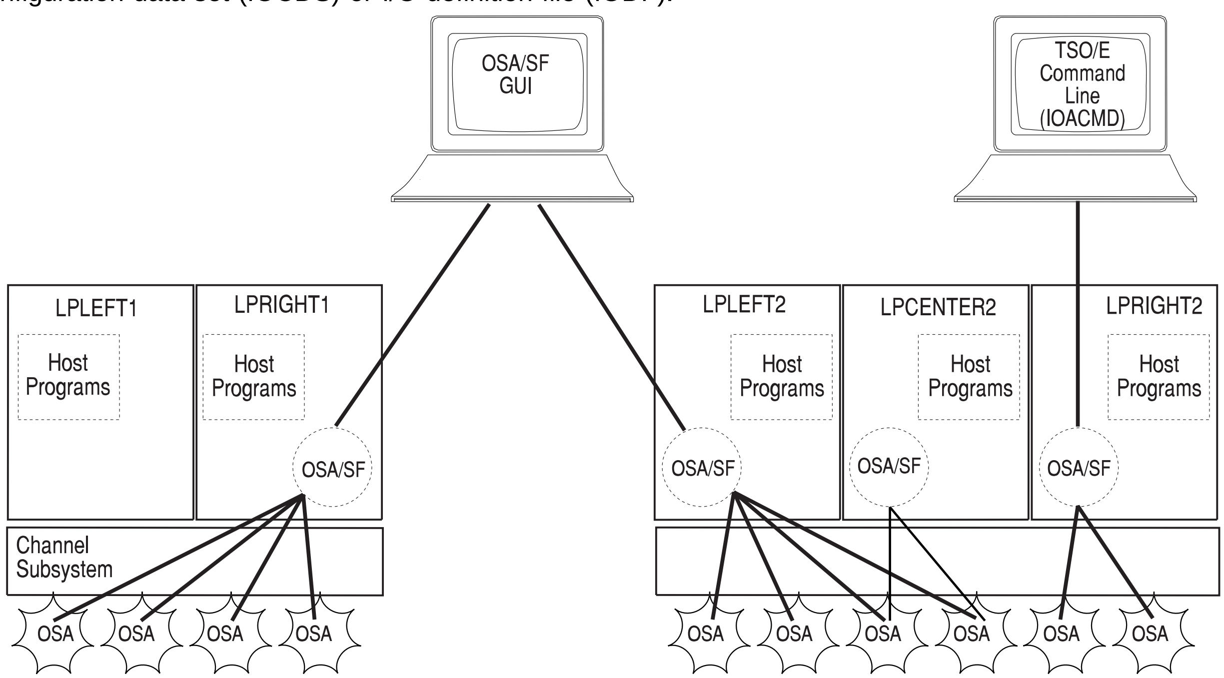
In an OS/390 environment, OSA supports the S/390 programs that transfer data using the IP, IPX, and SNA protocols as discussed in subsequent chapters on each of these protocols. For more information, refer to the OS/390 and CS for OS/390 books that are listed in the bibliography (page xviii).

3.5 Deciding OSA/SF Management Span

Only one instance, or copy, of OSA/SF can run on an OS/390 or MVS/ESA system image. However, that instance of OSA/SF can be used to customize, or configure, the modes of operation on all the OSAs defined in the system hardware I/O configuration data set (IOCDS) that the copy of OSA/SF can view.

For a managing instance of OSA/SF to recognize an OSA, you must associate one device number with the OSA channel path that is defined in the same logical partition (or system in basic mode) as the system image on which OSA/SF is running. Futhermore, this device number must be specified as device type = OSAD with unit address = `X'FE'`. Because of these requirements, this device number is usually called either the OSAD device or FE device.

An OSA/SF interface partly determines the OSA/SF's span of control. Using the OSA/SF GUI interface (OS/2 or Windows), you can establish an active host session with as many sessions with OSA/SF running on a S/390 system image as the GUI interface recognizes. Potentially, therefore, this interface allows OSA/SF's span of control to cross CPC boundaries as shown in the following figure. The other OSA/SF interfaces allow the instance of OSA/SF that is running on that system image to manage only those OSAs that it can recognize in its system hardware I/O configuration, that is, in the I/O configuration data set (IOCDS) or I/O definition file (IODF).



The system environment partially determines the OSA/SF's span of control. In the OS/390 and MVS/ESA environments, OSA/SF supports all OSAs and all OSA modes. Generally, therefore, one of these OSA/SFs will be managing the OSAs that are defined to the partitions in which these operating systems are running. It is, however, possible for OSA/SF for VM/ESA or OSA/SF for VSE/ESA to customize these OSAs under the limited conditions described on page 70.

Here are some guidelines for OSA/SF's management.

- Suppose an OSA is online and operational before OSA/SF is running. That OSA will be managed by the first instance of OSA/SF that is started and that can recognize the OSA.
- Now, suppose one or more OSA/SFs are running, but a particular OSA is not online. That OSA will be managed by the first OSA/SF that can recognize the OSA CHPID and that receives an OSA/SF command to start managing the OSA.

- Conversely, if a managing OSA/SF is terminated, another instance of OSA/SF does not automatically start managing the OSA.

  For example:

  – If another instance of OSA/SF is already active, it waits until it is instructed to start managing an unmanaged OSA by a user ID through the OSA/SF Start Managing command. The OSA channel, however, continues to transfer data in the OSA mode that is active at the time.

  – If another instance of OSA/SF is started, it automatically starts managing all the unmanaged OSAs that have been assigned to its logical partition.

3.6 Planning for OSA/SF

In addition to the general information provided in the following sections, refer to the appropriate OSA/SF program directories, informational APARs, and preventive service planning (PSP) buckets. Also, refer to *OSA/SF User's Guide* which contains instructions on downloading the OSA/SF GUI interface (OS/2 or Windows) as well as instructions on how to use OSA/SF.

3.6.1 Installing OSA/SF

OSA/SF is installed using the standard SMP/E services. After the OSA/SF data sets have been received, the APPLY SMP/E command is used to install and copy them into the target libraries. Refer to the OSA/SF for MVS/ESA and OS/390 program directory for more information on installing OSA/SF in these environments. OSA/SF can be accessed through TSO/E or via its API.

- In an OS/390 environment, OSA/SF is automatically delivered as a base, non-exclusive OS/390 element. Therefore, OSA/SF is delivered together with many of its corequisites (page 45).
- In an MVS/ESA environment, OSA/SF is provided as a licensed program (page 49).

3.6.2 Starting OSA/SF

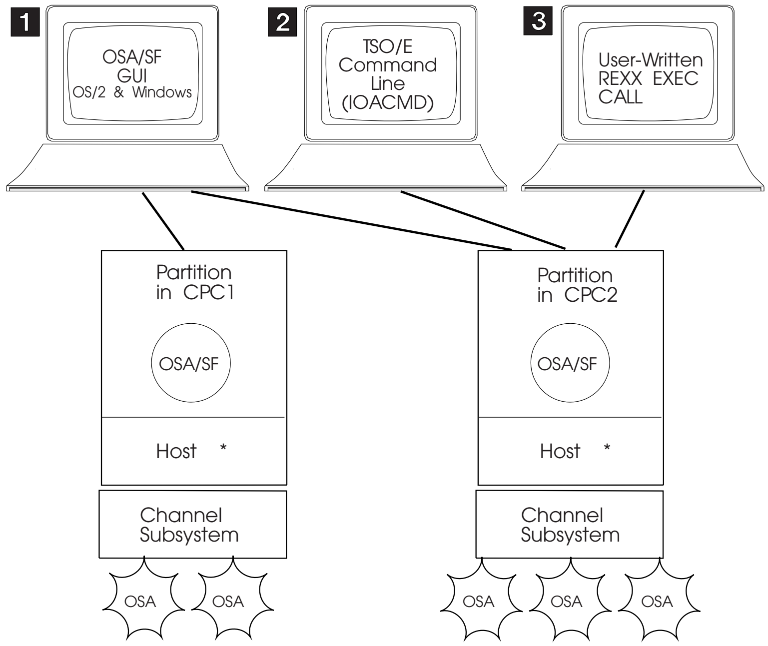
In an OS/390 or MVS/ESA environment, OSA/SF runs as a started task. After OSA/SF is installed, but before it can be started, it must be set up as an APPC server. For procedures, see the relevant OSA/SF program directory and OSA/SF User's Guide. The basic steps are to:

- Edit the APPCPM*xx* member in SYS1.PARMLIB, or the system library being used.
- Decide whether you can and want to change the IBM-supplied name of 'IOASERV'. You can change this name if:
  – You are using OSA/SF Release 2 and the PTF resolution to APAR OW19400 has been applied.
  – You have added the following additional line in the OSA/SF STARTUP Profile: `SET APPC NAME luname` where you replace *luname* with the name you want to use.
- Now, add the following statements. IOASERV is used in this example.

```
LUADD ACBNAME(IOASERV)
NOSCHED
TPDATA(SYS1.APPCTP)
```

- Then, stop and start APPC to include the statements. If OSA/SF GUI is to be used, the OSA/SF data sets must be downloaded to the workstation in the appropriate file format (OS/2 or Windows). For procedures, refer to the appropriate OSA/SF user's guide (page xv).

3.6.3 Deciding Which OSA/SF Interface to Use



The foregoing figure shows the three OSA/SF user interfaces that are available in an OS/390 or MVS/ESA environment. If either of these system images is running as a guest in a VM/ESA environment, see page 70 for the role of OSA/SF.

Note: For more information on OSA/SF, see the appropriate OSA/SF User's Guide, all of which are listed in the bibliography on page xv.

1 OSA/SF GUI interface (OS/2 or Windows)

- Can be used for all OSA/SF functions, offering the advantages of an application running on an OS/2 or Windows platform at a programmable workstation, including interactive function panels with pull-down menus and online help panels.
- Consists of files that are downloaded to an OS/2 or Windows platform from the host operating system on which OSA/SF is running.
- Allows you to use templates for many of the OSA/SF functions. The templates are stored in the OSA/SF SIOASAMP library.
- Can establish a session with any OSA/SF running on any S/390 operating system with which the workstation can establish an active host session.
- Requires one of the following communications protocols to be established with the host system on which OSA/SF is running: EHLLAPI (page 56); TCP/IP (page 57); or APPC (page 59).

2 REXX Execs at the TSO/E command line

- Can be used to customize any OSA-2 defined in the system in any OSA mode. Upon request, a list of the OSA CHPIDs and their types is provided. If OSA/SF is not currently managing a CHPID that is online, this interface can be commanded to do so.
- Must be used to customize an OSA in the SNA mode if the OSA is to be used as the communications controller between the host and OSA/SF OS/2 interface (GUI).

- Can control only those OSAs defined to the host system image on which the TSO/E user ID is also running.

3 A Call from a user-written REXX Exec to the OSA/SF API

- Can be made to the OSA/SF application program interface (API), which therefore allows you to automate OSA/SF procedures.
- Also, you can use the IBM NetView program to invoke the user-written REXX execs that call the OSA/SF API upon receiving the categories of alerts and data statistics discussed on page 202.

3.6.4 Handling Problems Using OSA/SF

Handle problems with the system procedures that you would generally use for an application in an OS/390 or MVS/ESA environment. Note that OSA/SF can display OSA-related data items, such as messages and dumps, that are not related to OSA/SF operations.

- If a problem appears to have occurred, make sure the managing OSA/SF is identified.

  As stated on page 53, one instance of OSA/SF can manage a number of OSAs. Also, an OSA can be managed, in turn, by different instances of OSA/SF.

  When investigating the symptoms of problems with an OSA, make sure the managing OSA/SF is identified. If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed. If the TSO/E command line or the OSA/SF API is being used, the Query command provides the same information.

- Check for OSA/SF messages, which are in the format of IOA*xyyyz*, where *x* denotes the OSA/SF component, *yyy* is the sequence number, and *z* signifies the severity of the condition.

  These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.

- Tracing is a default operation for OSA/SF. You can, therefore, get the trace log by using the Get Debug command and specifying Trace log.
- Because each instance of OSA/SF runs as an application, its contents can be dumped as part of a system dump. When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of a system dump. Refer to the system books listed in the bibliography for more information.

3.7 Setting Up a Communications Protocol for OSA/SF GUI

You can set up an EHLLAPI, TCP/IP, or APPC communications protocol.

- Checklists and guidelines are provided in the following sections.
- Instructions on how to use an OSA running in the SNA mode as a communications controller are provided in the OSA/SF user's guide.
- For more information on the communications protocols, refer to the applicable books listed in the bibliography.

3.7.1 Setting up an EHLLAPI Communications Protocol

3.7.1.1 At the Host, Take These Steps:

1. Ensure that the host session is able to do SENDs and RECEIVEs.

   If the host session cannot do this, you will need to set up the VTAM mode table entry for your terminal so that the device supports extended data stream capability.

2. Ensure that your TSO/E logon procedure points to the code library of OSA/SF, which defaults to SYS1.SIOALMOD and contains IOAXHSRV, and to the appropriate C run-time library.

3. Ensure that you are logged on with a TSO/E user ID and are at TSO READY.

4. Ensure that this user ID has at least five cylinders of DASD space available for temporary allocation of data sets.

5. Start the OSA/SF GUI program on the workstation.
   - For Windows, look for **IBM OSA Support Facility** in the Programs view.
   - For OS/2, look on the OS/2 desktop.

6. Select **Help** from the action bar and then select **How To**.

7. Select **Create Another** server icon for the GUI to server Communications. Follow the instructions and use online Help.

Notes:

1. When EHLLAPI is being used, session requests to a host are serialized. That is, one session request must finish before another session request can start.

2. To stop messages so that EHLLAPI communications will not be interrupted, at TSO Ready issue: `PROF NOINTERCOM`

3.7.1.2 At the Workstation, Take These Steps:

For OS/2:

1. Ensure that either Personal Communications 4.1 with the PTF resolution to APAR IC14372 with either OS/2 or OS/2-J is set up as described in the requirements (page 45 for OS/390 and page 49 for MVS/ESA).

2. Ensure that the OSA/SF GUI users know which session should be used for communications to the host.

For Windows:

1. Ensure Personal Communications 4.2 with CSD #2 is set up as described in the requirements ("For OSA/SF GUI (Windows):" on page 49.

2. Ensure that the OSA/SF GUI users know which session should be used for communications to the host.

3.7.2 Setting up a TCP/IP Communications Protocol

OSA-2 supports the TCP/IP program on any of the S/390 platforms that it supports. It also supports the TCP/IP function of CS for OS/390 on an OS/390 platform.

3.7.2.1 At the Host, Take These Steps: Create a TCP/IP configuration file for the TCP/IP address.

1. Copy the IOASRV member in the SIOASAMP library to a member in the SYS1.PROCLIB or any other valid system procedures library. The job will be started by TCP/IP for MVS.
2. Depending on the security procedures for your installation, you may need to authorize IOASRV to verify user IDs and their passwords. IOASRV is associated with those user IDs (or group) that logon through the GUI. IOASRV is a TCP/IP socket server.

   If you are using RACF as the security management tool, update the local user module that replaces the RACF ICHRIN03 module in the started procedures name table. For more information, refer to the RACF books listed in the bibliography (page xviii). You can use the RACF general resource class named STARTED or you can create source for ICHRIN03. Then, assemble and link edit the source into SYS1.LPALIB.
3. Use the TCP/IP socket number in the IOASRV started procedure to define the port number used by the OSA/SF GUI. The socket number is used to connect the GUI to TCP/IP on the host. This TCP/IP socket (port) number must also be specified at the GUI workstation as a parameter when communications are started with TCP/IP.
4. Include the OSA/SF server, IOASRV, in the Autolog statement in the TCP/IP profile.

   ```
   AUTOLOG
       .
       IOASRV      ; OSA/SF Server
       .
   ENDAUTOLOG
   ```
5. Also include the OSA/SF socket number and server name in the Port section:

   ```
   PORT
       .
     2000 TCP IOASRV    ; OSA/SF Server
       .
   ENDPORT
   ```
6. Use a file, for example, *yourprefix*.TCPIP.DATA, to specify the configuration information required by the TCP/IP client programs.
   - To specify the TCP host name of this system, use the HOSTNAME statement or let the name default to the node name specified in the IEFSSN*xx* PARMLIB member.

     ```
     HOSTNAME  OSASF
     ```
   - Use the TCPIPJOBNAME statement to specify the member name (JOBNAME) of the procedure used to start the TCP/IP address space. If you do not specify the name and if your TCP/IP started procedure name (JOBNAME) is not the default name of TCPIP, clients will fail at startup with an irrecoverable interaddress communication error.

     ```
     TCPIPJOBNAME TCPIPSF
     ```
   - Specify the DATASETPREFIX statement in *yourprefix*.TCPIP.DATA data set. The parameter in this statement, which can be up to 26 characters and must *not* end with a period, takes precedence over either the distributed or the modified data set prefix name as changed by the EZAPPRFX installation job. If this statement is used in a profile or configuration data set that is allocated to a client or server, that client or server dynamically allocates additionally required data sets using the statement's parameter value as the data set name prefix.

     ```
     DATASETPREFIX TCPIPSF
     ```
7. If more than one TCP/IP image is running on the host, you must distinguish which TCP/IP image is controlling the IOASRV program. To do this, take the following steps.

a. Uniquely identify the TCP/IP configuration profile data set with the following PROFILE statement:

```
//PROFILE DD DSN=yourprefix.PROFILE.TCPIP
```

in the TCP/IP startup JCL. During initialization of the TCP/IP address space, system operation and configuration parameters are read from the configuration profile data set. (Refer to “Specify Configuration Statements in PROFILE.TCPIP” in *TCP/IP Customization and Administration Guide.*)

b. Place the ‘//SYSTCPD DD’ statement in the TSO logon procedure and in the JCL of any client or server executed as a background statement. The SYSTCPD statement identifies the data set to be used to obtain the parameters defined by TCPIP.DATA.

```
//SYSTCPD   DD DISP=SHR,DSN=yourprefix.TCPIP.DATA
```

c. Ensure the IOASRV member you copied from the IOA.SIOSAMP library into SYS1.PROCLIB has the ‘//SYSTCPD DD’ line in it to associate IOASRV to the specific TCP/IP image.

```
//SYSTCPD   DD  DSN=yourprefix.TCPIP.DATA,DISP=SHR
```

3.7.2.2 At the Workstation, Take These Steps

1. Set up TCP/IP to access the host.
2. Verify that communications have been set up by pinging the host IP address used to access IOASRV for OSA/SF as an OS/390 element or an MVS/ESA application.
3. Start the OSA/SF GUI program on the workstation.
   - For Windows, look for **IBM OSA Support Facility** in the Programs view.
   - For OS/2, look on the OS/2 desktop.

   After the program starts, an OSA/SF server window is displayed with a Sample icon.
4. Select **Help** from the action bar and then select **How To**.
5. Select **Create Another** server icon for the GUI to server Communications. Follow the instructions and use online help.

3.7.3 Setting up an APPC, or CPI-C, Protocol

APPC is the term used in this section because that is the name for the LU 6.2 protocol. OSA/SF GUI, however, interfaces with the CPI-C, which is a commonality layer for workstation applications, and therefore uses that term on its panels.

Setting up APPC places requirements on each target host where the host OSA/SF application is running, the controller being used for the communication, and the workstation on which OSA/SF GUI will be running.

3.7.3.1 At the Host, Take These Steps

1. Add an APPC/MVS TP profile for the OSA/SF GUI to the APPC data set (TPADD TPNAME).
2. Add an entry in SYS1.PARMLIB(ASCHPMxx) for the OSA/SF-to-APPC scheduler interface (CLASSADD CLASSNAME).
3. Add an entry in SYS1.PARMLIB(APPCPMxx) for the OSA/SF-to-APPC GUI interface (LUADD ACBNAME). This ACBNAME must match the VTAM APPL-ID (next step) and the CM/2 Symbolic Destination Name (SDN) for GUI communications. Note that an LUADD entry for IOASERV will have already been made as part of the OSA/SF installation; this is a second LUADD entry for the OSA/SF GUI's VTAM access control block (ACB).

4. Add an entry in SYS1.VTAMLST for the GUI-to-VTAM-Application-ID (VBUILD TYPE=APPL). The ACBNAME in the APPL statement must match the ACBNAME in the APPCPM*xx* entry (previous step) and the CM/2 SDN. (This is also a good point to verify that your installation APPC applications that will establish sessions through the OSA are defined to VTAM.)
5. To use the APPC GUI-to-host interface, add an entry in SYS1.VTAMLST for one of the following communication control unit types if the entry does not already exist :
   - If you are using OSA as an external communications adapter (XCA), proceed with the next step.
   - For all other communications controllers, such as a 3172, 3174, or 37*x*5, refer to the books on that type of controller for more information.
6. If you use an OSA-to-VTAM connection (VBUILD TYPE=XCA), you can use the same VTAM entry, which was used to define the OSA in the SNA mode, to establish an OSA/SF APPC GUI-to-host (CP-to-CP) session. Either a VTAM host Interchange Node or Network Node is required.

   If SNA 3270 emulation support is to be used from the workstation GUI to the host across the OSA, however, it is necessary to add a VTAM TYPE=SWNET entry with a GRPNM matching the OSA XCA node name. Refer to the OSA/SF user's guide for more information.

3.7.3.2 At the Workstation, Take These Steps

1. Configure one of the following on the workstation where the OSA/SF GUI interface is to run to support an APPC CP-CP session:
   - Personal Communications (PCOMM) 4.1 with the resolution to APAR IC14272.
   - Communications Manager/2 (CM/2) 1.1.

   In the SNA Feature List, CPI Communications Side Information, the Symbolic Destination Name (SDN) must match the ACBNAME in the host OSA/SF GUI VTAM APPL-ID and the host APPC LUADD entry.

   If SNA 3270 emulation support is to be used from the workstation, configure PCOMM or CM/2 with additional support for SNA 3270 emulation. Refer to the OSA/SF user's guide for more information.
2. Using the GUI OSA/SF online help panel *Create Another Host Icon* as a guide, build an OSA/SF host icon to support the CPIC protocol. (CPIC is synonymous with APPC in this case.) The SDN in the OSA/SF GUI icon must match the PCOMM or CM/2 SDN, the OSA/SF host APPC LUADD name, and the OSA/SF GUI VTAM TYPE=APPL ACBNAME. The host name in the icon is a user variable.

3.8 Controlling Access to OSA/SF (RACF)

OSA/SF uses the System Authorization Facility (SAF) interface to let you optionally control user access to its commands and–in an OS/390 or MVS/ESA environment–to the system data sets that OSA/SF uses. In the following OSA-specific planning information, RACF is assumed to be used. (If RACF is installed, OSA/SF requires that it be active.) For more information on RACF, refer to the manuals listed in the bibliography (page xviii).

OSA/SF supports these RACF levels of authority:

- **None**, which prevents a user ID from entering any OSA/SF command.
- **Read**, which allows a user ID to view the OSA address table and debugging information.
- **Update**, which allows a user ID to enter all OSA/SF commands and enter all the options except the Force and the Stop_disk_serving options.
- **Control**, which allows a user ID to enter all OSA/SF commands with all the options.

The OSA/SF commands are listed in the following tables, and are described in detail in the OSA/SF user's guide listed in the bibliography (page xv).

If OSA/SF is managing an OSA in an OS/390 or MVS/ESA environment and if you protect data sets, follow the same procedures that you use for other system data sets.

OSA/SF on OS/390 and MVS/ESA runs as a started task. So give OSA/SF access to the data sets which it uses and which are listed in the OSA/SF startup profile. Unless the data set names that are shipped have been renamed, therefore, give access to `'IOA.SYS1.*'`, `'IOA.CEC1.*'`, and `'IOA.SIOALMOD'`.

3.8.1 OSA/SF Tasks and Commands

Command	Task	RACF Facility	Level
Clear Debug	Clear the OSA/SF message log.	IOA.CLEAR.DEBUG	Control
Delete File	Delete a file.	IOA.DELETE.FILE	Control
Get Config	Get the ATM configuration data on an ATM OSA-2. This command can be issued only from the REXX interface.	IOA.GET.CONFIG	Read
Get Console Screen	Get a screen image from the virtual console in the OSA-1 disk server.	IOA.GET.SCREEN	Read
Get Debug with Replace	Being able to replace, get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, SNA message log, and ATM traces.	IOA.GET.DEBUG	Update
Get Debug without Replace	Without being able to replace, get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, SNA message log, and ATM traces.	IOA.GET.DEBUG	Read
Get File with Replace	Get a file with the Replace option.	IOA.GET.FILE	Control
Get File without Replace	Get a file without the Replace option.	IOA.GET.FILE	Update
Get Table	Get the entries of an OSA Address Table (OAT). This command can be issued only through IOACMD at the TSO/E command line.	IOA.GET.TABLE	Read
Install	Create and install (or activate) an OSA mode configuration.	IOA.INSTALL	Control
List File	List the file in a given directory of the OSA-1.	IOA.LIST.FILE	Update
Put File	Put a file.	IOA.PUT.FILE	Control
Put Table with Force	Update and store an OAT disregarding whether an entry is in use. This command can be issued only through IOACMD at the TSO/E command line.	IOA.PUT.TABLE	Control
Put Table without Force	Update and store an OAT only if an entry is not in use. This command can be issued only through IOACMD at the TSO/E command line.	IOA.PUT.TABLE	Update
Query	Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.	IOA.QUERY	Read
Remove Directory	Delete an empty directory of the OSA-1 disk server	IOA.REMOVE.DIR	Control
Send Command with Force	Send any file management command to the OSA-1 disk server, including the Dismount, Down, Unbind, and Unload commands	IOA.SEND.COMMAND	Control

Command	Task	RACF Facility	Level
Send Command without Force	Send a file management command to the OSA-1 disk server, except the following commands, which require the Force option: Dismount, Down, Unbind, and Unload.	IOA.SEND.COMMAND	Update
Set Parameters	Set the OSA LAN port parameters that are settable with OSA/SF.	IOA.SET.PARAMETERS	Control
Start Managing with Force	Start managing an OSA by this instance of OSA/SF even if that forces another instance of OSA/SF to stop management.	IOA.START.MANAGING	Control
Start Managing without Force	Start managing the specified OSA by this instance of OSA/SF without forcing another instance of OSA/SF to stop managing the same OSA.	IOA.START.MANAGING	Update
Stop Managing with Force	Stop managing an OSA by OSA/SF even if that means stopping the disk-serving function.	IOA.STOP.MANAGING	Control
Stop Managing without Force	Stop managing the specified OSA by OSA/SF without stopping the OSA-1 disk-serving function.	IOA.STOP.MANAGING	Update
Synchronize	Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.)	IOA.SYNC	Update

3.8.2 Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEF command with a class of FACILITY. Enter the fully qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples. For more information on the RACF commands, see the RACF commands books listed in the bibliography (page xviii).

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter: **RDEF FACILITY IOA.GET.TABLE**
- To define a profile to allow user IDs to enter this command, enter:

  RDEF FACILITY IOA.GET.TABLE UACC(READ)
- To allow the use of generics for a class of service facility, enter: **SETROPTS GENERIC FACILITY**
- To prevent unauthorized use of OSA/SF commands, enter: **RDEF FACILITY IOA.* UACC(NONE).** If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

3.8.3 Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or *, determines the authorization level of the user ID identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:

  PERMIT IOA.* ACCESS(READ) CLASS(FACILITY) ID(*)

- To assign authorization by Access level, for example, to authorize user ID RPAUL to access the Control level, enter: **PERMIT IOA.* ACCESS(CONTROL) CLASS(FACILITY) ID(RPAUL)**
- To authorize another user (GLASER) to enter all commands that require the update authorization, enter: **PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(GLASER)**
- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter: **PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(*)**
- To authorize ID PINGCHAN to enter any command requiring the Update control option, enter: **PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(PINGCHAN)**
- To authorize a specific profile name, for example, to authorize user ID JGOLDMAN to enter the Put Table command with or without the Force option, enter:

  PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(JGOLDMAN)

Chapter 4. OSA in a VM/ESA Environment

In a VM/ESA environment, an OSA can be run in the TCP/IP Passthru and SNA modes starting with VM/ESA 1.2.1. OSA/SF for VM/ESA is available starting with VM/ESA 2.2.0. HDPT ATM Native is available starting with VM/ESA 2.4.0.

4.1 Task Planning Checklist

__ 1. For each OSA, determine whether it will be run in the HDPT ATM Native mode, the TCP/IP Passthru mode only, the SNA mode only, or in both the TCP/IP Passthru and SNA modes concurrently. This decision underlies many of your planning activities.

__ 2. Ensure the pre- and co-requisites are met that are listed in the next section (page 66).

__ 3. For each OSA, define its channel path and its associated control unit in the system hardware I/O configuration. See page 21, page 70, and the hardware I/O configuration books listed in the bibliography (page xviii).

__ 4. Check whether OSA/SF is needed and available. OSA/SF is required for all OSA modes except the TCP/IP Passthru mode in limited conditions.

__ 5. Ensure the OSA/SF requisites are met that are listed in the next section (page 66) and in the applicable OSA/SF program directory, which is either the OSA/SF for VM/ESA program directory or the OSA/SF for MVS/ESA and OS/390 program directory, depending on the factors that are listed in the discussion that starts on page 70.

__ 6. For each OSA, define a device number with unit address = `X'FE'` in the system hardware I/O configuration in the logical partition in which its customizing OSA/SF will be running (page 25).

If the system is running in LPAR mode and if more than one instance of OSA/SF will be active concurrently, ensure that the OSA device number or numbers will be defined to be shared among logical partitions to which the OSA is defined (page 22).

__ 7. Determine the span of control for each instance, or copy, of OSA/SF (page 70).

__ 8. Decide which OSA/SF user interface or interfaces will be used (page 74).

__ 9. If the OSA/SF GUI interface (OS/2 or Windows) is to be used, establish a communications protocol between the workstation and S/390 system images to be used. See *VM/ESA: Open Systems Adapter Support Facility User's Guide,* that is listed in the bibliography (page xv). Download the OSA/SF interface (GUI) files and install them on the OS/2 or Windows platform.

__ 10. If RACF is to be used to control user access to OSA/SF commands and data sets, plan the RACF profiles that are described on page 78 and in the RACF books.

Note that RACF is not required, but if it is installed, it must be active when OSA/SF is active.

__ 11. Plan for OSA/SF installation and its operations.

- If OSA/SF for VM/ESA is to be used, installation is via SES. See page 75, the OSA/SF for VM/ESA program directory, and *VM/ESA: Open Systems Adapter Support Facility User's Guide.*
- If OSA/SF for MVS/ESA and OS/390 is to be used, see page 54.

__ 12. Plan for the HDPT ATM Native mode (page 163), TCP/IP Passthru mode (page 101) or the SNA mode (page 135) or both modes.

4.2 Requirements in a VM/ESA Environment

4.2.1 Hardware Requirements

An OSA that is attached to an appropriate network is required. Ensure the OSA is at the code level you need (page 19). If OSA/SF for VM/ESA is to be used, an OSA-2 is required and:

- Each OSA must be represented by a minidisk that contains the OSA's channel file. Allocate 5 cylinders of 3390 DASD, or equivalent, for each minidisk.
- To install the OSA/SF on VM/ESA, one of the following is needed: a CD-ROM; a 6250 bpi magnetic tape; a 34K 3480 tape cartridge; a 4mm cartridge.
- To establish a communications protocol between the workstation on which the OSA/SF OS/2 interface (GUI) and the S/390 OSA/SF, one of the following communication adapters is required. The adapter must be supported by OS/2 and the microprocessor:
  – EHLLAPI for 3270 communications protocol
  – TCP/IP communications protocol
  – APPC, or CPI-C, protocol for a node that supports LU 6.2
- If OSA/SF for VM/ESA OSA/SF GUI interface (OS/2 or Windows) is to be used:
  – A PC with a Pentium 200 Mhz (or equivalent) processor, 32 MB RAM, and an SVGA display with resolution of 1024x768x16 colors.

    You may be satisfied with OSA/SF GUI performance on the minimum processor required by your OS/2 or Windows operating system, but the GUI may not display correctly at a lesser resolution.

4.2.2 Programming Requirements

Only the *minimum program release levels* are listed. Service levels and higher release levels are assumed to be supported. For information on how to check an OSA code level, see page 19.

With few exceptions, APARs and the PTFs required for their resolution are too transient to be maintained in this book. For that information, refer to the applicable program directory and to the relevant preventive service planning (PSP) buckets. Check IBMLink (Service level) and use the Upgrade and Subset values.

- If OSA/SF for VM/ESA is being used, check the OSASF/220 subset ID in the VMESA210F PSP bucket.
- If OSA/SF for MVS/ESA and OS/390 is used, check the OSA110 and OSA120 PSP buckets.
- If OSA/SF for VSE/ESA is being used, check the OSA/SF/1G7 subset ID in the VSEESA221 PSP upgrade bucket.

4.2.2.1 For VM/ESA 1.2.1 through VM/ESA 2.1

- An OSA can be run in the TCP/IP Passthru and SNA modes, but OSA/SF support is required for the SNA mode and for port-sharing, which allows S/390 server programs in different logical partitions to share access to an OSA port.
- In the system hardware I/O configuration, define an OSA channel path as well as all device numbers used for data transfer as Type=OSA.
- Define a device number for communications between an OSA and OSA/SF as Type=OSAD.
- You do not need to define an OSA to VM/ESA because an OSA device identifies itself in response to the Sense ID CCW command.

- If you do define an OSA device in a VM/ESA release prior to VM/ESA 2.1, you must, however, define the OSA channel path as the 3088 type of CTCA in the VM/ESA system configuration file.
- Starting with VM/ESA 2.1, you can define the OSA channel path to VM/ESA as Type=OSA.
- If OSA/SF is used to control an OSA from VM/ESA 1.2.1 through VM/ESA 2.1, that instance, or copy, of OSA/SF must be running as either a base, non-exclusive element on OS/390 (page 45) or as a licensed program on MVS/ESA (page 49).

  Furthermore:

  – Until VM/ESA 2.1, the system must be running in LPAR mode with VM/ESA running in a different partition than the OSA/SF that is managing the OSA.

  – Starting with VM/ESA 2.1, an additional option is available to you. You can use an instance of OSA/SF that is running on any other system image when that system image is running as a VM/ESA guest.

4.2.2.2 Starting with VM/ESA 2.2.0

- For an OSA-2 an alternative is available to you. An OSA-2 can be supported by OSA/SF for VM/ESA, which is a VM/ESA 2.2.0 facility.

| **4.2.2.3 Starting with VM/ESA 2.4.0:** An OSA-2 is now available in HPDT ATM Native mode in
| VM.

4.2.2.4 VM/ESA as a Host to Guest System Images: If OSA/SF is running on a VM/ESA guest system image, you must define the OSA to the host VM/ESA system image as follows:

- Specify the same unit address for the guest and host systems for each device number that is required for the mode.
- Specify the same device number for OSA/SF in the guest and in the host. By definition, this must have `X'FE'` as its unit address.

An exception to these rules occurs if an MVS/ESA system image is the guest and the PTF resolution to OSA/SF for OS/390 and MVS/ESA APAR OW29182 has been applied to the guest. In that case, you can remap the channel path and device definitions.

Barring this exception, the CHPID must be the same one that is defined for it in the system hardware I/O configuration (IOCDS) so that you cannot generate an IOCDS from a guest (OS/390, MVS/ESA, VSE/ESA) system image.

Note: You must authorize the host VM/ESA to put OSA/SF in the VM/ESA guest's directory by specifying the RMCHINFO option in the OPTION Directory Control statement.

4.2.2.5 TCP/IP Passthru Mode

- Requires TCP/IP for VM 2.3 (5735-FAL).
- Requires the PTF resolution to OSA/SF for VM/ESA APAR OW30932 for a FENET OSA-2 to be run in this mode.
- Requires the PTF resolution to OSA/SF for VM/ESA APAR OW33394 for an expanded Passthru OAT entry that allows multiple Home IP addresses in the same inbound data path and both primary and secondary default inbound data paths to be specified in the appropriate Passthru OAT entries.

4.2.2.6 SNA Mode

- ACF/VTAM 4.2 for VM/ESA (5654-010) is required.
- The PTF resolution to OSA/SF for VM/ESA APAR OW30932 is required to support the expanded set of OSA mode port parameters (page 140).
- The PTF resolution to OSA/SF for VM/ESA APAR OW24952 is required to support the basic set of OSA mode port parameters (page 151).
- A maximum number of 255 PUs is supported for each physical port unless a maximum number of 2047 PUs is supported. To support a maximum of 2047 PUs, the PTF resolution to VM/ESA APAR 608877 is required plus the PTF resolutions for the various OSA-2s listed in the following items.
- For an ENTR or FDDI OSA-2, the PTF resolution to OSA/SF for VM/ESA APAR OW24952 is required to support a maximum number of 2047 PUs.
- For an ATM OSA-2, the PTF resolution to OSA/SF for VM/ESA APAR OW28966 is required to support a maximum number of 2047 PUs for the physical port.

  For such a large number of PUs, you must also consider that an ATM OSA-2 can only support up to 1000 switched virtual circuits (SVCs) as logical attachments to its physical port and not more than 1000 distinct MAC addresses on each of the emulated LANs (ELANs) for which it provides LAN emulation client (LEC) services. However, if only one LEC port is active on the ATM OSA-2, and multiple SAPs are defined over a single client's MAC address, up to 2047 connections can be logged on to that LEC port.
- On a FENET OSA-2, the PTF resolution to OSA/SF for VM/ESA APAR OW30932 is required for any OSA/SF supports.
- To support the expanded set of SNA session availability options (page 140), the PTF resolution to OSA/SF for VM/ESA APAR OW30932 is required.
- NetView V2 R3 (5756-051) is optionally supported. If OSA/SF for VM/ESA is being used:
  - On an ATM OSA-2, the NetView Program-to-Program Interface (NetView PPI) is supported if the PTF resolution to OSA/SF for VM/ESA APAR OW30932 is applied. Without this PTF, the Box Manager node is supported for the NetView CSCF. Note that the NetView PPI and CSCF are not supported concurrently.
  - On a FENET OSA-2, the NetView PPI is supported with the PTF resolution to OSA/SF for VM/ESA APAR OW30932. The Box Manager node is not supported.
  - On an ENTR or FDDI OSA-2, the Box Manager node is supported for the NetView CSCF. The NetView PPI is not supported.
- If OSA/SF for MVS/ESA and OS/390 is managing the OSA and you want NetView support, see the requirements listed on page 51.

| #### 4.2.2.7 HDPT ATM Native Mode

| - The PTF resolution to OSA/SF for VM/ESA APAR OW36927 is required.
| - TCP/IP 2.3.
| - VM/ESA 2.4.0.

4.2.2.8 OSA/SF for VM/ESA

- Requires VM/ESA 2.2.0 on which it runs as a facility that is distributed through SES.
- Can support RACF 1.9.2 (5740-XXH) to meet its SAF interface.
- With the application of the PTF resolution to OSA/SF for VM/ESA APAR OW28966, two functions are available at the OSA/SF REXX Exec interface that were previously only available with OSA/SF GUI. An ATM OSA-2 can be customized at this interface and OSA/SF automatically provides the group size for an OAT entry for an OSA mode for any OSA.
- If the OSA/SF OS/2 interface (GUI) is to be used, that interface requires either OS/2 or OS/2-J.

  If you use OS/2, OS/2 3.0 WARP plus one of the following communications protocols is required:

  – EHLLAPI (3270), which requires ACF/VTAM 4.2 for VM/ESA with the resolution to APAR VM59237 and the 3270 PC File Transfer Program (5664-281) on the host. On the workstation being used, one of the following is required: Personal Communications 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.11.

  – TCP/IP, which requires TCP/IP 2.3 for VM (5735-FAL) on the host and TCP/IP 2.0 for OS/2 on the workstation.

  – APPC (CPI-C), which requires ACF/VTAM 4.2 for VM/ESA on the host and one of the following on the workstation: Personal Communications 4.1 with the resolution to APAR IC14272 or Communications Manager/2 1.11.

  If you use OS/2-J, OS/2-J 3.0 WARP, the PTF resolution to OSA/SF for VM/ESA APAR OW28838, and one of the following communications protocols is required:

  – EHLLAPI (3270), which requires ACF/VTAM 4.2 for VM/ESA with the resolution to APAR VM59237 and the 3270 PC File Transfer Program (5664-281) on the host. On the workstation being used, one of the following is required: Personal Communications 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2-J 1.11.

  – TCP/IP, which requires TCP/IP 2.3 for VM (5735-FAL) on the host and TCP/IP 2.0 for OS/2 on the workstation.

  – APPC (CPI-C), which requires ACF/VTAM 4.2 for VM/ESA on the host and one of the following on the workstation: Personal Communications 4.1 with the resolution to APAR IC14272 or Communications Manager/2-J 1.11.

- If you use Windows 95, Windows 98, or Windows NT, one of the following communications protocols is required:

  – EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

  – TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.

  – APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

4.3 System Hardware I/O Configuration Definitions

To VM/ESA, define an OSA channel path with its connected, or attached, control unit plus the devices that are required by the OSA mode or modes in which the OSA is being run.

If you define an OSA to VM/ESA dynamically, you can use the VM/ESA dynamic I/O configuration commands, but the data is put in the HSA and will not be kept after the system is shut down. To keep data across IPLs, you must also define the OSA in the system hardware I/O configuration using IOCP statements. Shown below are the VM/ESA I/O configuration statements for OSA X'20'.

```
CP DEFINE CHPID 20 TYPE OSA SHARED ACC LPLEFT1 LPRIGHT1 INIT LPLEFT1 INIT LPRIGHT1
CP DEFINE CU F00 TYPE OSA CHPID 20
CP DEFINE DEVICE F00-F03 UNIT_A 00 CU F00 PAR LPLEFT1 LPRIGHT1
CP DEFINE DEVICE 1FE UNIT_A FE CU F00 PAR LPLEFT1 LPRIGHT1
```

For more information on the user input required, see the descriptions that start on page 21. For information on the VM/ESA statements, refer to the following books, which are listed in the bibliography (page xviii).

- *VM/ESA: Planning Dynamic I/O Configuration*
- *VM/ESA: CP Command and Utility Reference*

If you use OSA/SF to manage the OSAs,

- You can use OSA/SF for VM/ESA to manage an OSA-2 starting with VM/ESA 2.2.0 (page 70).
- Use OSA/SF for MVS/ESA and OS/390 to manage an OSA-2 on VM/ESA 1.2.1 up to VM/ESA 2.2.0.
- Use OSA/SF for MVS/ESA and OS/390 to manage an OSA-1 on any release that OSA supports.

If more than one copy of OSA/SF is running in a logical partition, at least one copy is running on a guest system in a VM/ESA host environment (page 73). Therefore:

- Specify the same unit address for the guest and host system for each device number that is required for the TCP/IP or SNA modes.
- Specify the same device number for OSA/SF in the guest and in the host. (By definition, this device number must have X'FE' as its unit address.)
- Specify the RMCHINFO option in the VM/ESA OPTION Directory Control statement to authorize the VM/ESA host to put OSA/SF in the applicable guest directories.
- Attach, or activate, only one copy of OSA/SF in a logical partition at a time.

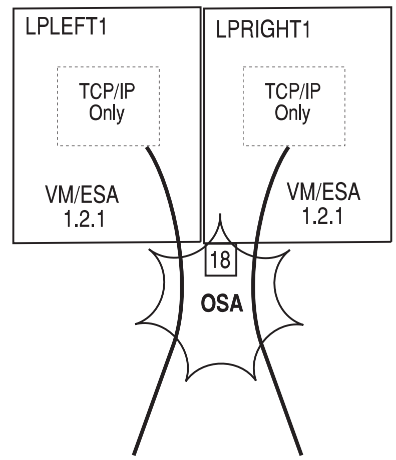
4.4 Evolution of OSA Management Since VM/ESA 1.2.1

An OSA can be defined to VM/ESA starting with VM/ESA 1.2.1. OSA/SF for VM/ESA support is available starting with VM/ESA 2.2.0.

4.4.1 Without OSA/SF Management

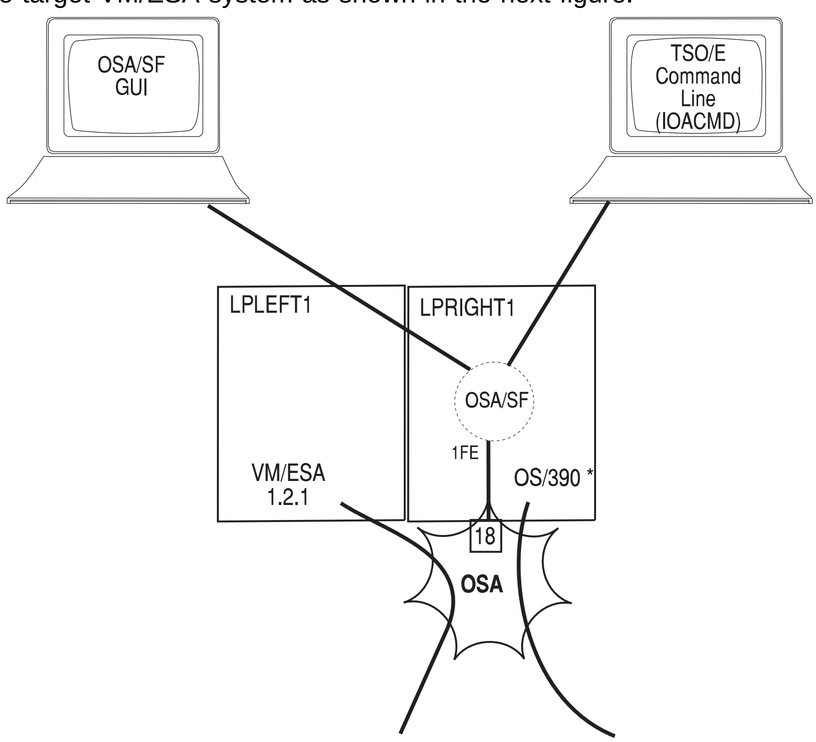
An OSA can be defined in a VM/ESA environment without requiring OSA/SF support.

As shown in the adjacent figure, however, such an OSA can only be run in the TCP/IP Passthru mode. Access to its ports cannot be shared by the TCP/IP host programs that have access to the OSA channel path.



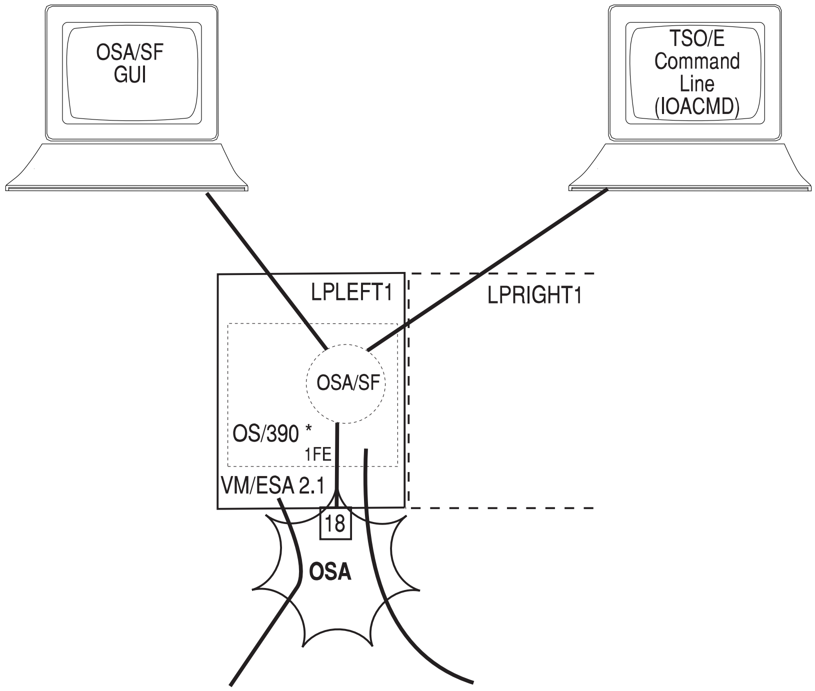
4.4.2 Starting with VM/ESA 1.2.1

An OSA can be managed by OSA/SF when the OSA is defined to a VM/ESA system that is running in a logical partition (LP) in a central processing complex (CPC) that is running in logically partitioned (LPAR) mode. With OSA/SF support, the OSA can now be run in either the TCP/IP Passthru mode or the SNA mode, or in both modes. However, the managing OSA/SF must be running as an OS/390 element, an MVS/ESA licensed application, or on an VSE/ESA image that supports OSA/SF for VSE/ESA, in a different LP than the target VM/ESA system as shown in the next figure.



4.4.3 Starting with VM/ESA 2.1

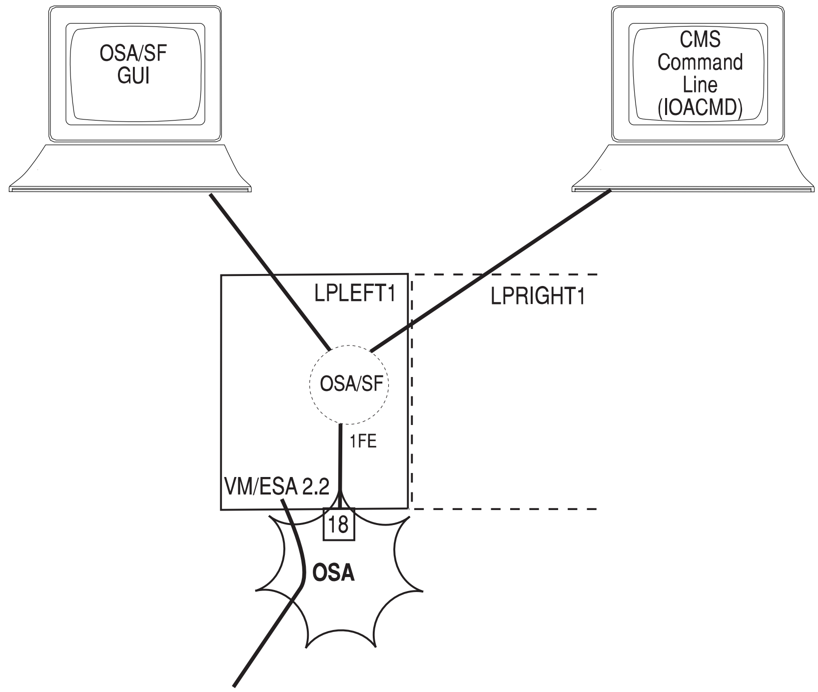
An OSA can also be managed by OSA/SF when OSA/SF is running on either OS/390 or MVS/ESA and that system is running as a guest in the VM/ESA environment. For device assignment rules, see page 70.



4.4.4 Starting with VM/ESA 2.2.0

OSA/SF for VM/ESA V2R2 is available in addition to the earlier OSA configurations in a VM/ESA environment. OSA/SF for VM/ESA is a VM/ESA facility that runs in its own OSA/SF server virtual machine (page 75).

- If the OSA channel path is not defined as shared, only the managing OSA/SF with a read/write path to the OSA's minidisk can receive a Stop Managing command for that OSA.
- If the OSA channel path is defined as shared, the OSA minidisk is secure only if you use CSE XLINK. The OSA/SF that gains control is the first OSA/SF that recognizes the OSA and receives a Start Managing command.
- Before another OSA/SF can gain control, the managing OSA/SF must receive a Stop Managing command. If that is not possible, the OSASF user ID should be logged off. If the system image cannot receive that command, the CSE XLINK Reset command will release the read/write path to the OSA's minidisk.
- OSA/SF for VM/ESA can be accessed through its OS/2 interface (GUI) and by those CMS user IDs that have been set up for the OSA/SF server virtual machine's ID (OSASF).

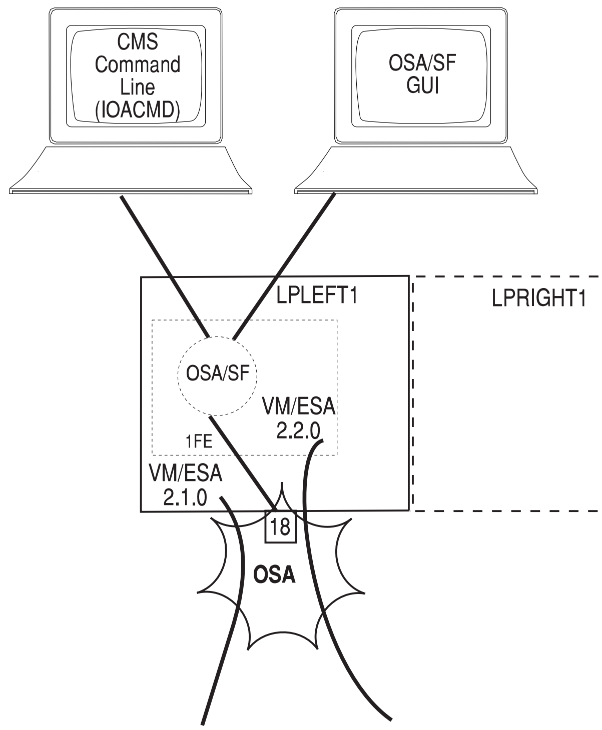


4.5 OSA/SF Running on a Guest in a VM/ESA Environment

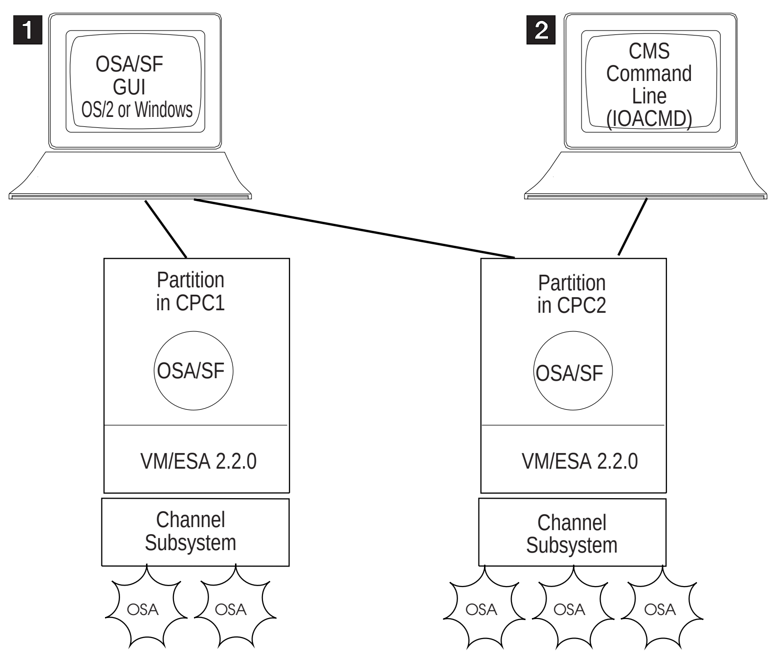
OSA/SF can run on OS/390, MVS/ESA, VM/ESA, or VSE/ESA when that system image is running as a guest in a VM/ESA environment.

The same guidelines apply to each guest. Note especially that:

- You must define the OSA to the VM/ESA host system image.
- You must authorize the host to put OSA/SF in the guest's directory by specifying the RMCHINFO option in the OPTION Directory Control statement (page 70).
- For a VSE/ESA guest, you must vary OSA devices and reconfigure OSA CHPIDs through the VM/ESA commands (page 95).
- For the requirements, see page 67.



4.6 Deciding Which OSA/SF Interface to Use



1 OSA/SF GUI interface (OS/2 or Windows)

- Allows you to establish an active host session with as many "host" OSA/SF sessions as the OS/2 or Windows interface recognizes. Potentially, therefore, this interface allows OSA/SF's span of control to cross CPC boundaries as shown in the preceding figure. The other OSA/SF interfaces allow OSA/SF to manage only those OSAs the instance of OSA/SF running on their host can recognize its system hardware I/O configuration.

- Can be used for HDPT ATM Native, TCP/IP Passthru, and SNA modes.
- Offers the advantages of an application running on an OS/2 or Windows platform at a programmable workstation, including interactive function panels with pull-down menus and online help panels.
- Consists of files that are downloaded to an OS/2 or windows platform from the host operating system on which OSA/SF is running.
- Can establish a session with any "host" OSA/SF running on any host operating system with which the workstation can establish an active host session.
- If you plan to use the OSA/SF GUI interface (OS/2 or Windows), you must establish a communications protocol between the workstation on which the OSA/SF GUI interface is running and the host system on which the S/390 component of OSA/SF is running.
  - For instructions on how to accomplish this task for OSA/SF for VM/ESA, see *VM/ESA: Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page xv).
  - For guidelines on how to accomplish this task for OSA/SF for MVS/ESA and OS/390, which can manage an OSA defined to VM/ESA, see the discussions in Chapter 3 for EHLAPPI (page 56), IP (page 57), and APPC (page 59).

2 REXX Execs at the CMS command line

- Can be used for HDPT ATM Native, TCP/IP Passthru, and SNA modes.
- Is required to customize an OSA in the SNA mode when OSA/SF for VM/ESA is being used and you want to use the OSA as the communications controller between the host and OSA/SF GUI.
- Controls only those OSAs defined to the same host as the managing OSA/SF.

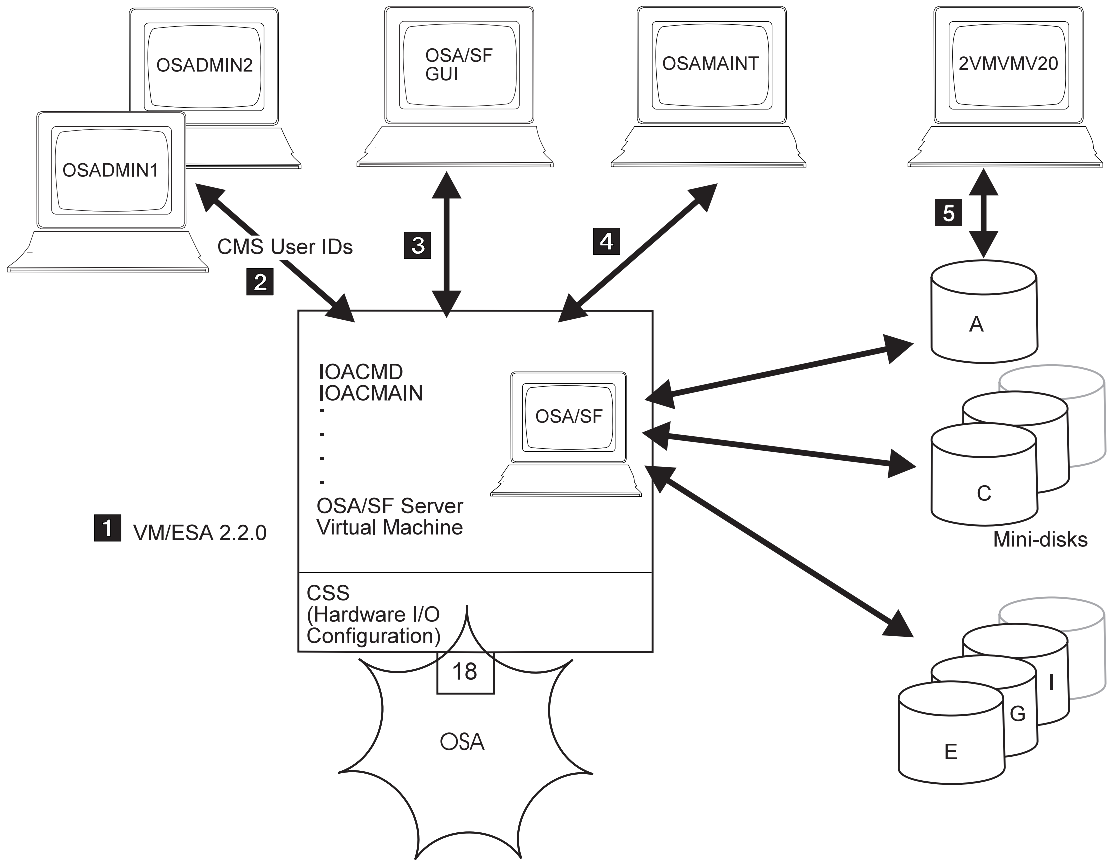
4.7 Planning for OSA/SF for VM/ESA Operations

OSA/SF for VM/ESA, which is shipped via SES as a facility starting with VM/ESA 2.2.0, allows you to customize an OSA-2 to run in the TCP/IP Passthru and SNA modes. An OSA/SF APAR is available to customize an OSA-2 ATM in ATM Native mode.

OSA/SF for VM/ESA runs in its own OSA/SF server virtual machine that:

- Runs automatically unless it is shut down with the OSA/SF Shutdown command (page 78).
- Is disconnected until it receives an OSA/SF command that causes the server to be dedicated to that command.

4.7.1 General Tasks



1 In a VM/ESA 2.2.0 environment, assign the OSASF user ID to run the OSA/SF server virtual machine. OSA/SF for VM/ESA is shipped with a sample $SERVER$ NAMES file that contains this default user ID.

If an OSA-2 is being run in the SNA mode and you want to ensure that alerts are always recorded on OSASF, make sure the following steps are taken.

- The OSASF server machine is added to the autolog list of VM/ESAs brought up during system IPL.
- The PROFILE EXEC on OSASF must have the following two lines edited in:

  'LOADMOD IOACMAIN'
  'START'

- Make the OSASF virtual machine exempt from inactivity forcing in a manner similar to PVM and RSCS.

2 To set up a CMS user ID, which access OSA/SF at the CMS Ready state, you must set up the server machine in the CMS user ID's UCOMDIR NAMES file. You must also add the CMS user ID in the OSA/SF $SERVER$ NAMES file. An example is shown below. For more information, refer to the VM/ESA books listed in the bibliography (page xviii).

- To set up the UCOMDIR NAMES file of CMS user ID ***OSADMIN1*** to contain the nickname of the OSA/SF service machine IOASERV:

```
:nick.IOASERVR :luname.*userid OSASF
                :tpn.IOASERV
```

- Conversely, to add the CMS user ID ***OSADMIN1*** in the OSA/SF $SERVER$ NAMES file:

```
:nick.IOASERV :list.OSADMIN1
             :module.IOACMAIN
```

3 Ensure a communications protocol has been established with the platform on which OSA/SF GUI is to run, and download the OSA/SF GUI files. OSA/SF GUI is recommended for all OSA-2s (page 74).

For information on how to establish a communications protocol using an OSA in the SNA mode, refer to *VM/ESA: Open Systems Adapter Support Facility,* which is listed in the bibliography (page xv).

4 Assign OSAMAINT as the CMS user ID to which OSA/SF for VM/ESA sends its dumps and trace records. Do not change this ID.

5 At installation, establish a user ID to download data, including PTFs, to the disks that OSA/SF for VM/ESA uses. The default ID is ***2VMVM20***.

C Allocate 1 minidisk to represent each OSA that is defined to the CPC where OSA/SF for VM/ESA will run.

- Allocate 5 cylinders (3390 DASD) for each minidisk, and define it as ***70****cc*, replacing *cc* with the OSA-2 CHPID. Get the OSA CHPID from the *Placement Report* or *CHPID Report* produced by the IBM Configuration (CFSYSTEM) or the *Systems Assurance Product Review*, which may be available from your OSA marketing representative.
- If the OSA-2 channel path is defined as being shared among logical partitions, define the minidisks on Cross System Extensions (CSE) DASD.
- If an error has occurred in allocating the OSA minidisk, OSA/SF sends an error message to the VM/ESA error log, which can be handled in accordance with general VM/ESA procedures.

A **E** **G** **I**
Allocate additional space for, for example, the (A) OSASF's A disk, (B) OSA/SF production files, (G) cross-partition files, and (I) OSA/SF images. Refer to the OSA/SF for VM/ESA program directory for the number of cylinders needed.

4.7.2 Notes on Handling Problems with OSA/SF

Handling problems with running OSA/SF follows the system procedures generally used for a VM/ESA facility. However, OSA/SF can also display OSA-related data, such as messages and dumps, that are not related to OSA/SF operations. It sends this data to the OSAMAINT ID that you have set up.

- If a problem seems to have occurred, make sure the managing OSA/SF is identified (page 70).

  If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed. A CMS user ID can issue the Query command.

- Check for OSA/SF messages, which are in the format of IOA*xyyyz*, where *x* denotes the OSA/SF component, *yyy* is the sequence number and *z* signifies the severity of the condition.

  These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.

- Tracing is a default operation for OSA/SF. You can, therefore, get the trace log by using the Get Debug command and specifying Trace log.

- OSA/SF can also be dumped as part of a system dump, which is sent to the OSA/SF OSAMAINT ID. its contents can be dumped as part of a system dump. When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of an system dump. Refer to the system books listed in the bibliography for more information.

4.8 Controlling Access to OSA/SF for VM/ESA (RACF)

OSA/SF uses the System Authorization Facility (SAF) interface to let you optionally control user access to its commands. In the following OSA-specific planning information, RACF is assumed to be used. (If RACF is installed, OSA/SF assumes it is active.) For more information on RACF, refer to the manuals listed in the bibliography (page xviii).

If OSA/SF for VM/ESA is being used, authorize OSA/SF (OSASF user ID) to issue RACROUTE requirements as indicated in the following list.

1. Update the CP directory entry for the OSASF user ID to include an inter-user communication vehicle (IUCV) line that allows communications with the RACF service machine. Use either ANY or the name of the RACF VM/ESA server machine.

   ```
   IUCV any_or_racf_server_machine PRIORITY MSGLIMIT 255
   ```

2. If not already defined, define a profile with the name ICHCONN in the class Facility:

   ```
   RAC RDEFINE FACILITY ICHCONN UACC(NONE)
   ```

3. Authorize OSA/SF to issue RACROUTE requests:

   ```
   RAC  PERMIT ICHCONN CLASS(FACILITY) ID(OSASF) ACCESS(UPDATE)
   ```

4. If the Facility class is not active, activate it:

   ```
   RAC SETROPTS CLASSACT(FACILITY)
   ```

OSA/SF supports the None, Read, Update, and Control RACF levels of authority. The minimum authority level that is required for each command is listed in the next table. More information on the commands is provided in *VM/ESA: Open System Adapter Support Facility User's Guide,* which is listed in the bibliography (page xv).

Command	**Task**	**RACF Facility**	**Level**
Clear Debug	Clear the OSA/SF message log.	IOA.CLEAR.DEBUG	Control
Get Config	Get the ATM configuration data on an ATM OSA-2. This command can only be issued through IOACMD at the CMS command line.	IOA.GET.CONFIG	Read
Get Debug	Get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, and SNA message log.	IOA.GET.DEBUG	Read
Get Table	Get the entries of an OSA Address Table (OAT). This command can be issued only through IOACMD at the CMS command line.	IOA.GET.TABLE	Read
Install	Create and install (or activate) an OSA mode configuration.	IOA.INSTALL	Control
Put Table with Force	Update and store an OAT disregarding whether an entry is in use. This command can be issued only through IOACMD at the CMS command line.	IOA.PUT.TABLE	Control

Command	Task	RACF Facility	Level
Put Table without Force	Update and store an OAT only if an entry is not in use. This command can be issued only through IOACMD at the CMS command line.	IOA.PUT.TABLE	Update
Query	Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.	IOA.QUERY	Read
Set Parameters	Set the OSA LAN port parameters that are settable with OSA/SF.	IOA.SET.PARAMETERS	Control
Shutdown	Shuts the OSA/SF virtual server machine down, releases all OSA/SF resources, and logs the OSA/SF server virtual machine off. The OSA/SF server virtual machine is automatically restarted by any subsequent OSA/SF command. This command can only be issued through IOACMD at the CMS command line.	IOA.SHUTDOWN	Control
Start Managing	Start managing an OSA by this instance of OSA/SF even if that forces another instance of OSA/SF to stop management.	IOA.START.MANAGING	Control
Stop Managing	Stop managing the specified OSA by OSA/SF.	IOA.STOP.MANAGING	Update
Synchronize	Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.)	IOA.SYNC	Update

4.8.1 Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEF command with a class of FACILITY. Enter the fully qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples. For more information on the RACF commands, see the RACF commands books listed in the bibliography (page xviii).

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter: **RDEF FACILITY IOA.GET.TABLE**
- To define a profile to allow user IDs to enter this command, enter:

  RDEF FACILITY IOA.GET.TABLE UACC(READ)
- To allow the use of generics for a class of service facility, enter: **SETROPTS GENERIC FACILITY**
- To prevent unauthorized use of OSA/SF commands, enter: **RDEF FACILITY IOA.* UACC(NONE)** If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

4.8.2 Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or *, determines the authorization level of the user ID identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:

  PERMIT IOA.* ACCESS(READ) CLASS(FACILITY) ID(*)

- To assign authorization by Access level, for example, to authorize user ID NAMEROW to access the Control level, enter:

  ```
  PERMIT IOA.* ACCESS(CONTROL) CLASS(FACILITY) ID(NAMEROW)
  ```

  And, to authorize another user (SALLY) to enter all commands that require the update authorization, enter:

  ```
  PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(SALLY)
  ```

- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter:

  ```
  PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(*)
  ```

- To authorize ID RAICHER to enter any command requiring the Update control option, enter:

  ```
  PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(RAICHER)
  ```

- To authorize a specific profile name, for example, to authorize user ID OMAR to enter the Put Table command with or without the Force option, enter:

  ```
  PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(OMAR)
  ```

Chapter 5. OSA in a VSE/ESA Environment

Starting with VSE/ESA 2.2.1, an OSA-2 can be defined in a VSE/ESA environment and customized, or configured, to be run in the OSA SNA mode, the TCP/IP Passthru mode, or in both modes concurrently.

In this chapter, guidelines are provided to help you plan for an OSA-2 in the VSE/ESA environment within the context of this OSA-centric book. For more information on VSE/ESA, refer to the VSE/ESA books listed in the bibliography (page xix).

A few words about some terms. In the other chapters of this book, partition is used interchangeably with logical partition (LP). Both terms are used not only in the context of a hardware system that is running in logically-partitioned (LPAR) mode, but are also used to include a system in basic mode unless a statement exempting that system is made.

In this chapter on VSE/ESA, the following terms are used.

- *Basic mode* is the mode in which a hardware system is running when it is not in LPAR mode and therefore has no logical partitions.
- A *logical partition* (LP) is a division of the hardware system in which a system image is running when the hardware system is running in logically partitioned (LPAR) mode.
- *Native* signifies that a VSE/ESA system image is running on a hardware system that is in basic mode.
- *Native in LPAR mode* signifies that a VSE/ESA system is running on a hardware system that is in LPAR mode.
- A *VSE/ESA partition* is either a static or dynamic partition of the VSE/ESA system image.

5.1 Task Planning Checklists

Two checklists are provided: one for OSA and one for OSA/SF for VSE/ESA. In addition, system-independent checklists are provided for the TCP/IP Passthru mode (page 101) and the SNA mode (page 136).

5.1.1 General Checklist

__ 1. Ensure the hardware and programming requirements for each OSA-2 are met (page 84).

__ 2. Ensure the hardware requirements for each OSA-2 port, which are described in Chapter 2, are met.

Each FDDI OSA-2 and FENET OSA-2 has one port (port 0). Each ENTR OSA-2 has two ports (ports 0 and 1). For the TCP/IP Passthru and SNA modes, an ATM OSA-2 provides LAN emulation client (LEC) services through its two LEC, or logical, ports 0 and 1.

__ 3. If you intend to set a locally-administered medium access control (MAC) address for an OSA port, consider doing so when the OSA-2 is installed because the OSA channel path must be reconfigured (reset) to activate the change.

- You can set a local MAC address for any OSA port using OSA/SF. The PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required for an ENTR, FDDI, or FENET OSA-2 port.

  Refer to the information on page 210 and to *OSA/SF for VSE/ESA User's Guide,* which is listed in the bibliography (page xix).
- You can set a local MAC address for an ENTR, FDDI, or FENET OSA-2 port using the standalone support element or single object operations via the hardware management console.

Refer to the information on page 210 and the CMOS books that are listed in the bibliography.

__ 4. Ensure the frame protocol to be used in each OSA mode is supported by the OSA-2 to be used. See page 97 (TCP/IP Passthru mode) and page 135 (SNA mode).

__ 5. Decide whether OSA/SF will be used. OSA/SF is required for an ATM OSA-2 and recommended for all OSAs.

To be run in the TCP/IP Passthru mode, an ENTR, FDDI, or FENET OSA-2,however, does not require OSA/SF if access to the OSA ports is not to be shared among logical partitions, the OSA is to be run only in the TCP/IP Passthru mode, and no default inbound data paths are to be defined for it.

__ 6. If OSA/SF is to be used, decide which instance, or copy, will be used, and plan for its installation and use.

- OSA/SF for VSE/ESA allows you to use OSA/SF on a VSE/ESA system image. A separate planning checklist for OSA/SF for VSE/ESA is provided in this chapter (page 83).

  If you intend to use OSA/SF for VSE/ESA and the VSE/ESA system image is running as a guest in a VM/ESA environment, refer to page 66 for additional information.

- If you use OSA/SF on OS/390 or MVS/ESA to customize an OSA-2 that is defined to a logical partition in which VSE/ESA is running, refer to the information on this program in Chapter 3.

- If you use OSA/SF for VM/ESA to customize an OSA-2 defined to a logical partition in which VSE/ESA is running, refer to OSA/SF for VM/ESA information in Chapter 4.

__ 7. Define each OSA CHPID with its associated logical control unit number and devices in the system hardware I/O configuration (IOCDS) using IOCP statements (page 89).

__ 8. If an ATM OSA-2 is to be used, use OSA/SF to customize each LAN emulation client (LEC) port to be used to provide LEC services on the ELAN to be used.

__ 9. To customize an OSA to be run in the TCP/IP Passthru mode:

a. Define one pair of logical device numbers in the system hardware I/O configuration and to VSE/ESA (page 90) for each OSA port involved. These pairs of devices can be shared across logical partitions if the OSA channel path is defined to be shared by those logical partitions.

b. Define the OSA in each TCP/IP for VSE/ESA initialization member to be used.

c. Either use the IBM-supplied TCP/IP Passthru OAT entries or create appropriate ones if you define a default inbound data path or specify that access to this OSA port will be shared either by more than one S/390 program (page 6).

d. Activate the Passthru OAT on the OSA-2 if you created an OAT entry using OSA/SF, taking care to configure the OSA channel path and its devices off and on. See the *OSA/SF User's Guide,* which is listed in the bibliography (page xvii).

__ 10. To customize an OSA to be run in the SNA mode:

a. Define one logical device number in the system hardware I/O configuration (page 89) and to VSE/ESA (page 90) for each OSA port involved. This device can be shared across logical partitions if the OSA channel path is defined to be shared by those logical partitions.

b. Define the VTAM nodes involved in the SNA communication. Take care to match the OSA-related parameters that are specified in the hardware I/O configuration and OSA/SF.

c. Create an OAT SNA entry for each OSA port and logical partition, or system in basic mode.

d. If you want this OSA to be monitored in the SNA mode by an SNA network management service, such as NetView, make sure the relevant requirements listed for the SNA mode are met, and refer to Chapter 11 for more information.

e. Review the SNA port timers (page 140 and page 151). Change them if needed.

f. Activate the SNA image on the OSA taking care to configure the OSA channel path and its devices off and back on. See *OSA/SF User's Guide* which is listed in the bibliography (page xvii).

5.1.2 OSA/SF for VSE/ESA Checklist

__ 1. Decide which OSA/SF interface to use and make sure its requirements are met (page 86).

__ 2. Make sure the requirements for each function or OSA mode are met.

__ 3. Create the appropriate OAT entries.

__ 4. Plan to control user access to the OSA/SF commands. Use the access control table DTSECTAB that is described in *VSE/ESA Administration* which is listed in the bibliography (page xix).

Here is a list of the OSA/SF commands that are supported by OSA/SF for VSE/ESA. For information on the syntax and usage of these commands, see *VSE/ESA OSA/SF User's Guide* which is listed in the bibliography (page xvii).

Command	Task
Clear Debug	Clear the OSA/SF message log.
Get Config	Get the ATM configuration data on an ATM OSA-2. This command can be issued only with an IOACMD job (page 90).
Get Debug	Get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, and SNA message log. From an ATM OSA-2, also get the ATM trace and ATM memory dump.
Get OAT|Table	Get the entries of an OSA Address Table (OAT). This command can be issued only with an IOACMD job (page 90).
Install	Create and install (or activate) an OSA mode configuration.
Put OAT|Table with Force	Update and store an OAT disregarding whether an entry is in use. This command can be issued only with an IOACMD job (page 90).
Put OAT|Table without Force	Update and store an OAT only if an entry is not in use. This command can be issued only with an IOACMD job (page 90).
Query	Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.
Set Parameters	Set the OSA LAN port parameters that are settable with OSA/SF. (On the OS/2 interface, or GUI, this function underlies the Set pushbuttons.)
Start Managing	Start managing an OSA by this instance of OSA/SF.
Stop Managing	Stop managing the specified OSA by OSA/SF.
Synchronize	Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.)

__ 5. If OSA/SF for VSE/ESA is used, ensure that its installation and operational requirements are met (page 86).

__ 6. Plan to manage problems that can occur using OSA/SF. Follow the system procedures that you use for a VSE/ESA system. Note that OSA/SF can display OSA-related data, such as messages and dumps.

- If a problem has apparently occurred, make sure the managing OSA/SF is identified.

If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed using the OSA/SF Query command.

- Check for OSA/SF messages, which are in the format of IOA*xyyyz*, where *x* denotes the OSA/SF component, *yyy* is the sequence number and *z* signifies the severity of the condition.

  These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.

- Tracing is a default operation for OSA/SF. If a trace is needed, the IBM support center will request that you get the trace log by using the Get Debug command and specifying Trace log.

- When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of a system dump. Refer to the VSE books listed in the bibliography for more information.

5.2 Requirements in a VSE/ESA Environment

The requirements for an OSA in a VSE/ESA environment are listed under three headings in this chapter: OSA-2 requirements, VSE/ESA system requirements, and OSA/SF for VSE/ESA requirements. For more information, refer to the VSE/ESA books listed in the bibliography (page xix).

5.2.1 OSA Requirements

- OSA-2 hardware and user-cabling requirements are described in Chapter 2.
- Frame protocol requirements and maximum number of users are listed on page 97 (TCP/IP Passthru mode) and page 135 (SNA mode)
- If the VSE/ESA OS/2 interface (GUI) is to be used, communications with the OSA/SF host component requires a communication adapter that is supported by OS/2 and the workstation microprocessor to support the EHLLAPI for 3270 communications protocol.
- OSA/SF OS/2 interface (GUI) requires:
  - A workstation with at least an 80386SX, 16MHz microprocessor. (An 80486 microprocessor is recommended.)
  - Sufficient memory to support IBM Operating System/2 3.0, or later. (8MB or more of memory is recommended.)
  - Approximately 14MB of free disk space to download the OSA/SF GUI files to, and unpack them on, the workstation. About 4MB of these files can then be erased. About 9MB remains as a requirement to run OSA/SF GUI.
- You will need to use the standalone support element or single object operations via the hardware management console to reconfigure (reset) an OSA-2 channel path and its devices. If a VSE/ESA system image is running as a guest under VM/ESA, the host VM/ESA's CHPID management support can be used.

5.2.2 VSE/ESA Requirements

Minimum system level is VSE/ESA 2.2.1.

- OSA/SF is a component of VSE/ESA Central Functions 6.1.1 for VSE 2.2.1, and of VSE/ESA Central Functions 6.3 for VSE/ESA 2.3.
- Service levels and higher release levels are assumed to be supported. Although some key APAR numbers are listed, a complete list is not provided in this book.

- For more information, refer to the OSA/SF on VSE/ESA preventive service planning (PSP) buckets, Use either the OSA/SF/1G7 PSP subset ID of the VSEESA221 upgrade PSP bucket or check IBMLink (Service level) and use those Upgrade and Subset values.
- Note that TCP/IP for VSE/ESA 1.3 is integrated in VSE/ESA 2.3.

OSA/SF instances that can be used:

- OSA/SF for VSE/ESA can be used. For the SNA mode, the minimum level is OSA/SF for VSE/ESA as a component of VSE/ESA Central Functions 6.1.1 for VSE/ESA 2.2.1. For the SNA mode, the minimum level is OSA/SF for VSE/ESA as a component of VSE/ESA Central Functions 6.3 for VSE/ESA 2.3.
- OSA/SF for MVS/ESA and OS/390 1.2 can be used.
- OSA/SF for VM/ESA 2.2 can be used.

For the SNA mode:

- VTAM 4.2 (5686-065) with the PTF UD50298 resolution to APARs DY44152 and DY44300 is required.
- The PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required to support the expanded set of SNA mode port parameters (page 140).
- A maximum number of 2047 PUs is supported for an OSA-2 if the PTF resolution to VSE APAR DY44347 is applied plus the appropriate OSA/SF for VSE/ESA APARs as listed in the following items.
- NetView is optionally supported.
  - NetView for VSE/ESA 2.3 (5686-055) is required for an ATM OSA-2 or FENET OSA-2 to support the NetView program-to-program interface (PPI). The PTF resolution to OSA/SF for VSE PQ11504 is also required. If this PTF is applied, the Box Manager node for NetView CSCF is not supported.
  - NetView for VSE/ESA 2.3 (5686-055) is required for the Box Manager node support that is required for NetView CSCF. This is the only NetView support available on an ENTR or a FDDI OSA-2. It is available on an ATM OSA-2 only if the PTF resolution to OSA/SF for VSE/ESA PQ11504 is *not* applied. It is not available on a FENET OSA-2.
- For a FDDI OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ03091 is required to support a maximum number of 2047 PUs.
- For an ENTR OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ03091 is required to support a maximum number of 2047 PUs.
- For an ATM OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ06993 is required.

  If more than 255 PUs are to be supported, also consider that an ATM OSA-2 can only support up to 1000 switched virtual circuits (SVCs) as logical attachments to its physical port and up to 1000 unique MAC addresses on each emulated LAN (ELAN) for which it provides LAN emulation client (LEC) services. However, if only one LEC port is active on an ATM OSA-2 and multiple SAPs have been defined over a single client's MAC address, up to 2047 connections can be logged on to that LEC port.
- For an FENET OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required for any OSA/SF supports.

For the TCP/IP Passthru mode:

- TCP/IP for VSE/ESA 1.3 is required.
- If OSA/SF for VSE/ESA is to be used, the PTF resolution to OSA/SF for VSE/ESA APAR PQ06993 must be applied.

- The PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required for an FENET OSA-2 to be run in this mode.
- The PTF resolution to OSA/SF for VSE/ESA APAR PQ16071 is required for an expanded Passthru OAT entry, which allows multiple Home IP addresses to be specified in the same inbound Passthru entry, which is the Passthru entry that you specify, as well as both primary and secondary default inbound data paths to be specified in the TCP/IP Passthru mode (page 100).

5.2.3 OSA/SF for VSE/ESA Requirements

OSA/SF for VSE/ESA is delivered as a central function of VSE/ESA starting with VSE/ESA 2.2.1. For more information than provided in this chapter, refer to *OSA/SF User's Guide for VSE/ESA* which is listed in the bibliography (page xvii).

5.2.3.1 Corequisite: The “VSE C Language Run-Time Support“, which is part of the IBM Language Environnment (LE), is required. LE is automatically shipped and installed with VSE/ESA 2.3. Prior to VSE/ESA 2.3, it is delivered on the VSE/ESA optional product “IBM Language Environment for VSE 1.4 (LE/VSE)“ (5686-094).

5.2.3.2 OSA/SF GUI Requirements: Either OS/2 or OS/2-J is required. Although the CICS (MVS/VSE) File Transfer Program V2 (APVUFILE), product number 5799-PGZ is required for EHLAPPI, that FTP is included in VSE/ESA 2.2.1.

If OS/2 is used, OS/2 3.0 (WARP) is required plus EHLLAPI as the communications protocol. EHLLAPI requires VTAM 4.2 running on the VSE/ESA system image and one of the following on the workstation being used:

- Communications Manager/2 1.11.
- Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272.

If OSA/2-J is used, OS/2-J 3.0 (WARP) is required plus the PTF resolution for OSA/SF for VSE/ESA APAR PQ07521. EHLLAPI (3270) is required as the communications protocol, which requires Communications Manager/2-J 1.11 on the workstation being used and VTAM 4.2 on the VSE/ESA system image.

5.2.3.3 OSA/SF REXX Requirements: The PTF resolution to OSA/SF for VSE/ESA APAR PQ06993 provides two functions at the OSA/SF REXX Exec interface that were previously only available with OSA/SF GUI. An ATM OSA-2 can now be customized at this interface, and OSA/SF automatically provides the group size in an OAT entry. (Without this PTF, you have to enter group size = 2 for the TCP/IP Passthru mode and group size = 1 for the SNA mode if you use the REXX Exec.)

5.2.3.4 DASD Requirements

- The storage requirements for PRD2.PROD, which is the library that is recommended for OSA/SF data and work files, depends on your configuration.
- The storage requirements for the executable OSA/SF for VSE/ESA code in PRD2.PROD are listed in the following table.

	Library blocks	3375 cylinders	3380 cylinders	3390 cylinders	9345 cylinders	FBA blocks
Minimum	10851	37	24	22	26	21702
Recommended	13021	44	28	26	31	26042

5.2.3.5 VSE/ESA Partition Requirements: The following storage is required for OSA/SF for VSE/ESA to run in either a static or dynamic VSE/ESA partition. These numbers reflect a system that has the maximum number of OSA features installed.

OSA/SF Job Name	VSE/ESA Partition Requirements	
IOAMAIN	ALLOC=9.0MB, SIZE=0.6MB, GETVIS=8.4MB	Note 1
IOACMD	ALLOC=8.5MB, SIZE=1.1MB, GETVIS=7.4MB	
IOAHRUN	ALLOC=2.5MB, SIZE=0.2MB, GETVIS=2.3MB	Note 2

Notes:

1. The size of the IOAMAIN job, which is always required, depends on the number of OSA-2s defined. The maximum size is listed.
2. The IOAHRUN job is started automatically if and when the OSA/SF OS/2 interface (GUI) communicates with IOAMAIN.

5.2.3.6 Installation Requirements: Note that OSA/SF for VSE/ESA must be stored in PRD2.PROD. You must also define a working sublibrary for the OSA/SF data and work files. It is recommended that you use the name ***PRD2.OSASF***.

1. Start with the *VSE/ESA Function Selection* panel, select ***Installation - V2 Format*** followed by ***Prepare for Installation.*** This dialog creates a job stream that scans the VSE/ESA optional programs distribution tape and reports the library space that is required. For information on this dialog, refer to *VSE/ESA Administration,* which is listed in the bibliography (page xix).
2. Start with the *VSE/ESA Function Selection* panel, select ***Installation - V2 Format*** followed by ***Install Program(s) from Tape.*** This dialog displays a full list of the products and components on the tape. For OSA/SF for VSE/ESA, it lists the recommended target library. If the following library names are *not* shown, amend them:

   ```
   Library name ...... PRD2
   Sublibrary name ... PROD
   ```

   Complete the dialog by pressing Process (PF5) to create a job stream that runs the OSA/SF for VSE/ESA installation.
3. Define the library for OSA/SF for VSE/ESA data and work files via LIBR as follows: `DEF S=PRD2.OSASF`
4. Activate OSA/SF for VSE. Refer to *VSE/ESA Central Functions Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page xvii).

To install the OSA/SF for VSE/ESA OS/2 interface (GUI), refer to *VSE/ESA Central Functions Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page xvii). However, if you use an OSA as the communication controller, bear the following points in mind.

- The OSA must adhere to the requirements for OSA/SF GUI (page 84).
- The OSA must first be customized in the SNA mode.

  If you do not have OSA/SF GUI available on a workstation that you can use, you must use the OSA/SF SNA Exec, which is documented in the OSA/SF User's Guide (page xvii). Additionally, you must run either an IOACMD job.OSA must be set up through VTAM. In addition to the statements shown for the following example, you will need to add a VTAM application for ***OSAMACB*** as described in *VSE/ESA Central Functions Open Systems Adapter User's Guide* which is listed in the bibliography (page xvii).

5.3 An Example to Show How the Definitions Fit Together

In the following hypothetical example, the relationships among the OSA-related definitions are demonstrated.

Here are the assumptions for the example.

1. An ENTR OSA-2 has been installed and is available in CHPID slot X'84'. For a description of an ENTR OSA-2, refer to page 26.
2. VSE/ESA 2.2.1 is running natively in logically partitioned (LPAR) mode and is defined to only two logical partitions (LPs): LPLEFT (LP 1) and LPRIGHT (LP 2).

   Both (all) the LPs are defined to be shared by the OSA. If a processor contains more LPs that would be defined for OSA, you would define the LPs that are defined for OSA in a candidates list (page 22).
3. Each port of the OSA is attached through its lower (TR) RJ-45 connector to a different token-ring LAN segment. This means they can be specified as participating members of the same SNA session enhancement group (page 154).
4. The system is running in logically-partitioned (LPAR) mode and the CHPID (X'84') is defined to be shared between the only two logical partitions (LPs) that the CPC has (LPLEFT and LPRIGHT).
5. Although a block of 16 device numbers, which starts with X'0960' is assigned to this CHPID, only the device numbers for the TCP/IP Passthru mode through both ports, the SNA mode through port 1, and the device for OSA/SF communications are discussed here.

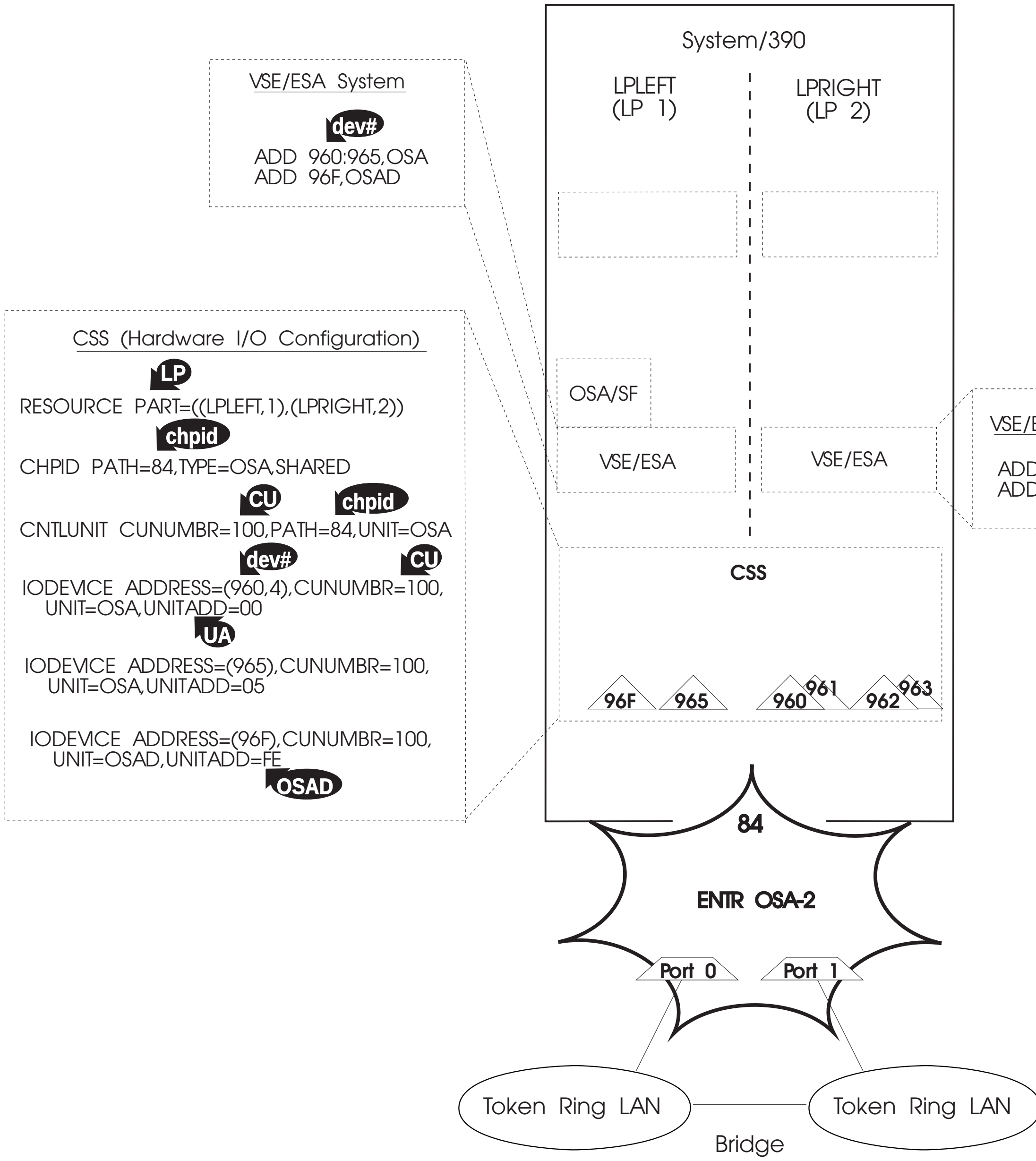
   The device assignments are X'0960'–X'0963' for the two pairs devices used in the TCP/IP Passthru mode; X'0965' for the device used in the SNA mode; and X'096F' for the OSA/SF device for OSA/SF that is installed and operational in LPLEFT (LP 1).

   Each unit address equates with the last two digits of the device number with which it is associated with the exception of the OSA/SF device whose unit address is X'FE'.
6. The three Home IP addresses are: 9.164.180.16 (LP 1 through port 0); 9.164.180.15 (LP 1 through port 1); 9.164.180.14 (LP 2 through port 1). Network set up for IP clients falls outside the scope of this book. For that information, refer to *TCP/IP for VSE/ESA User's Guide* which is listed in the bibliography (page xix).
7. Only one OSA configuration, ***BOEVSE84,*** is created for the OSA to be run in the TCP/IP Passthru and SNA modes concurrently.
8. To simplify the example, only one VTAM PU is shown with only one LU. Only one TCP/IP network client is shown for each token-ring LAN segment.

The labeled arrows used in the figures and the text should help you to keep track of which parameters are need for the IOCP statements, VSE/ESA, the TCP/IP for VSE/ESA initialization member (TCP/IP Passthru mode), VTAM macros (SNA mode), and the OSA/SF for VSE/ESA commands.

Although these definitions are discussed in the following sections, it falls outside the scope of this book to provide detailed IOCP, VSE/ESA, VTAM, and OSA/SF instructions. For that information, refer to the appropriate books that are listed in the bibliography (page xviii).

5.4 System I/O Definitions



5.4.1 Where to Specify I/O Devices to the System

You must define an OSA CHPID in the system hardware I/O configuration (IOCDS) and associate one control unit plus whatever device numbers are required. You must also add these associated device numbers to each VSE/ESA system image involved.

To define an OSA in the system hardware I/O configuration, you must use IOCP statements because an OSA requires the EXEC statement IZPIOCP. Therefore, you cannot use the VSE/ESA skeleton SKIOCPN in ICCF library (59), which uses the EXEC statement IXPIOCP in its example, unless of course you change the SKIOCPN JCL to use IZPIOCP. For some information on IOCP statements, see page 21. For complete information, however, refer to *IOCP User's Guide* which is listed in the bibliography (page xviii).

5.4.2 Ways to Add OSA Device Numbers

There are two ways to add device numbers to a VSE/ESA system image.

- If PTFs UQ000864 and UQ000865 have been installed for APARs PN91985 and PN91988, respectively, you can select ***Fastpath 241*** to get to the *Configure Hardware* dialog and add the device numbers to VSE/ESA that way.

  You must, of course, have the highest authority level, which is usually reserved for the system programmer under user ID ***SYSA.***

- Alternatively, you can code the device numbers for VSE/ESA manually for each logical partition in the VSE/ESA $IPLESA.PROC member in the IJSYSRS.SYSLIB library. Note, however, that these definitions are lost once you use the *Configure Hardware* dialog.

  For information on defining devices to VSE/ESA, see the VSE/ESA books listed in the bibliography (page xix). Note that VSE/ESA views an OSA device as a telecommunications device.

5.4.3 Notes on OSA Devices

1. VSE/ESA accepts only 3-digit device numbers. OSA/SF accepts 4-digit device numbers and pads a 3-digit device with a leading zero in its output.

2. Define the same device numbers in the system hardware I/O configuration and to VSE/ESA. For more information on IOCP definitions, refer to the discussion that starts on page 24.

   You can, of course, define a block of device numbers. In keeping with the other examples in this book, device numbers *xx*00–03 are used for the TCP/IP Passthru mode, *xx*04–05 for the SNA mode, and *xx*0F for OSA/SF communications. Only these device numbers are shown in the figure.

3. Define one device number for OSA/SF with type=OSAD and unit address `X'FE'`. In the example, this device number is `X'096F'`.

4. If the OSA channel path is defined to be shared, as is the case in the example, you only need to associate devices for data transfer through each port. All the logical partitions will share the same devices.

5. If the OSA is to be run in the TCP/IP Passthru mode, define one even/odd, read/write pair of device numbers with type=OSA for each port to be used in this mode.

   In the example, device numbers `X'0960'` and `X'0961'` are associated with port 0, and `X'0962'` and `X'0963'` with port 1. For more notes on device assignments in this mode, refer to page 103.

6. If the OSA is to be run in the SNA mode:

   - Define one device with type=OSA per port to be used in this mode.

     In the example, only port 1 of the ENTR OSA-2 is to be used for data transfer in the SNA mode. Therefore, only one device, `X'0965'`, is associated with the OSA channel path for this mode. For more notes on device assignments in this mode, refer to page 138.

   - If you use NetView and need a Box Manager node to communicate with it, define an additional device number with type=OSA for the virtual port `X'FF'` (page 138).

7. In the system hardware I/O configuration, associate a unit address with each device number that you specify.

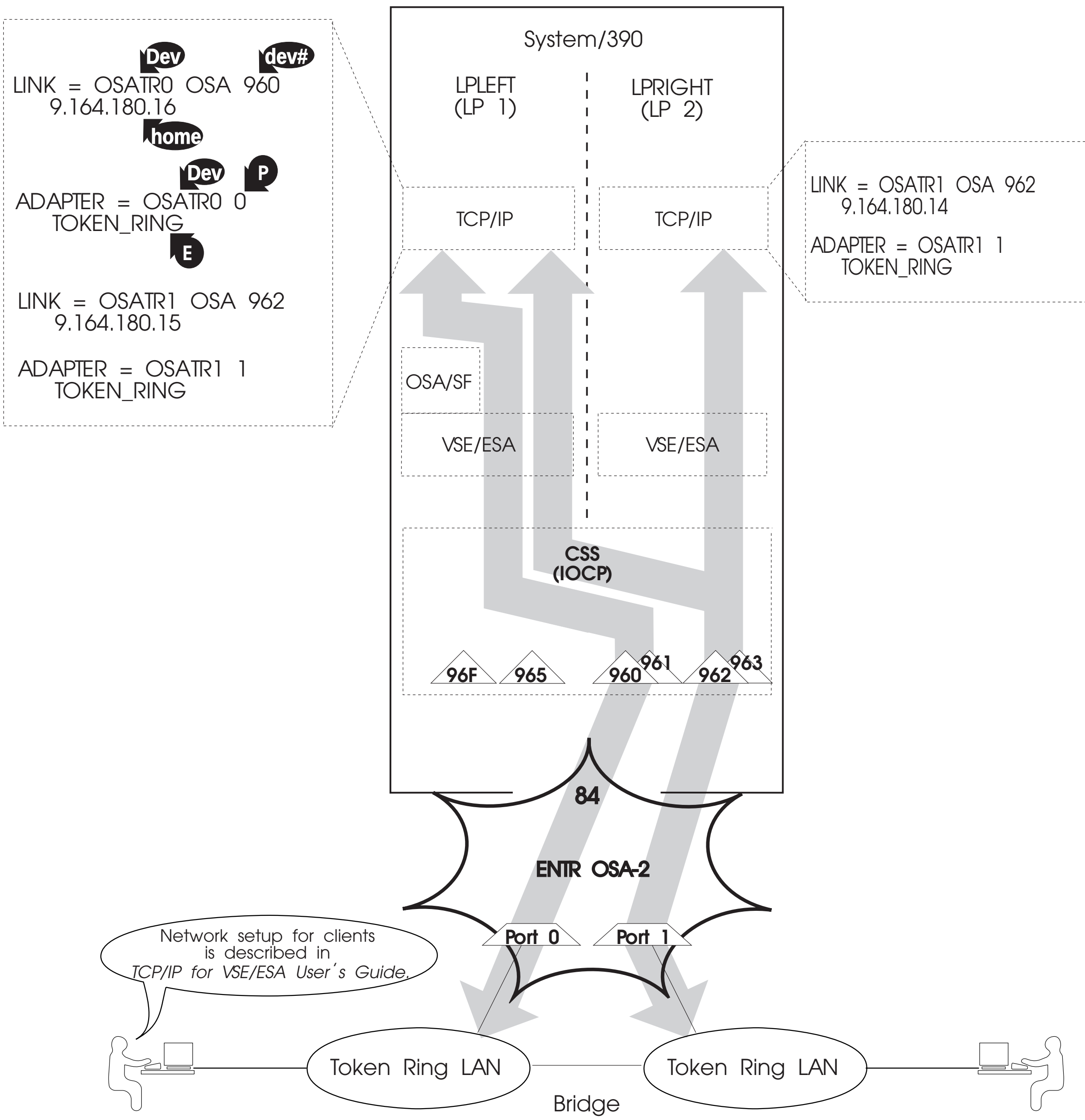
   - The IBM-supplied default unit addresses for an OSA in the TCP/IP Passthru mode are `X'00'`and `X'01'` for port 0 and `X'02'` and `X'03'` for port 1.

   - You can specify a unit address from `X'00'` through `X'FB.'`

- Specify the unit address (UA) either explicitly with the UNITADD parameter or implicitly as the last two digits of the device number.

8. If the VSE/ESA system image is running as a VM/ESA guest, make sure the device assignments match with the host VM/ESA system (pages 67 and 73).

5.5 TCP/IP for VSE/ESA Definitions



To be run in the TCP/IP Passthru mode, an OSA must be defined in the TCP/IP for VSE/ESA initialization member.

For more information on these definitions, refer to *TCP/IP for VSE/ESA User's Guide* which is listed in the bibliography (page xvii). More information on the TCP/IP Passthru mode is provided on page 108 but note that the examples in that chapter assume OS/390, MVS/ESA, or VM/ESA as the programming system, which use TCP/IP Profile statements, not the TCP/IP for VSE/ESA initialization member statements.

5.5.1 LPLEFT (LP 1) TCP/IP Definitions

The TCP/IP for VSE/ESA that is running in LPLEFT (LP 1) has sole access to port 0. It shares access to port 1 with VTAM in both LPs and with TCP/IP for VSE/ESA in LP 2. Only the OSA-related definition statements for the TCP/IP initialization member are listed below.

For port 0

```
DEFINE LINK,ID=OSATRO,TYPE=OSA,DEV=960,IPADDR=9.164.180.16,MTU=1500
DEFINE ADAPTER,LINKID=OSATR0,NUMBER=0,TYPE=TOKEN-RING
```

For port 1

```
DEFINE LINK,ID=OSATR1,TYPE=OSA,DEV=962,IPADDR=9.164.180.15,MTU=1500
DEFINE ADAPTER,LINKID=OSATR1,NUMBER=1,TYPE=TOKEN-RING
```

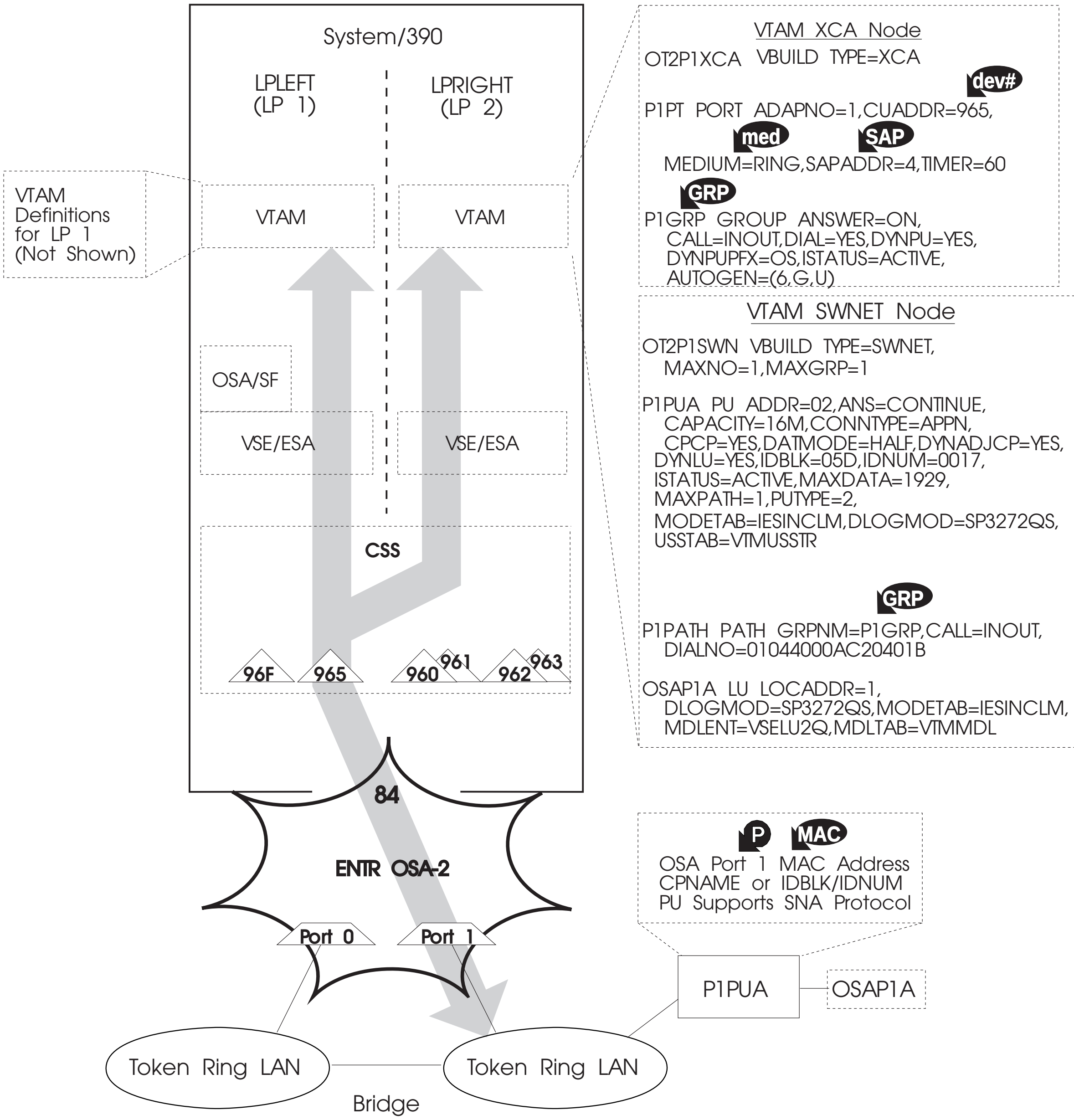
5.5.2 LPRIGHT (LP 2) TCP/IP Definitions

TCP/IP for VSE/ESA running in LPRIGHT (LP 2) shares access to the port 1 with VTAM in both LPs and with TCP/IP for VSE/ESA in LPLEFT (LP 1). The OSA-related definition statements for the TCP/IP initialization member are listed below.

For port 1

```
DEFINE LINK,ID=OSATR1,TYPE=OSA,DEV=962,IPADDR=9.164.180.14,MTU=1500
DEFINE ADAPTER,LINKID=OSATR1,NUMBER=1,TYPE=TOKEN-RING
```

5.6 VTAM Macro Definitions



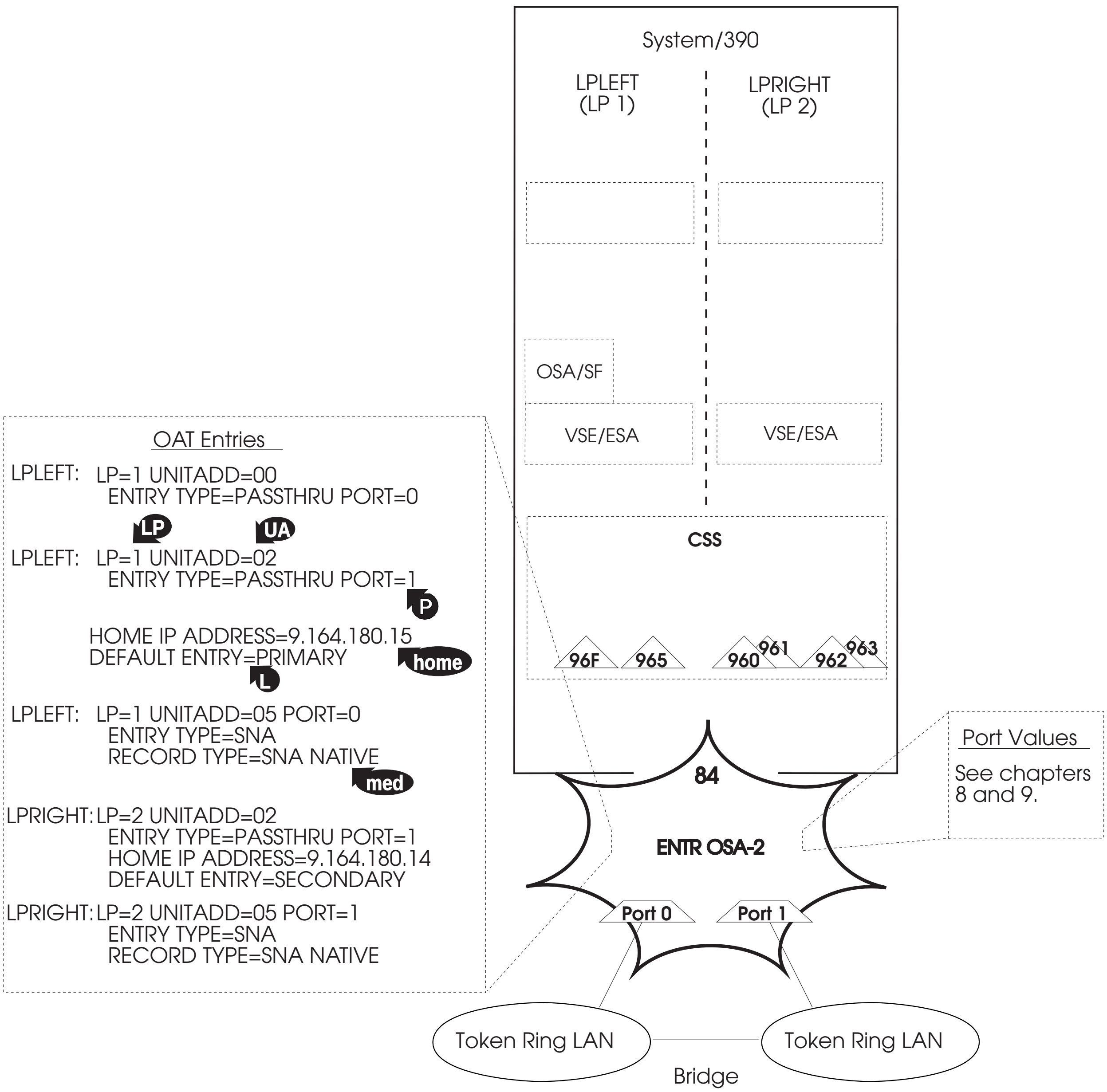
VTAM views an OSA as an external communication adapter (XCA). Therefore, you must define the OSA in the XCA major node. You must also define the switched connections in the switched network (SWNET) major node.

- The XCA and SWNET macro definitions for the example in this chapter are shown in the preceding figure. As you can see, VTAM in both LPs can access the token-ring LAN segment that is attached to port 1.
- System-independent discussions on these macros with different examples are provided on page 156.
- For more information on VSE/ESA requirements, see the VSE/ESA books listed in the bibliography (page xix).

5.7 OSA-2 Definitions

For each OSA mode, you must create the appropriate OSA address table (OAT) entry or entries for the OSA channel path. For a discussion on the OAT, see page 6. After you have specified the proper input for the OAT entry or entries, you have created an OSA mode image that you must install and activate on the OSA.

In the following example, an ENTR OSA-2, which is identified by OSA CHPID X'84', is defined to be shared between two logical partitions. VSE/ESA system images are running natively in LPAR mode in both logical partitions. TCP/IP in both LPs share access to ports 0 and 1. VTAM in both LPs share access to port 1.



In this example, the OSA channel path with OSA CHPID X'84' is defined to be shared between two logical partitions with VSE/ESA system images running in both logical partitions.

5.7.1 Creating and Installing OAT Entries

For any OSA that is supported in this environment except an ATM OSA-2, you provide input for the OAT entries of an OSA mode configuration in one of the following ways.

- Provide input to the panels of the OSA/SF OS/2 interface (GUI) for each OSA mode.
- Run an IOACMD job to create the OAT entries you need to install the resulting OAT image on the OSA.

  Note that you must get these jobs from the ICCF library (59) and put them in your private library. You will need to name the workfile to use for IOACMD's debug files. ***PRD2.OSASF*** is the recommended library.sublibrary.

For an ATM OSA-2, you must first customize each ATM LAN emulation client (LEC) port to be used using one of the OSA/SF interfaces. Then, you provide the same input for the OAT entries that you would for the other OSA-2s.

For more information, refer to:

- Page 104 for the TCP/IP Passthru mode parameters.
- Page 138 for the SNA mode parameters.
- Chapter 10 for the ATM LAN emulation client (LEC) platform parameters.
- *VSE/ESA Central Functions Open Systems Adapter Facility User's Guide* which is listed in the bibliography (page xvii).

5.7.2 Activating an OAT Image

Notes:

1. If OSA/SF for VSE/ESA is being used, refer to *VSE/ESA OSA/SF User's Guide.* Otherwise, refer to the appropriate OSA/SF user's guide. The titles and order numbers of these books are listed in the bibliography (page xv).
2. Installing an OSA mode image on an OSA is disruptive to all the devices using the OSA.
3. If you are creating an OAT image using the OSA/SF GUI, you can defer installation until a time that is more convenient by selecting Activate (No Install).
4. After you activate and install an OAT image, you must:
   a. Vary the OSA devices for the affected CHPID offline from all the logical partitions to which the CHPID is defined.
   b. Configure the CHPID off.
      - If the VSE/ESA system image is running natively, you must reconfigure the OSA CHPID from either the stand-alone support element or single object operations via the hardware management console.
      - If the VSE/ESA system image is running as a guest under VM/ESA, use the VM/ESA Vary command `VARY OFFLINE CHPID xx FORCE` ensuring that the OSA CHPID is varied off from all the logical partitions to which it is defined. (Alternatively, you can `DET cua` each OSA device from the VSE/ESA guest before varying the OSA CHPID offline.)
   c. Configure the CHPID on.
      - If the VSE/ESA system image is running natively, you must reconfigure the OSA CHPID from either the stand-alone support element or single object operations via the hardware management console.

- If the VSE/ESA system image is running as a guest under VM/ESA configure the OSA CHPID back online to all the logical partitions to which it is defined `VARY ONLINE CHPID xx`.

d. Vary the OSA devices back online to all the logical partitions to which the OSA is defined.

5.7.3 OSA Port Definitions

- Each type of OSA port has several settable port parameters, which are described for that port in Chapter 12.
- Defining a locally-administrated MAC address for an OSA port is discussed on page 210. Note that an ATM OSA-2 has one MAC address for each of its two LAN emulation client (LEC) ports.
- Parameters for the ATM LAN emulation client (ATM LEC) platform, which are required for an ATM OSA-2 to be run in the TCP/IP Passthru or SNA modes, are described in Chapter 10.

Chapter 6. OSA Modes for the IP Protocol

All OSAs support S/390 TCP/IP and the TCP/IP function of CS for OS/390 when the OSA is being run in the TCP/IP Passthru mode. Furthermore:

- The FDDI and FENET OSA-2s support the CS for OS/390 High Speed Access Access Services (HSAS) when these OSAs are being run in the HPDT MPC mode to transfer IP data packets.
- The ATM OSA-2 supports TCP/IP and the TCP/IP function of CS for OS/390 when the OSA is being run in the ATM IP Forwarding mode. CS for OS/390 high speed networking for IP networks (RFC 1577) is supported when an ATM OSA-2 is being run in the HPDT ATM Native mode, which is discussed in Chapter 9.

| An ATM OSA-2 supports the TCP/IP 2.3.0 function of TCP/IP for eNetwork Communications Server for
| VM/ESA 2.4.0.

6.1 IP Frame Protocols

The IP frame protocols that OSA supports are listed by OSA mode in the following sections.

6.1.1 TCP/IP Passthru Mode (All OSAs)

Any OSA can be run in this mode in any of the environments that OSA supports. The OSA can be run concurrently in the TCP/IP Passthru and SNA modes if the requisites for both modes are met. A FDDI or FENET OSA-2 can also be run concurrently in the HPDT MPC mode.

In the TCP/IP Passthru mode, an OSA transfers data between a S/390 IP program to which it is defined and clients on the following networks:

- A FDDI LAN that is attached to a FDDI OSA and supports the following frame protocol:

  FDDI ANSI X3T9.5 using the 802.2 SNAP envelope

- An Ethernet LAN that is attached either to the port on an FENET OSA-2 or to one of the ports on an ENTR OSA-2 (or an Ethernet OSA-2) and supports one of the following frame protocols:

  Ethernet II using the DEC Ethernet V 2.0 envelope
  Ethernet 802.3 using the 802.2 envelope with SNAP

- A token-ring LAN that is attached to one of the ports on an ENTR OSA-2 (or a token-ring OSA-1) and supports the following frame protocol:

  Token Ring 802.5 using the 802.2 envelope with SNAP

- A so-called “legacy” Ethernet or token-ring LAN that is bridged via an ATM emulated LAN (ELAN or LANE) to the ATM-based network that is attached to an ATM OSA-2 and adheres to either the Ethernet or token-ring frame protocols listed above. The ATM OSA-2 must be attached to a 155 Mbps ATM switch as described on page 38. On each ELAN, the ATM OSA-2 provides ATM LAN emulation client (LEC) services by means of one of its two LEC ports.

6.1.2 HPDT MPC Mode (FDDI and FENET OSA-2)

In the OS/390 environment, a FDDI OSA-2 or FENET OSA-2 can be run in the HPDT MPC mode exclusively or concurrently with either the TCP/IP Passthru or SNA mode, or with both modes. In the HPDT MPC mode, these OSAs support the same Ethernet frame protocols that are listed above for the TCP/IP Passthru mode. A FENET OSA-2 additionally supports data packet transfer in this mode for the IPX protocol, which is described in Chapter 7.

6.1.3 ATM IP Forwarding Mode (ATM OSA-2)

In the OS/390 and MVS/ESA environments, an ATM OSA-2 can be run in the ATM IP Forwarding mode, which requires the exclusive use of the OSA. In this mode, the ATM OSA-2 transfers data across one permanent virtual circuit (PVC) between TCP/IP on its S/390 platform and the ATM device to which the ATM OSA-2 is attached.

The ATM device must support RFC 1483 routed encapsulation (page 38). For the frame protocol in this mode, the ATM OSA-2 supports the Token Ring 802.5 using the 802.2 envelope with SNAP.

6.1.4 HPDT ATM Native Mode (ATM OSA-2)

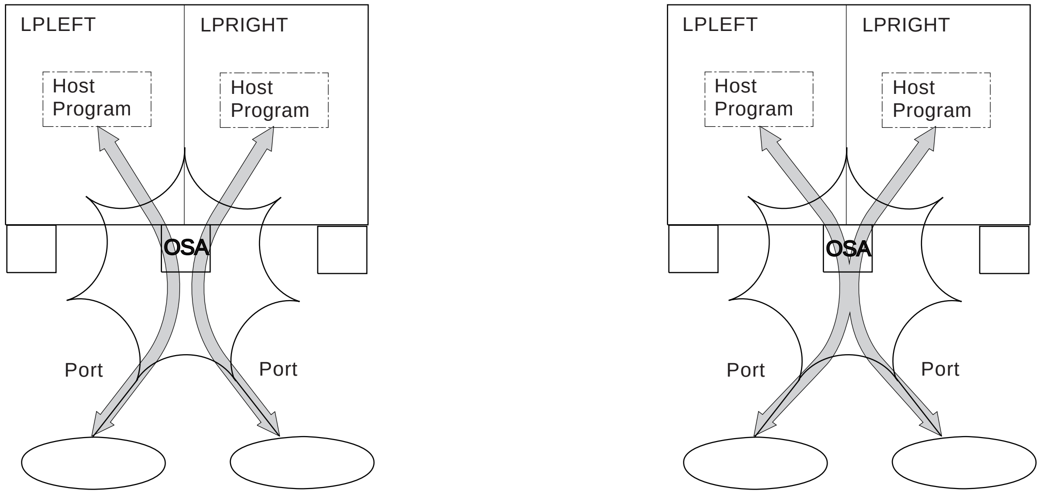
In the OS/390 V2 R5 environment, an ATM OSA-2 can be run in the HPDT ATM Native mode to support the eNetwork Communications Server for OS/390 (CS for OS/390) high speed networking for IP networks (RFC 1577). This IP support is not discussed in this chapter, but starts on page 179.

| For VM/ESA 2.4.0, an ATM OSA-2 can be run in the HPDT ATM Native mode to support the TCP/IP 2.3.0
| function of TCP/IP for eNetwork Communications Server for VM/ESA. This IP support is not discussed in
| this chapter, but starts on page 179.

6.2 OSA Port Sharing Among Logical Partitions

If a system is running in logically-partitioned (LPAR) mode with the EMIF facility, an OSA channel path can be defined to be shared among the logical partitions (LPs) to which it is defined in the system hardware I/O configuration (IOCDS). This allows access to a network port on the OSA to be shared among the system images that are running in the LPs to which the OSA has been defined.

The principle of *port sharing* is shown in the following two figures. In the figure on the left side of the page, neither S/390 program shares access to either port. In the figure on the right, both IP programs share access to both OSA ports.



Notes:

1. Port sharing applies to all OSA modes, not just those described in this chapter.

   However, sharing access to an OSA port is especially noteworthy in the TCP/IP Passthru and HPDT MPC modes because an OSA can be run in both modes concurrently. In fact, an OSA can be run concurrently in the SNA mode as well. Although the HPDT ATM Native and ATM IP Forwarding modes each require exclusive use of an OSA, the ATM port can be shared in these modes among the allows access to an OSA port to be shared among the LPs to which the OSA has been defined.

2. Access to a port can be shared among the system images that are running in the logical partitions to which the OSA channel path is defined to be shared.
3. Access to a port can be shared concurrently among IP stacks in the same LP or in different LPs if the OSA is being run in the TCP/IP Passthru mode or HPDT MPC mode in any combination.
4. Access to a port can also be shared between one or more IP programs if the OSA is being run in the TCP/IP Passthru and/or HPDT MPC modes and VTAM when the OSA is being run concurrently in the SNA mode.
5. Access to a port can be shared among IP stacks in the ATM IP Forwarding mode but the OSA cannot be run in this mode concurrently with any other mode.

6.3 Data Transfer of IP Packets

To transfer an IP packet across an OSA, two data paths must be defined: one inbound data path for IP packets whose destination is a S/390 Home IP address, and one outbound data path for IP packets whose destination is a network IP address. Each data path requires an entry in the OSA address table (OAT). To specify data paths for IP packets through an OSA, Passthru OAT entries are used in the TCP/IP Passthru and ATM IP Forwarding modes; MPC entries are used in the HPDT MPC and HPDT ATM Native modes. Before proceeding to a discussion of these types of OAT entries, consider the following points.

To send an inbound IP packet to a S/390 program, a LAN client first sends an ARP to determine which MAC address or addresses can be used for the connection to the S/390 Home IP address. If an OSA port's MAC address is selected for the IP packet, the OSA must know the S/390 Home IP address for which the inbound IP packet is destined. If that Home IP address is unknown to the OSA, the OSA must also know what to do with the inbound IP packet.

To send an outbound IP packet to a network client, the S/390 TCP/IP program or TCP/IP function of CS for OS/390 must not only specify the destination address in its Gateway statement, but also direct it to the proper OSA using the defined read/write device pair. Additional data items may be needed depending on the OSA mode, whether access to the OSA port is being shared between logical partitions, whether the data path is being shared between IP stacks, and so on.

OSA supports IP unicast and IP broadcast destination addresses in all the modes in which IP data packets are transferred. For more information on IP addresses, see the IP Configuration book listed in the bibliography (pagexix).

OSA supports IP multicast destination addresses only in the TCP/IP Passthru mode and only in a CS for OS/390 environment. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF presents the IP multicast addresses of the registered members of the multicast group for the OSA. Examples of the OSA/SF GUI panels are listed for each OSA in Chapter 12. For more information on IP addresses, see the IP Configuration book listed in the bibliography (page xix).

6.3.1 Passthru OAT Entries

A Passthru OAT entry is used in the TCP/IP Passthru and ATM IP Forwarding modes. Its key parameters are the unit address (UA), the LP number of the logical partition involved, the S/390 Home IP address of each IP stack involved, and the optional designation of primary and secondary default data paths.

6.3.1.1 Unit Address (UA): TCP/IP and the TCP/IP function of CS for OS/390 view an OSA that is being run in the TCP/IP Passthru or ATM IP Forwarding modes as a LAN channel station (LCS) device. Because IP is a duplex protocol, it requires separate read/write (even/odd) devices, which you define in the system hardware I/O configuration (page 24). The read device number and, therefore, the even unit address, are associated with the inbound data path.

Using OSA/SF, you can add, change, or delete, an inbound data path Passthru OAT entry. (OSA/SF automatically takes a corresponding action on the matching outbound data path entry.) In the OSA/SF GUI panels, the even unit address of the Passthru entry is displayed on the top data line between the logical partition (LP) number and the port number.

6.3.1.2 LP Number: Each OAT entry correlates the port number, the unit address of a device, and the number of the logical partition (LP) of the system image on which the S/390 program is running if the system is running in LPAR mode. If the OSA channel path is defined in the system hardware I/O configuration as shared among logical partitions, OSA/SF needs user input to determine the LP number. Otherwise, use LP=0.

6.3.1.3 Default Inbound Data Paths: If an OSA is defined to be shared in the TCP/IP Passthru or ATM IP Forwarding modes, you can define a default inbound data path in one of the Passthru OAT entries that you define. A default data path is the path that the OSA uses to forward an inbound packet that has an unknown destinattion IP address, that is, a S/390 Home IP address, that is unknown to the OSA in the active mode.

If the PTF resolutions to the OSA/SF APARs listed in the next paragraph are not applied, you can define only one inbound data path, which was called the *default LP*, in one of the Passthru entries for the active mode. The other Passthru entries in the mode were not default data paths. This nomenclature is still used in a basic Passthru entry (page 107), and it equates with the *primary default entry* that is used in the expanded Passthru entry.

If the PTF to one of the following OSA/SF APARs is applied, you can designate up to two Passthru entries in the same mode to specify default inbound data paths. These OSA/SF APARs are OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) and PQ16071 (VSE/ESA). You designate primary default entry, *secondary default entry*, or neither primary nor secondary default entry, for each Passthru entry. The OSA forwards an inbound IP packet with an unknown destination IP address (Home IP address) across the primary default data path if it is available. It forwards the IP packet across the secondary default path only if the primary path is not available but the secondary path is.

The concept of primary and secondary inbound default data paths is shown in the figure on page 113. If the default data path is changed from primary to secondary, or vice versa, OSA/SF issues an IOA message.

Do not confuse a default inbound data path with the default OAT. (A default OAT is one whose entries have not been customized by OSA/SF as described on page 6.)

6.3.1.4 S/390 Home IP Address: If an inbound IP packet that is received by an OSA port can be sent to only one IP stack, the OSA does not need user input on the S/390 Home IP address. However, if the OSA is required to send IP packets to more than one IP stack or if the OSA is being run in more than one mode concurrently, the situation is different. In those cases, you must either have specified the proper Home IP address in an inbound OAT entry, or the OSA must have a default inbound data path available to it.

If the required OSA/SF PTF is applied (page 104) so that the expanded Passthru entry is used, you can enter up 8 Home IP addresses in the same inbound Passthru OAT entry as long as you do not exceed the maximum of 16 Home IP addresses for the port concurrently. These multiple Home IP addresses therefore allow redundant pathing for IP packets that are inbound from the LAN to the S/390 as shown in the next set of figures.

If the required PTF is not applied, only the basic Passthru entry is available (page 107). In the basic Passthru entry, you can specify only 0 or 1 Home IP address so that redundant inbound pathing is not feasible in the same OAT entry. Remember, you must specify 1 Home IP address if access to the port is shared among the logical partitions to which the OSA is defined in the mode, the OSA is being run concurrently in more than one mode, or you want to designate a default inbound data path.

6.3.2 MPC OAT Entries for IP Traffic

MPC OAT entries are needed for the HPDT MPC and for IP data packets that are transferred in the HPDT ATM Native modes.

- In the HPDT MPC mode, IP data packets can be transferred across either a FDDI or a FENET OSA-2 (page 124). A FENET OSA-2 can also be run in the HPDT MPC mode to support IPX data packets as discussed in Chapter 7.
- In the HPDT ATM Native mode, IP data packets can be transferred in an OS/390 system environment
| and a VM environment as discussed in Chapter 9.

6.4 TCP/IP Passthru Mode

As the name TCP/IP Passthru mode implies, an OSA works as a passthrough agent for TCP/IP on its S/390 platform. S/390 TCP/IP views the OSA as a LAN channel station (LCS) device.

Note: The discussion in this chapter applies to the OSA TCP/IP Passthru mode in general. However, the examples and some of the information assumes that TCP/IP for OS/390, MVS/ESA, or VM/ESA is being used.

6.4.1 Task Planning Checklist

6.4.1.1 Preparatory Tasks

1 It is advisable to prepare worksheets for each OSA to keep track of all the data items.

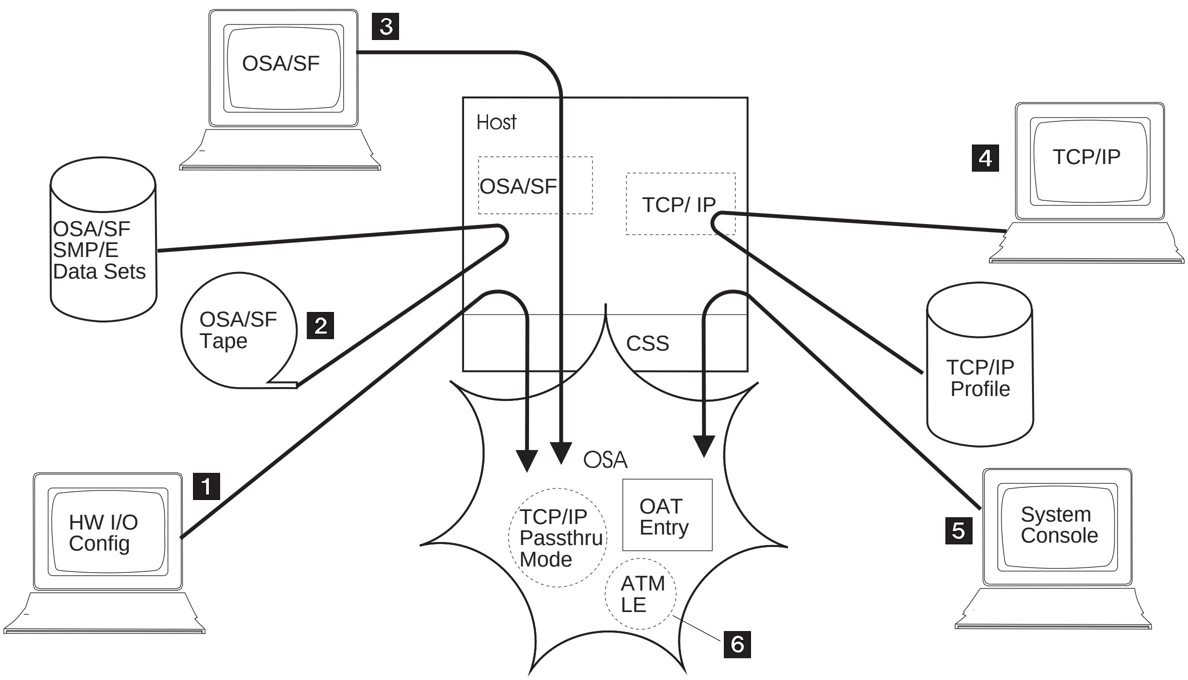
3 Ensure that the programming requisites for this mode are met. See the S/390 system requisites in the earlier chapters of this book. Also, refer to the IP books listed in the bibliography (page xviii).

4 Ensure that the installation factors relevant to this mode are taken into account. Refer to the chapter on the relevant operating system.

5 Check whether this port will be used concurrently for data transfer in either the HPDT MPC or SNA mode. If so, make sure you enter the S/390 Home IP address or addresses of each S/390 IP program that has a data path through the OSA in the TCP/IP Passthru mode.

6 Plan for the use of this mode, including how to handle problems that can occur. When using OSA/SF, refer to the OSA/SF user's guide that is listed in the bibliography (page xv).

6.4.1.2 TCP/IP Passthru Mode Tasks



1 For each port to be used in this mode, associate one even/odd, read/write pair of logical device numbers with the channel path in each LP involved. Remember the unit address that you associate with each device number because you will need to input it to OSA/SF for an inbound Passthru OAT entry. Remember also that IBM-supplied default unit addresses are provided in the default OAT table for each OSA except an ATM OSA-2.

2 *Only* on an ATM OSA-2 do you need to install the TCP/IP Passthru mode via SMP/E (OS/390 or MVS/ESA) and download it on to the OSA. The other OSAs already have a set of IBM-supplied default unit addresses installed for each port and the maximum number of logical partitions. On these OSAs, downloading and updating is done via the system console or hardware management console.

3 To deploy any OSA in this mode fully, for example, for port sharing, multiple Home IP addresses, and default inbound data paths, you will need the services of OSA/SF to input data for the OAT entries.

4 Identify each OSA to TCP/IP or the TCP/IP function of CS for OS/390 as a LAN channel station (LCS) device. Associate the LCS address, which is the even-numbered (read) device, with the IP device name, link name, port number, and frame protocol.

5 To activate an OSA mode, the OSA channel and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA CHPID must be reset.)

6 If an ATM OSA-2 is being used, use OSA/SF to provide the LAN emulation client (ATM LEC) platform settings for each LEC port to be used (page 185). Note that each LEC port has its own MAC address, which you can set locally according to the LAN frame protocol being used (page 210).

6.4.2 System Hardware I/O Configuration (IOCDS) Definitions

6.4.2.1 General Notes: TCP/IP and the TCP/IP function of CS for OS/390 view an OSA that is being run in the TCP/IP Passthru mode as a LAN channel station (LCS) device. IP duplex protocol requires that you associate one read/write, even/odd device pair in this mode. If the system is running in logically-partitioned (LPAR) mode and the OSA channel path is defined to be shared, these device pairs can also be shared among the logical partitions (LPs) to which the OSA is defined in this mode

- As applicable, check the OS/390 eNetwork Communications Server books (page xix) or the other applicable IP books (page xix) for constraints imposed by the host program. For example, your level of TCP/IP may not support 4-digit device numbers or might require an OSA device to be specified as static, that is, DYNAMIC=NO.
- If access to the OSA port is not shared, consider defining only one partition to the port for the TCP/IP Passthru mode. If you define more than one LP, the TCP/IP that establishes its interface with the OSA for that port first becomes the “owner” of that port.
- Specify consecutive unit addresses, each of which is associated wth one of the even/odd read/write pair of device numbers. Specify a unit address value from `X'00'` through `X'FB'`.
- It is strongly recommended that you associate the IBM-supplied default unit address numbers with the device numbers. If the OSA is not to be managed by OSA/SF, you must, in fact, do so.

  In the VM/ESA environment, you can use OSA/SF for VM/ESA starting with VM/ESA 2.2.1. You can, however, use OSA/SF for OS/390 for all the VM releases that OSA supports. If you use the latter OSA/SF to manage an OSA defined in a VM/ESA environment, you must specify the default unit addresses.
- Specify the same unit address to OSA/SF for the OSA OAT entry that you specify for that device and LP in the hardware I/O configuration. The order in which you do so does not matter, but the communication path cannot be active until both specifications have been successfully completed.
- If an OSA is being managed by OSA/SF that is running on a system image in a system in a logically-partitioned (LPAR) mode and if you have defined access to a port to be shared, create an OAT entry for each TCP/IP that has access to the port. Also, omit the LP names in the IODEVICE statements.
- Before activating the TCP/IP Passthru mode, ensure that the missing-interrupt handler (MIH) is set off (0) for the OSA user devices defined for this mode. The device must be defined to the S/390 system before you can set the MIH.

6.4.2.2 Device and Unit Address Definitions

- For each LP in a system running in LPAR mode or for the system running in basic mode, specify one even/odd, read/write pair (2 consecutive numbers) for each OSA LAN port or logical ATM OSA-2 port to be used in this mode.
- Associate a unit address with each device number.

  The IBM-supplied default unit addresses are `X'00'` and `X'01'` for port 0 and `X'02'` and `X'03'` for port 1.

- If you use IOCP to define the device numbers for the examples at the end of this section, you would input:

```
                          dev#             CU                        UA
IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA,UNITADD=00
```

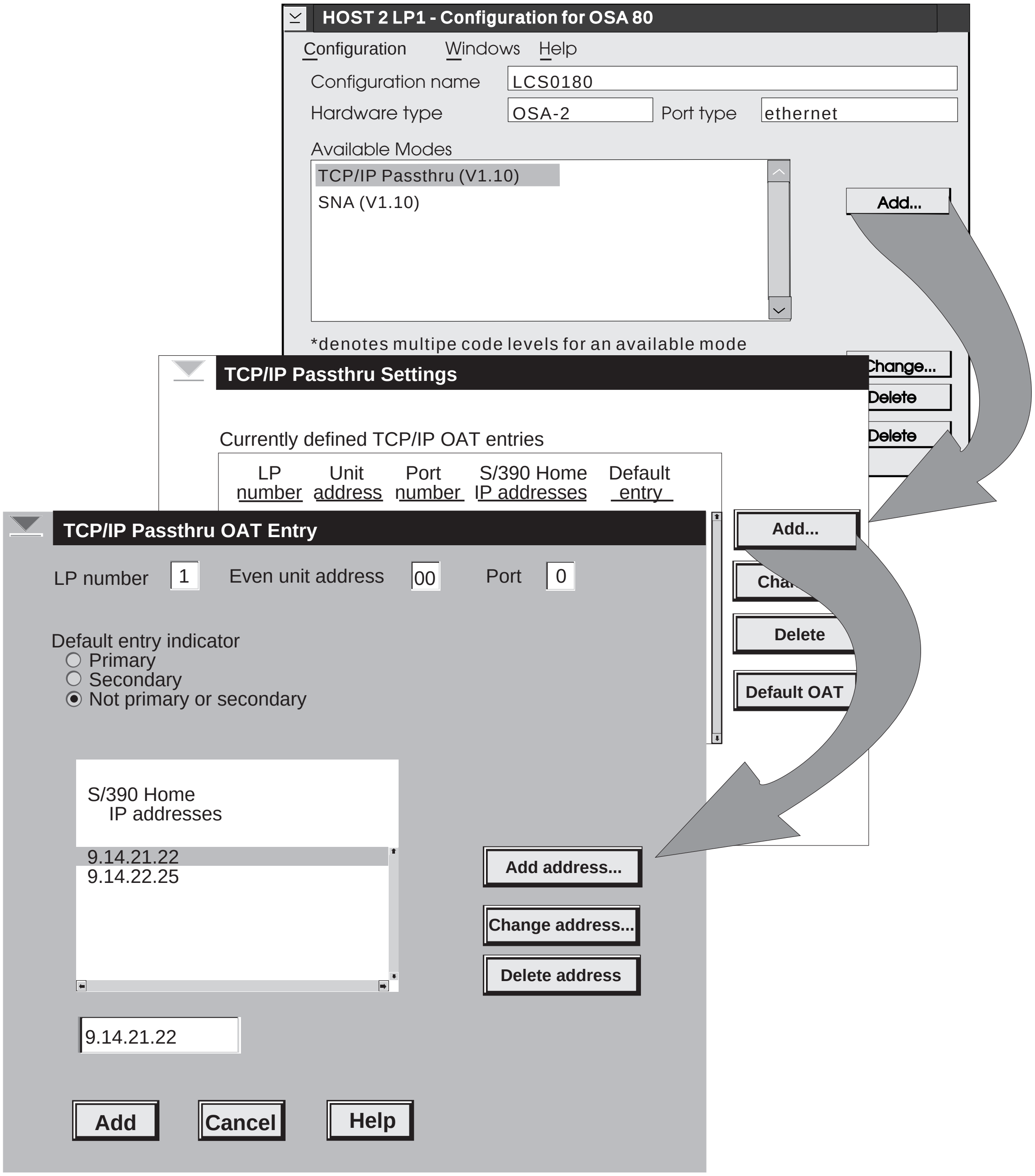
6.4.3 OSA Definitions (Passthru OAT Entries)

A Passthru OAT entry specifies a data path through the OSA when it is being run in the TCP/IP Passthru mode. If an OSA is being run in the modes that require a Passthru entry, a pair of entries is required, but you create only the inbound Passthru entry for the even (read) device number. OSA/SF automatically creates the matching outbound for the odd (write) Passthru entry. To create a Passthru entry, you can use either the OSA/SF GUI or REXX interface. In the following discussion, it is assumed that you are using OSA/SF GUI.

Except for an ATM OSA-2, which always requires you to create an OAT entry using OSA/SF, check whether you must create an inbound Passthru OAT entry or whether the default OAT entries will be used in this OSA. Refer to page 6 for a discussion of the OAT, and note that an OSA's default OAT can be used only if the following conditions are met.

- The default set of unit addresses has been associated in the system hardware I/O configuration with the pair of device numbers that is associated with the OSA channel path when the OSA will be run in this mode.
- The OSA will not be run concurrently in any other mode so that you do not have to define a S/390 Home IP address in the Passthru OAT entry.
- If the system is running in LPAR mode, access to the OSA port will not be shared among the logical partitions (LPs) to which the OSA is defined in the system hardware I/O configuration for the TCP/IP Passthru mode.

6.4.3.1 Expanded Passthru OAT Entry: If the PTF resolution to one of the following OSA/SF APARs is applied to the system, the expanded Passthru OAT entry is used. OW33393 is required in an OS/390 environment; OW33394 in a VM/ESA environment; and PQ16071 in a VSE/ESA environment. The advantage of the expanded Passthru OAT entry lies in the fact that you can specify up to eight (8) Home IP addresses in the same inbound Passthru entry. You can also specify a primary default data path in one inbound Passthru entry and a secondary default data path in another inbound Passthru entry.



In the preceding figure for an ENTR OSA-2, the three OSA/SF panels are shown that you need to use to add, change, or delete a Passthru entry. Those buttons are partially hidden by the large arrow at the right of the middle panel. Note, however, that there is also a *Default OAT* button on the right of the ***TCP/IP Passthru Settings Panel.***

Note: The *Default OAT* button allows you to reset the OSA to its default OAT settings, which OSA/SF then displays. Those settings require the IBM-supplied default unit addresses and do not allow the OSA port to be shared. See page 21.

LP #

If the OSA is defined to be shared among LPs, specify the LP number of LP for this data path. If the OSA channel path is not defined to be shared, enter 0.

UA ***Even unit address:***

Specify the unit address that is associated with the lower, even-numbered device number that you specified in the system hardware I/O configuration (IOCDS) for this OSA data path (logical connection).

P ***Port***

Specify the port number (0 for a FDDI or FENET OSA-2; 0 or 1 for an ENTR port or a LEC port on an ATM OSA-2) of the port used in this data path.

L ***Default entry indicator***

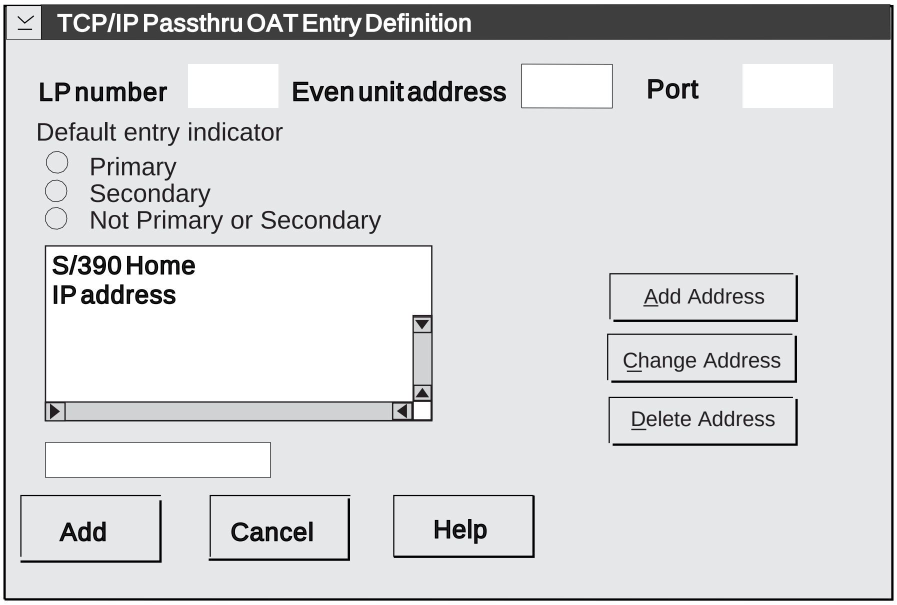
- Specify primary if you want the OSA to send an IP packet with an unknown inbound address across this data path if it is available.
- Specify secondary if you want the OSA to send an IP packet with an unknown inbound address across this data path if it is available and the primary default inbound data path is not available. (Make sure that another inbound Passthru OAT entry specifies the primary default data path.)
- Accept or specify the default, which is not primary or secondary, if you do not want the OSA to forward any inbound IP packet with a Home IP address unknown to the OSA in this mode.

home ***S/390 Home IP address***

Specify from one up to eight S/390 Home IP addresses or leave the field blank.

- If you specify at least one Home IP addresses for this inbound OAT entry, remember that you cannot specify more than 16 Home IP addresses for the port at one time. (A port can be used concurrently in the TCP/IP Passthru, HPDT MPC, and SNA modes.)
- If you leave this field blank, the data path specified by this OAT entry cannot be used as a default inbound data path.

6.4.3.2 A Basic Passthru OAT Entry: If the PTF resolution to none of the following OSA/SF APARs has been applied, you can create only a basic Passthru OAT entry: OSA/SF APAR OW33393 in an OS/390 environment, OW33394 in a VM/ESA environment, and PQ16071 in a VSE/ESA environment.



LP #

If the OSA is defined to be shared, specify the LP number with which you want to associate the dat path specified by this OAT entry. If the OSA is not defined to be shared, enter 0.

Even unit address

Specify the unit address of the lower, even-numbered device number that you specified in the system hardware I/O configuration (IOCDS) for this data path in this mode.

Port

Specify the port number (0 for a FDDI or FENET OSA-2; 0 or 1 for an ENTR port or a LEC port on an ATM OSA-2).

S/390 Home IP address

If the device pair used in this mode for the OSA is defined in the system hardware I/O configuration as shared and you want more than one IP stack to have access to this OSA port concurrently or you specify that the OSA can be run concurrently in another mode, specify the S/390 Home IP address of the IP stack of the LP that is specified in this Passthru OAT entry.

Default LP

If you override the default (No) by specifying Yes, you have designated this Passthru entry to specify the only, or primary, inbound default data path to be used in this mode. The OSA will send each IP data packes with an address unknown to the OSA across the data path specified by this OAT entry.

Note: The term default LP is used only on input. On output, the term default entry is used. For a comparison of these two terms, see page 100.

6.4.4 TCP/IP Definitions

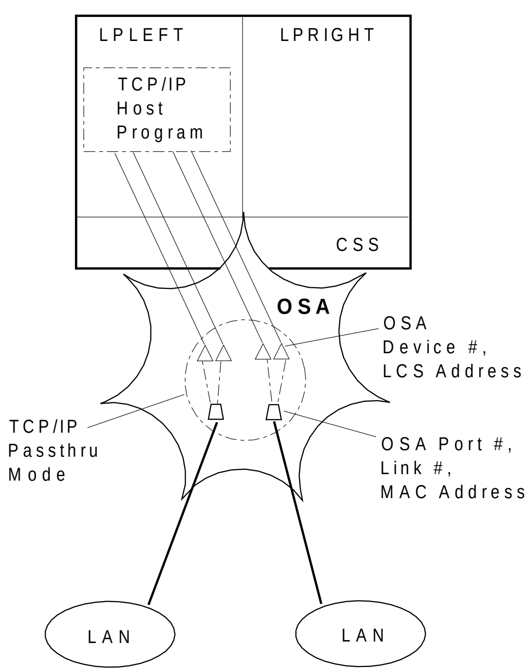
In the examples in this book, only the most simple formats of the TCP/IP profile statements are used. The following discussion is meant to put OSA-related parameters into the context of the host server program, but it is beyond the scope of this book to describe TCP/IP statements fully. For more information, refer to the TCP/IP books and CS for OS/390 books listed in the bibliography (page xix).

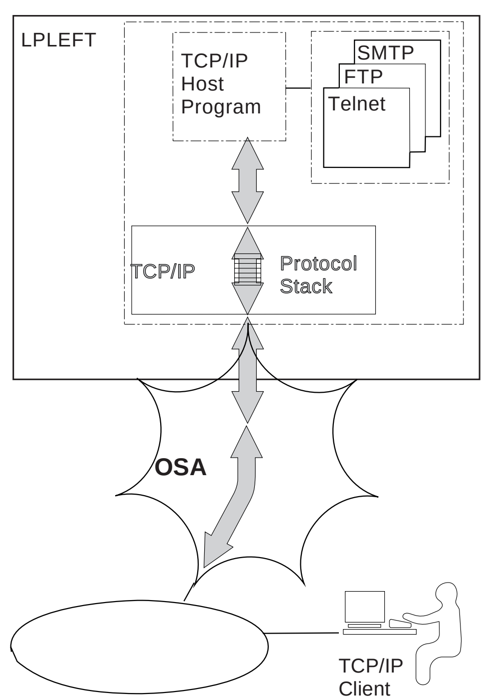
6.4.4.1 Requirements: An OSA being run in the TCP/IP Passthru mode is viewed as a LAN channel station (LCS) device by the S/390 TCP/IP and the TCP/IP function of the eNetwork Communications Server for OS/390 (CS for OS/39, which use the device pair required by the IP duplex protocol to establish the data path to the OSA port. You must therefore define the read, or lower, or even-numbered device number in the IP program's Device statement as the LCS address. And, you must define the OSA port number as the link number in the corresponding Link statement.

These definitions are shown in the following figure, which uses the TCP/IP as an example. A triangle depicts the device number. A trapezoid depicts the port number. Traffic paths are simplified to avoid cluttering the figure. Two logical partitions (LPs) are shown: LPLEFT and LPRIGHT.

Notes:

1. If an ATM OSA-2 is being used, its LAN emulation client (LEC), or logical, ports are defined in the TCP/IP Passthru mode. The ATM OSA-2 physical port is defined in the ATM IP Forwarding mode.
2. A MAC address is shown for the port. A MAC address is significant in the TCP/IP Passthru and HPDT MPC modes to identify the port on a directly-attached LAN or ATM emulated LAN. It is not significant in the ATM IP Forwarding mode.
3. You must also specify the S/390 Home IP address of the LP associated with an inbound Passthru OAT entry if access to the OSA port is to be shared. If you are creating an expanded Passthru OAT entry (page 104), you can specify more than one S/390 Home IP address to provide redundant pathing.





6.4.4.2 For the Device Statement:

Note that the LCS address is the even-numbered device number that you want to associate with the port number. Also note that the NETMAN parameter is not supported for OSA. Following the format:

DEVICE device_name LCS lcs_address

For LPLEFT (LP 1), one statement is needed for port 0 and one for port 1.

DEVICE OSATR0 LCS 1800
DEVICE OSATR1 LCS 1802

For LPRIGHT (LP 2), one statement is needed for port 1.

```
DEVICE OSATR1  LCS 1802
```

6.4.4.3 For the Link Statement:

Note that the TCP/IP link number is the same as the OSA port number.

LINK link_name network_protocol link_number device_name

For LPLEFT, one statement is needed for port 0 and one for port 1.

LINK TR0 IBMTR 0 OSATR0
LINK TR1 IBMTR 1 OSATR1

For LPRIGHT, one statement is needed for port 1.

LINK TR1 IBMTR 1 OSATR1

6.4.4.4 For the Home Statement

HOME home_ip_address link_name

For LPLEFT (LP 1), two statements are needed:

HOME 128.40.200.191 TR0
HOME 128.40.202.192 TR1

For LPRIGHT (LP 2), one statement is needed:

HOME 128.40.202.182 TR1

6.4.4.5 For the Gateway Statement

Notes:

1. If there is a hop, associate it with the network address and the link name.
2. In these examples, there is no hop so '=' is used to specify that the data is routed directly to destinations on that network.
3. The most specific form of the network address, the client IP address, is used in these examples.

GATEWAY <u>network</u> <u>first hop</u> <u>link_name</u> <u>max_packet_size</u> <u>subnet_mask</u>

For LPLEFT, two statements are needed:

```
GATEWAY  128.40.200.58  =  TR0 DEFAULTSIZE 0
GATEWAY  128.40.202.68  =  TR1 DEFAULTSIZE 0
```

For LPRIGHT, one statement is needed:

```
GATEWAY  128.40.202.68  =  TR1 DEFAULTSIZE 0
```

6.4.4.6 For the Start Statement:

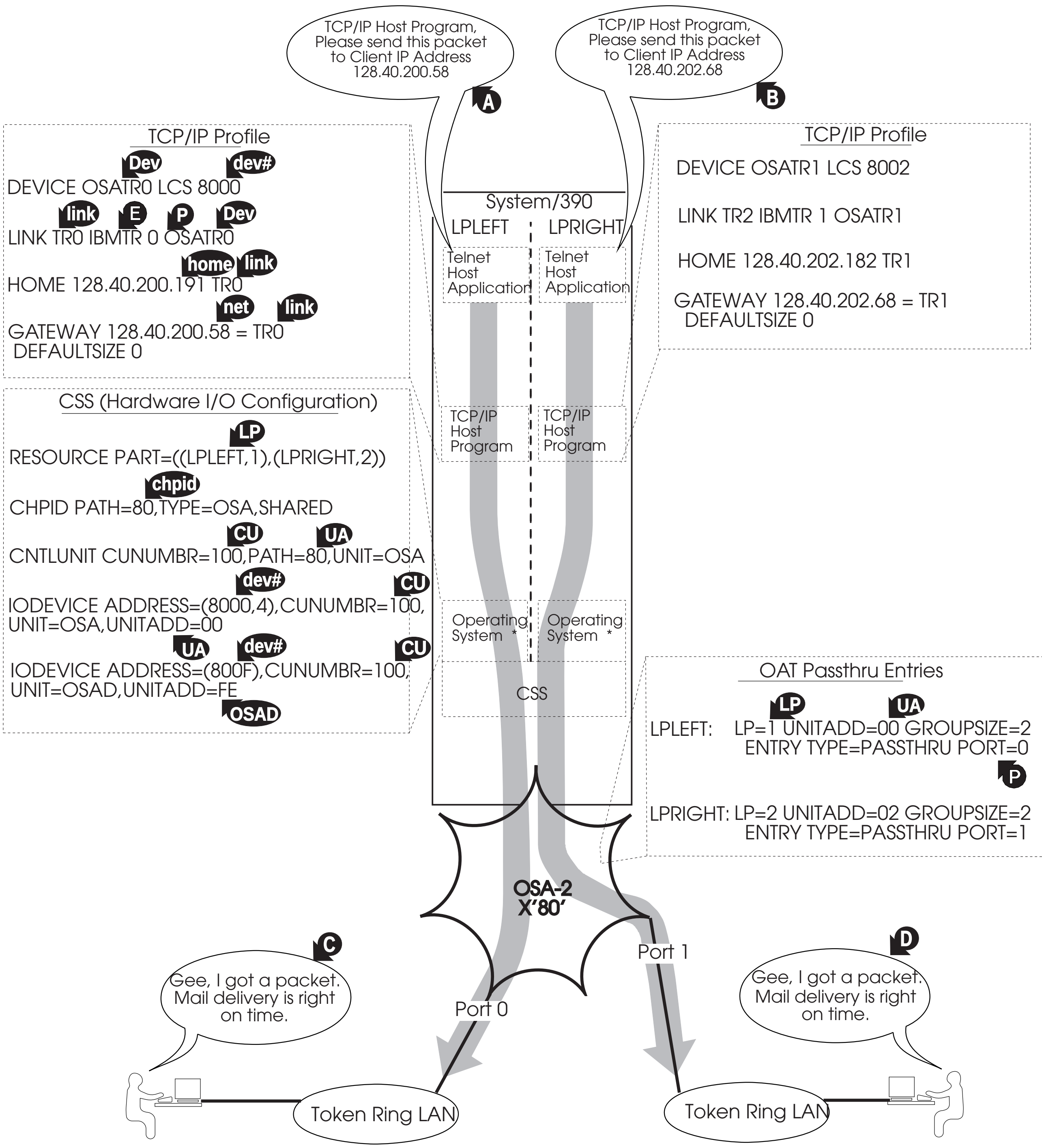
START <u>device_name</u>

For LPLEFT: `START OSATR0` and `START OSATR1`

For LPRIGHT: `START PSATR1`

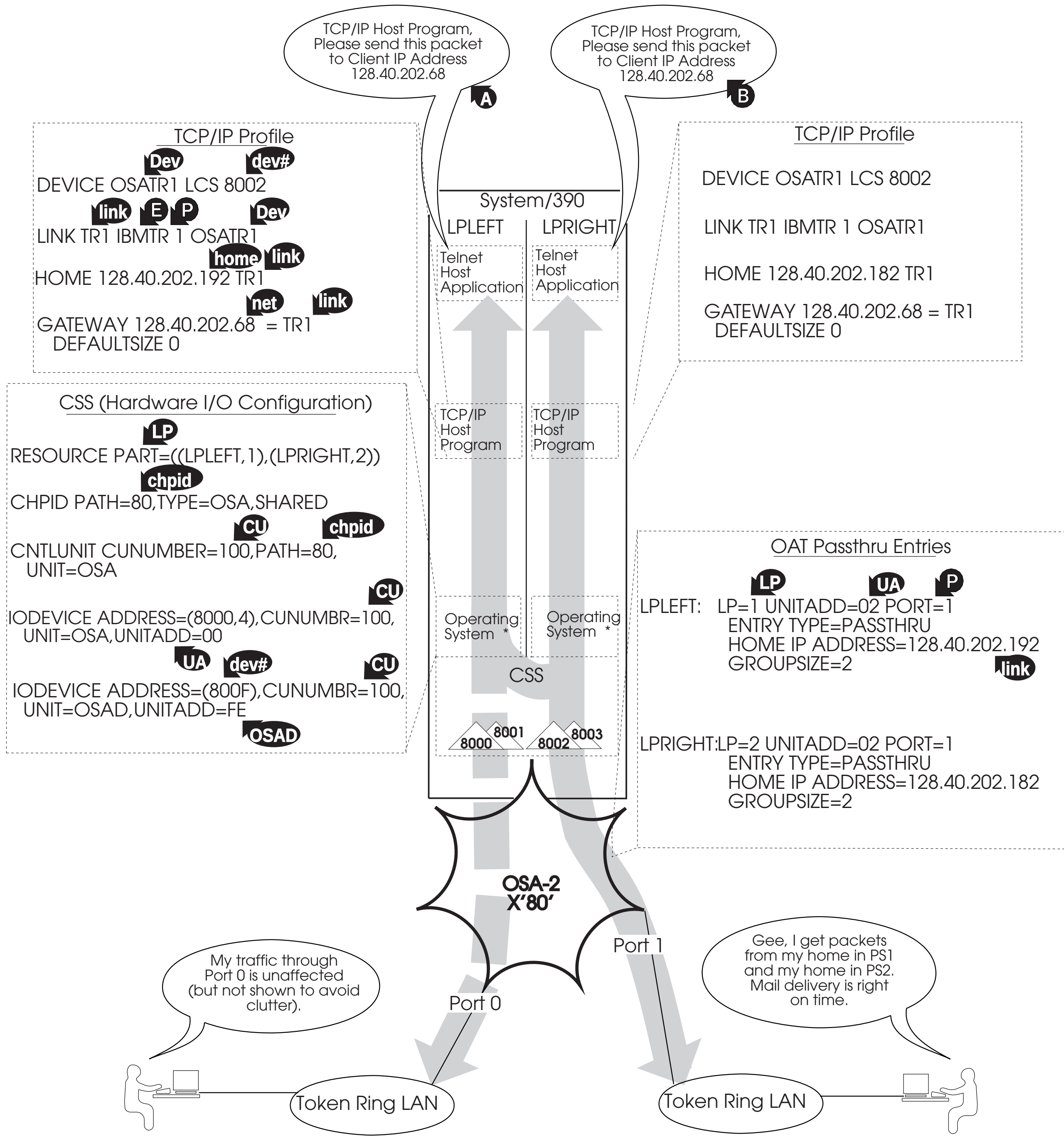
6.4.5 Example 1. Sharing Access to a CHPID

Assume that the 2 ports of ENTR OSA-2 X'80' have been attached to different token-ring LANs. Because the channel path is defined to be shared, TCP/IP in both LP 1 (LPLEFT) and LP 2 (LPRIGHT) can access the CHPID. (In examples 1, 2, and 3, basic Passthru OAT entries are used.)



6.4.6 Example 2. Sharing Access to an OSA Port

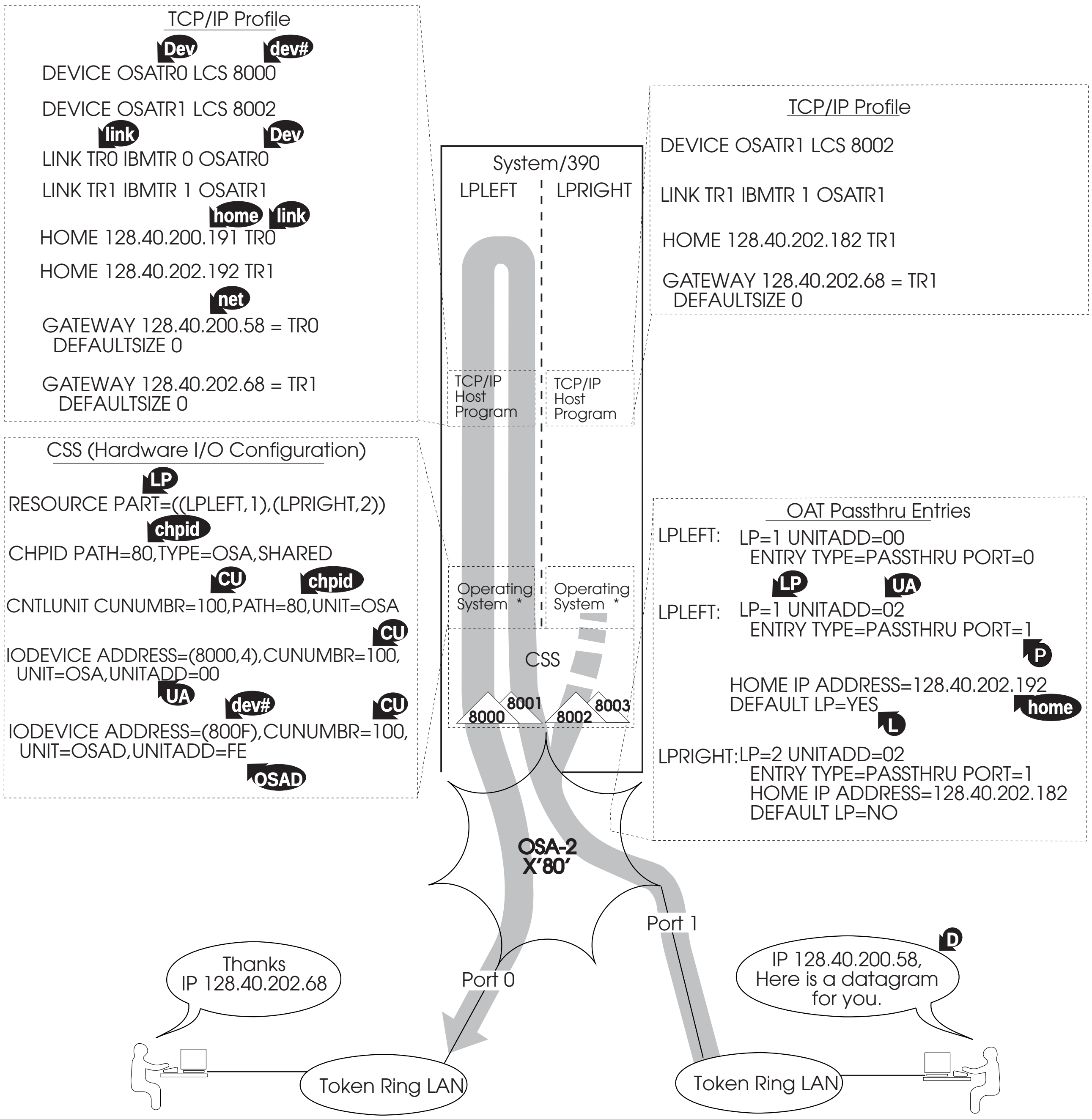
Once you define the S/390 Home IP address in the appropriate OAT entries, TCP/IP in LP 1 (LPLEFT) can share access to port 1 with TCP/IP in LP 2 (LPRIGHT), allowing both TCP/IPs to send packets to a client on the LAN attached to port 1. (in examples 1, 2, and 3, basic Passthru OAT entries are used.)



6.4.7 Example 3. Specifying a Default Inbound Data Path

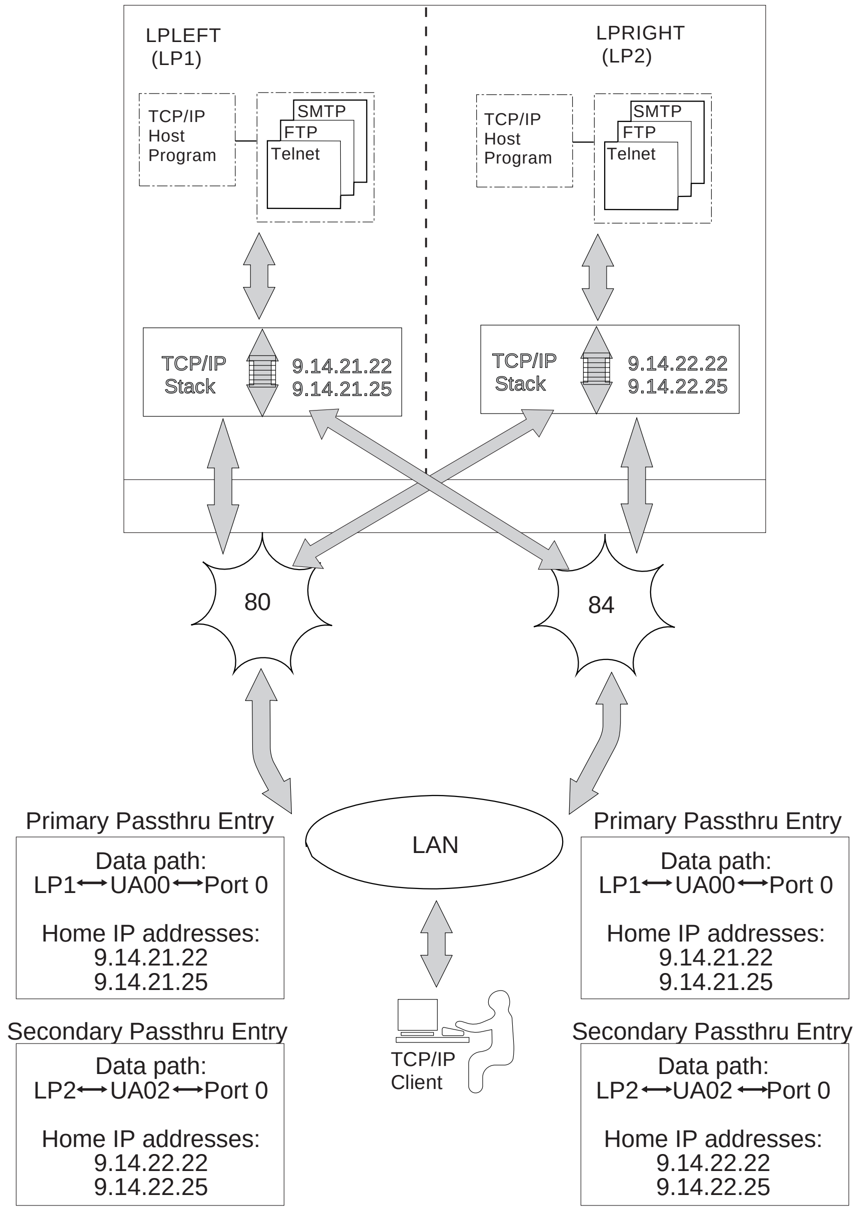
In this example, basic Passthru OAT entries are used. Therefore, only a primary default inbound data path can be specified. For the specifications on the expanded Passthru OAT entries, refer to page 104.

For an example of primary and secondary default entry designations, see Example 4 on the next page.



6.4.8 Example 4. Expanded Passthru OAT Entries

If the expanded Passthru OAT entry is used to define the inbound data paths (pages 100 and 104), you can define more than one Home IP address for a given data path. Furthermore, you can designate a data path to be a primary inbound default path, secondary inbound default path, or neither a primary nor a secondary default path.



In the foregoing figure, TCP/IP in LP 1 (LPLEFT) has two Home IP addresses that the LAN client can use: 9.14.21.22 and 9.14.21.25. You have specified both Home IP addresses in a Passthru OAT entry. You also created two Passthru OAT entries. One entry describes the primary default data path for inbound IP packets that have addresses unknown to the OSA. The other Passthru entry describes the secondary default data path for those packets. These Passthru OAT entries are therefore called the primary default entry and the secondary default entry, respectively.

The LAN client can now send an IP packet for either Home IP address through either OSA port. Neither OSA is therefore a single point of failure. If both ports are available, they both respond to the LAN client's ARP. If an inbound IP packet is sent through a default data path, which is represented by a default Passthru entry, switching may or may not be required between the two logical partitions before the packet arrives at its correct destination. For information on switching between logical partitions, refer to the IP and programming system books.

In addition, remember to take the following steps.

- Define a device pair for each Home IP address in the hardware I/O configuration (IOCDS). See page 103.
- Define the OSA for each device pair in the TCP/IP through the Device, Link, Home, and Gateway statements as discussed on page 108.

6.5 ATM IP Forwarding Mode

In the ATM IP Forwarding mode, an ATM OSA-2 transfers IP data packets to an ATM device that is attached to the OSA and adheres to RFC 1483 routed encapsulation. An ATM OSA-2 can be run in this mode in either an OS/390 or MVS/ESA environment. The OSA transfers data across one permanent virtual circuit (PVC) that you define to the OSA using OSA/SF. TCP/IP views the ATM OSA-2 as a LAN channel station (LCS) device.

6.5.1 Task Planning Checklist

6.5.1.1 Preparatory Tasks

1 It is advisable to prepare worksheets for each OSA to keep track of the data items that you must input.

2 Ensure the user documentation is available for the ATM device to which the ATM OSA-2 is attached to be able to run in this mode. That ATM device must support RFC 1483 routed encapsulation and support the maximum data packet size specified in the TCP/IP Gateway statement.

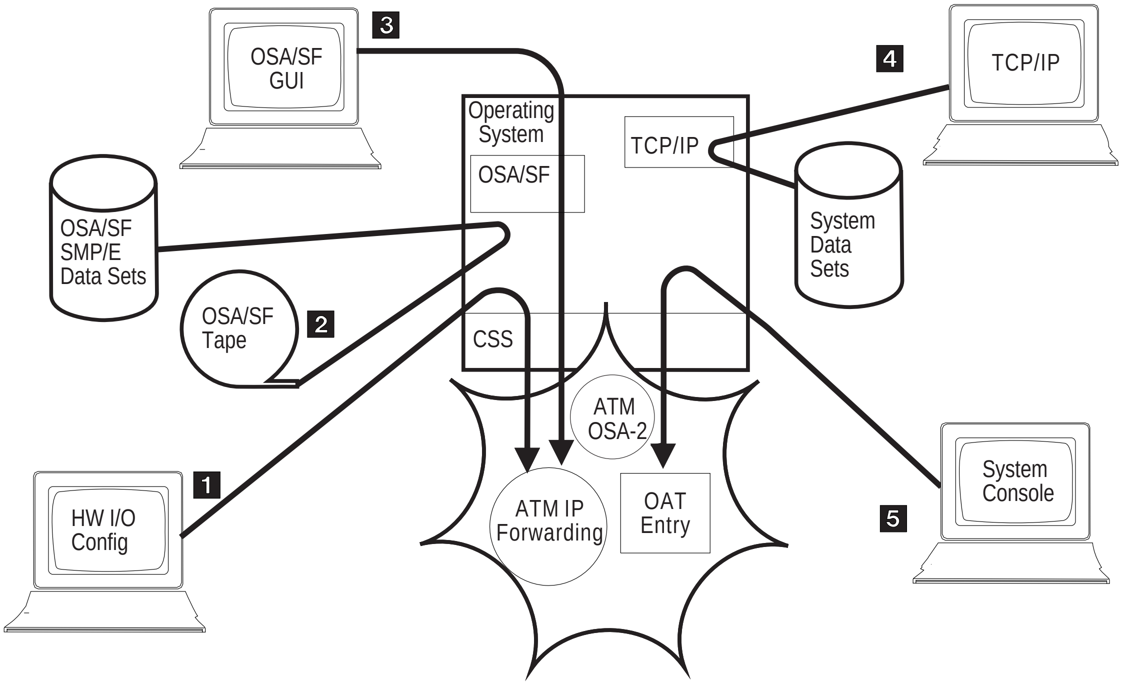
3 Ensure the TCP/IP device driver supports the token ring frame protocol (page 98).

4 Ensure the programming requisites that are listed for this mode are met in the OS/390 (page 45) or MVS/ESA (page 49) environment that supports this mode. Also, refer to the OSA/SF for MVS/ESA and OS/390 program directory, which is listed in the bibliography (page xv).

5 Ensure you are familiar with the concepts on virtual circuits that are discussed on page 34. You define one PVC in this mode.

6 Plan for the use of this mode, including how to handle problems that can occur. When using OSA/SF, refer to the OSA/SF user's guide that is listed in the bibliography (page xv).

6.5.1.2 ATM IP Forwarding Mode Tasks



1 In the IOCDS, define one even/odd, read/write pair of device numbers for the ATM OSA-2's single physical port for each logical partition or for the system in basic mode. (The ATM OSA-2's LAN emulation client (LEC) ports are not involved in the ATM IP Forwarding mode.)

2 Install the ATM IP Forwarding mode so that you can use OSA/SF to customize the ATM OSA-2 in this mode in an OS/390 (page 45) or MVS/ESA (page 49) environment. Also, refer to the OSA/SF for MVS/ESA and OS/390 program directory listed in the bibliography (page xv).

3 To the ATM OSA-2, define parameters for the:

- ATM OSA-2 port in this mode a shown in this chapter by the OSA/SF GUI ***ATM IP Forwarding Settings*** panel (page 117) and the ***Passthru OAT Entry*** panel (page 169). Passthru is the type of OAT entry used for this mode.
- PVC using the ***PVC Definition*** panel (page 120).

Ensure that an ATM OSA-2 will not be customized in this mode concurrently with any other OSA mode.

4 To TCP/IP or the TCP/IP function of CS for OS/390, define the OSA-related parameters (page 122).

5 Install and activate the mode image. The OSA channel path and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA CHPID must be reset.)

6.5.2 IOCDS Definitions

To define an ATM OSA-2 to be run in the ATM IP Forwarding mode, define one even/odd, read/write pair of device numbers for each LP. The definitions required for the example are shown in the lower left corner of the following figure. IOCP definitions are listed because of their compact format.

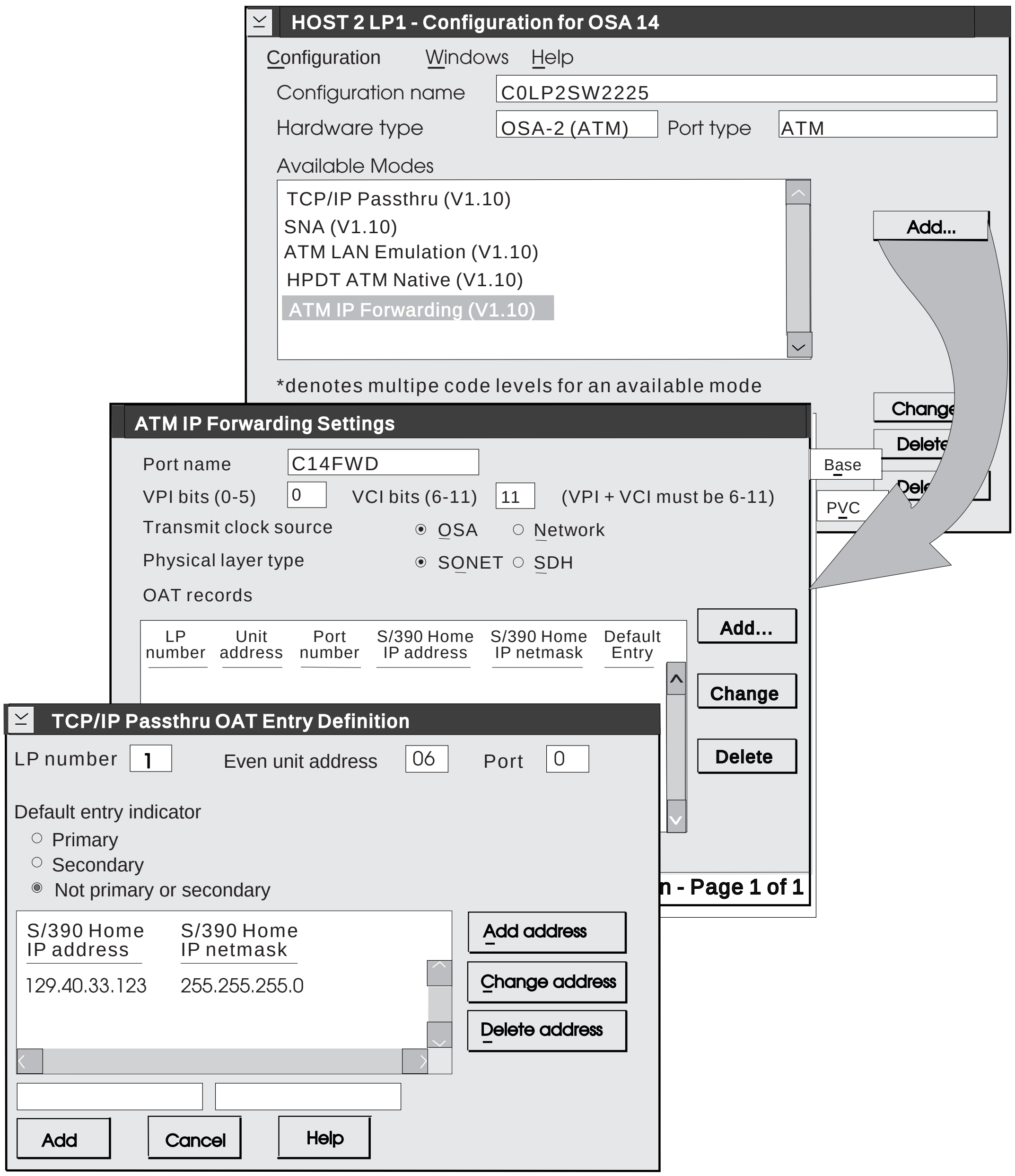
6.5.3 ATM OSA-2 Definitions

To customize an ATM OSA-2 in the ATM IP Forwarding mode, use OSA/SF to:

- Enter port traffic settings on the ***ATM IP Forwarding Settings*** panel (page 117).
- Add a Passthru OAT entry extension by clicking on the ***Base*** tab of the ***ATM IP Forwarding Settings*** panel. See page 119 for the parameters.
- Define the PVC by clicking on the ***PVC*** tab of the ***ATM IP Forwarding Settings*** panel. See page 120 for the parameters.

For more information on using OSA/SF, refer to the OS/390 or MVS/ESA OSA/SF user's guides, which are listed in the bibliography (page xv).

6.5.3.1 Port Traffic Definitions



The middle panel in the foregoing figure of an ATM OSA-2 shows the ***ATM IP Forwarding Settings*** panel. If you select the ***Base*** tab, you can add, change, or delete a Passthru OAT entry for this mode. If you select the ***PVC*** tab, you can define the PVC as described on page 120.

Port Port name

Specify a port name in 1 through 8 of the following characters: A through Z in upper case, @, #, $, and–starting with the second character–0 through 9. Do not duplicate a port name for different modes in the same logical partition. In this mode, a port name is only used by SNMP.

pbit VPI bit settings

Let the virtual path identifier (VPI) bit settings default to 0 if you accept the VCI bit setting default of 11. Otherwise, specify a number from 1 through 5 as long as that VPI bit setting is allowed by the ATM device to which the ATM OSA-2 is attached. By setting a nonzero bit setting, you can maximize the addressing range that the ATM OSA-2 supports for the ATM PVC in this mode. See the explanation for the VCI bit setting parameter.

cbit VCI bit settings

First, check the documentation of the ATM device to which this ATM OSA-2 is attached. If that unit supports at least 11 VCI bits, let the ATM OSA-2 VCI bit value default to 11 and do not change the default value of 0 for the VPI bit setting.

If the ATM device supports 6 through 10 VCI bits, specify that number on this panel. (You must specify 6–11 VCI bits as described on page 34). To maximize the sum of VPI+VCI bit settings to 11, consider increasing the VPI bit setting stated in the VPI bit settings parameter.

This sum is used as the exponent *n* in the equation that determines the addressing range of virtual circuit addresses: (2***n*–1). An ATM OSA-2 supports a maximum range of 2**11–1=2047 addresses.

XMT Transmit clock source

Either setting should be acceptable to most ATM devices, but you should generally accept the default. The SONET/SDH protocols accomodate differences in clocking by adjusting the pointers in the SONET/SDH frame. OSA synchronizes its transmit clock to the derived receive clock. If the received data stream is lost, OSA reverts to its locally-generated clock.

- Accept the default of OSA if the ATM OSA-2 generates the transmit clock.
- Select Network if the source of the transmit clock comes from the ATM network.

PL Physical layer type

Check with the documentation of the ATM device the network provider to see which type of physical layer is used to provide, through a framing structure, the payload envelope necessary for the transport of ATM cells.

- Synchronous Optical Network (SONET), which is the default, is the replacement for the digital hierarchy called plesiochronous digital hierarchy (PDH), or NADH by some, and consists of DS0 through DS4 in the United States of America.
- Synchronous Data Hierarchy (SDH), which is the ITU recommended counterpart to SONET and replaces the international community's existing digital hierarchy that consists of E1 through E3 transmission links.

OAT entries

The current Pasthru OAT entries are displayed. To add, change, or delete a Passthru OAT entry, see the next section.

6.5.3.2 Passthru OAT Entry: To add, change, or delete a Passthru OAT entry for this mode, select the ***Base*** tab to get the ***ATM IP Forwarding OAT Entry*** panel. (In older releases of OSA/SF, the panel titles said Record Definition instead of Entry.)

LP #

If the OSA CHPID is defined as shared in the hardware I/O configuration (IOCDS), specify the LP number of the logical partition specified by this data path. Otherwise, specify 0.

Even unit address

Specify the unit address of the even-numbered device of the device pair that you defined in the IOCDS for this ATM OSA-2 for this inbound data path.

Port number

Do not set this field. The port number is preset to 0 for the single ATM OSA-2 physical port.

S/390 Home IP address

Specify the same IP address that is specified on the Home statement in the corresponding IP program profile.

Subnet mask

Specify the subnet mask that you specify in the Gateway statement of the corresponding IP program profile.

Note: The last digits of the subnet mask may not be visible until you shift the ***ATM IP Forwarding Settings*** panel to the left.

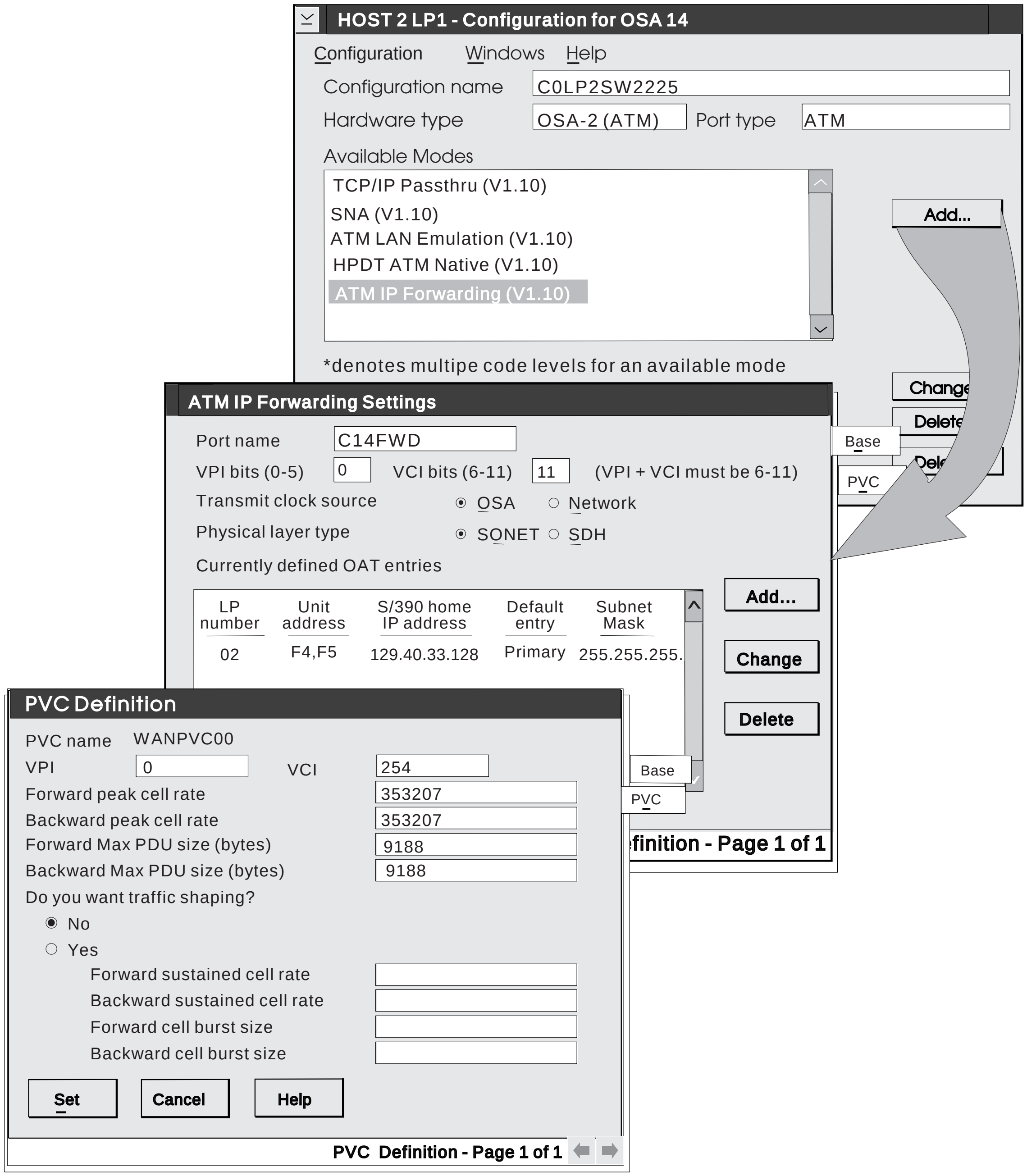
Default entry indicator

- For an expanded Passthru entry, accept the default setting (not primary or secondary) or specify that this data path be designated as either the primary or secondary default inbound path.

  A default inbound data path is the path across which the OSA will send inbound IP packets that have IP addresses unknown to it. The primary default data path is used if it is available. Otherwise, the secondary default data path is used if it is available and the primary path is not available.

- For a basic Passthru entry, override the default setting only if access to the OSA channel path is shared by more than one S/390 program and you want to specify this entry to be designated as the (primary) inbound default data path.

6.5.3.3 PVC Definitions



Select the ***PVC*** tab on the ***ATM IP Forwarding Settings*** panel to get to the ***PVC Definition*** panel.

VPI value

Specify a VPI value for the PVC within the range of the VPI bit setting that you specified (page 117).

For example, if you set a VPI bit setting of 3 for the port. You can set a VPI value that ranges from 0 through 7, which is (2**3–1). In the example, however, you specify 0 because the VPI bit setting = 0 on the ***ATM IP Forwarding Settings*** panel.

cval VCI value

Specify a VCI *value* from 32 up to and including the maximum that you specified for the VCI *bit* setting on the ATM OSA-2 ATM IP Forwarding Settings page for the port (page 117).

Suppose you have set a VCI bit setting for the ATM OSA-2 of 8 for the port. You can now set a VCI value from 32 up to and including 255, which is (2**8–1). The combination of VPI value and VCI value uniquely identifies this PVC.

fpk bpk Forward and backward peak cell rates

- Specify both a forward and backward peak cell rate up to a maximum of 353207 ATM cells/second.

  ATM OSA-2 supports a line speed of 155 Mbps. After the SONET/SDH frame overhead is deducted, about 149.76 Mbps is available for ATM cells if you calculate the 53 payload and header bytes/cell. If you calculate only the 48 payload carriage (AAL5 PDU), about 135.63 Mbps is available.

- The peak cell rate is ignored if you specify a sustained cell rate and a 0 (zero) cell burst size.

fpdu bpdu Forward and backward max PDU sizes

- The maximum PDU size is equal to the size of one frame that can be processed in that direction for the ATM AAL5 SDU layer.
- Set the maximum PDU size to a value that is at least 100 bytes greater than the maximum packet size you specify in the Gateway statement of the corresponding TCP/IP profile (page 123).
- The largest maximum packet size that OSA accepts is 17800 bytes, so do not set a higher value in the IP Gateway statement and not more than 17900 as the maximum PDU size or the cell burst size.
- The default maximum PDU size is 9188 bytes.

Do you want traffic shaping?

If you have not already done so, check the conditions of the contract, the documentation of the network provider, or the documentation of the ATM device to which the ATM OSA-2 is attached, to determine whether you must specify a sustained cell rate and, if so, whether you can also specify a non-zero cell burst size (page 36).

- Accept the default of No if you are not going to specify a sustained cell rate. You are finished defining this PVC.
- Select Yes if you are going to specify a sustained rate.

fsus bsus Forward and backward sustained cell rates

Specify sustained cell rates in cells/second. If you want to convert these to Mbps, multiply cells * 48 payload bytes. As stated with the peak cell rate parameter, up to 135.63 Mbps is available.

fcell bcell Forward and backward cell burst sizes

- Specify a cell burst size if you specify a sustained cell rate.

- Do not specify a cell burst size if you do not specify a sustained cell rate.
- If you specify 0 as the cell burst size, the peak cell rate is ignored.
- If you specify a non-zero cell burst size, this cell burst will be transferred at the peak cell rate if and when the peak cell rate is being used.
- Specify the cell burst size in cells/second.

  Consider setting the cell burst size to the cell equivalent of the maximum PDU size that you specified in bytes.

  ```
  For example, 17856 bytes / 48 payload bytes = 372 ATM cells
  ```

6.5.4 TCP/IP Definitions

In this book, TCP/IP profile statements are discussed only in the context of the parameters needed for the OSA modes. For more information on the TCP/IP profile and the IP switching required for this mode, refer to the TCP/IP books listed in the bibliography (page xix).

6.5.4.1 For the Device Statement: Associate a TCP/IP device name with the ATM OSA-2 even-numbered device number that you associated with ATM OSA-2 channel when it is being run in the ATM IP Forwarding mode. The S/390 device number is called the LCS address in the TCP/IP profile because TCP/IP views an OSA CHPID as a LAN channel station (LCS). Note that the NETMAN parameter is not supported for OSA. The minimum format for the example is shown below.

DEVICE <u>device_name</u> LCS <u>lcs_address</u>

DEVICE ATM2225C0 LCS 14FA

6.5.4.2 For the Link Statement: Associate the TCP/IP link name, ATM OSA-2 port number, and network protocol with the TCP/IP device name that you specified in the Device statement. The ATM OSA-2 port number, which is always 0, is called the link number in the TCP/IP statements.

The network protocol must be IBMTR for transportation across to allow the largest maximum-sized packets to be transported across the PVC. The ATM OSA-2 strips off the token-ring header and sends on the 802.2 LLC/SNAP frame with RFC 1483 encapsulation. The minimum format for the example is shown below.

LINK <u>link_name</u> <u>network_protocol</u> <u>link_number</u> <u>device_name</u>

LINK ATMLNKF4 IBMTR 0 ATM2225C0

6.5.4.3 For the Home Statement: Specify the S/390 Home IP address that is in the corresponding ATM OSA-2 Passthru OAT entry for this mode. The minimum format for the example is shown below.

HOME <u>home_ip_address link_name</u>

HOME 129.40.33.123 ATMLNKF4

6.5.4.4 For the Gateway Statement

Notes:

1. Do not enter a maximum packet size greater than 17,800 bytes to support an ATM OSA-2 in the ATM IP Forwarding mode.
2. Make sure the maximum packet size that you specify is supported by the ATM device to which the ATM OSA-2 is attached.
3. Some of the overhead for data transfer is by packet size, so consider specifying as large a packet size as possible.
4. If there is no hop, as is the case in this example, use the equal sign (=) to specify that data is routed directly to destinations on that network.
5. The minimum format for the example is shown below.

```
            net                link        pckt             mask
GATEWAY  network  first hop  link_name  max_packet_size  subnet_mask
               net                  link     pckt    mask
  GATEWAY  129.40.200.123  =  ATMLNKF4  8000  255.255.255.0
```

6.5.4.5 For the Start Statement: Start the device with the device name that you specified in the Device statement.

```
        DEV
START device_name
         DEV
START ATM2225C0
```

6.6 HPDT MPC Mode

Both an FDDI and FENET OSA-2 can be customized to be run in the High Performance Data Transfer Multipath Channel (HPDT MPC) mode in an OS/390 environment. A FENET OSA-2 supports both the IP and IPX protocols in this mode. (The IPX protocol support is described in Chapter 7.) A FDDI OSA-2 supports only the IP protocol, which is described in this section.

In the HPDT MPC mode, a FDDI or FENET OSA-2 supports the OS/390 High Speed Access Services (HSAS). Because a discussion of HSAS falls outside the scope of this book, refer to the OS/390 books listed in the bibliography for more information on HSAS.

6.6.1 Task Planning Checklist

1. Ensure the requirements for the HPDT MPC mode are met that are listed on page 48.
2. In the system hardware I/O configuration (IOCDS), associate one even/odd, read/write pair of device numbers with the OSA channel path and its associated control unit if the OSA is defined to be shared across logical partitions and you want to use the same pair of device numbers. Otherwise, define one pair of device numbers for each data path that you want in this mode.

   An example of HCD definitions is provided in the next section. A discussion on IOCDS starts on page 21. For more information on IOCDS parameters, refer to the appropriate system books, some of which are listed in the bibliography (page xviii).
3. Ensure that OSA/SF is running on OS/390 and can customize the FDDI or FENET OSA-2 in the HPDT MPC mode.
4. Using OSA/SF, define an MPC OAT configuration for the OSA channel paths (CHPIDs) to be run in this mode.An example of an MPC OAT entry for this mode is shown on page 127.
5. Activate the HPDT MPC mode on the OSA-2 as described in *OS/390 OSA/SF User's Guide,* which is listed in the bibliography (page xv).
6. Create a VTAM resource definition for the OSA by defining the OSA name, port name, and the pair of device numbers in the TRLE statement of the VTAM or CS for OS/390 SNA TRL macro. An example is provided on page 130. For more information, refer to the appropriate system books listed in the bibliography (page xix).
7. Activate the VTAM resource definition that you created.
8. Assign a Home IP address to the device pair. Use the OS/390 Unix System Services (Open Edition) OEIFCONFIG commands to define and start the LAN connection (data path). See 6.6.6 on page 130. For more information, refer to the system books some of which are listed in the bibliography (page xviii).

6.6.2 HCD Definitions

Assuming that you use the HCD panels to define the OSA in the system hardware I/O configuration data set (IOCDS) that is shown on page 130, the following HCD panels would be used to define FDDI OSA-2 CHPID `X'C8'` with control unit `X'C800'` and the read/write device pair `X'C806'` and `X'C807'` to be used in the HPDT MPC mode. Note that not all the transition HCD panels are shown, nor the panel that specifies attachment to the S/390 system.

```
Goto     Filter     Backup     Query     Help
                        Add Channel Path
 Specify or revise the following values.

 Processor ID . . . . : OS390S1
 Configuration mode : LPAR

 Channel path ID . . . . . . . . . . . : C8  +
 Number of CHPIDs  . . . . . . . . . : 1
 Channel path type  . . . . . . . . . : OSA  +

 Operation mode . . . . . . . . . . . : SHR  +
 Description  . . . . . . . . . . . . :______________________

 Specify the following values only if connected to a switch:
 Dynamic switch ID . . . . . . . . . : __  +  (00 - FF)
 Entry switch ID  . . . . . . . . . . : __  +
 Entry port  . . . . . . . . . . . . . : __  +

F1=Help    F2=Split    F4=Prompt    F5=Reset    F9=Swap    F12=Cancel
```

```
Goto     Filter     Backup     Query     Help
                        Define Access List
                                                          Row 1 of 10
Command ==> ______________________________ Scroll ==>  PAGE

Select one or more partitions for inclusion in the access list.

Channel path ID  . . . :  C8          Channel path type . . :  OSA
Operation mode  . . . :  SHR          Number of CHPIDs. . :  1

/ Partition Name   Number  Usage   Description
/ LPLEFT           1       OS      Used for HPDT MPC OSA path
/ LPRIGHT          2       OS

F1=Help    F2=Split    F4=Prompt    F5=Reset    F9=Swap    F12=Cancel
```

```
Goto     Filter     Backup     Query     Help
                        Add Control Unit

Specify or revise the following values

Control unit number   . . . .  C800
Control unit type  . . . . . . . OSA______ +
Serial number  . . . . . . . .  ________ +
Description                     HPDT/OSA connection to OS390S1
Connected to switches  . . . __  __  __  __  __  __  __  +
Ports  . . . . . . . . . . . . . __  __  __  __  __  __  __  +

If connected to a switch, select whether to have CHPIDs/link
addresses, and unit address range proposed.

Auto-assign  . . . . . . . . .  2    1. Yes
                                     2. No

F1=Help    F2=Split    F4=Prompt    F5=Reset    F9=Swap    F12=Cancel
```

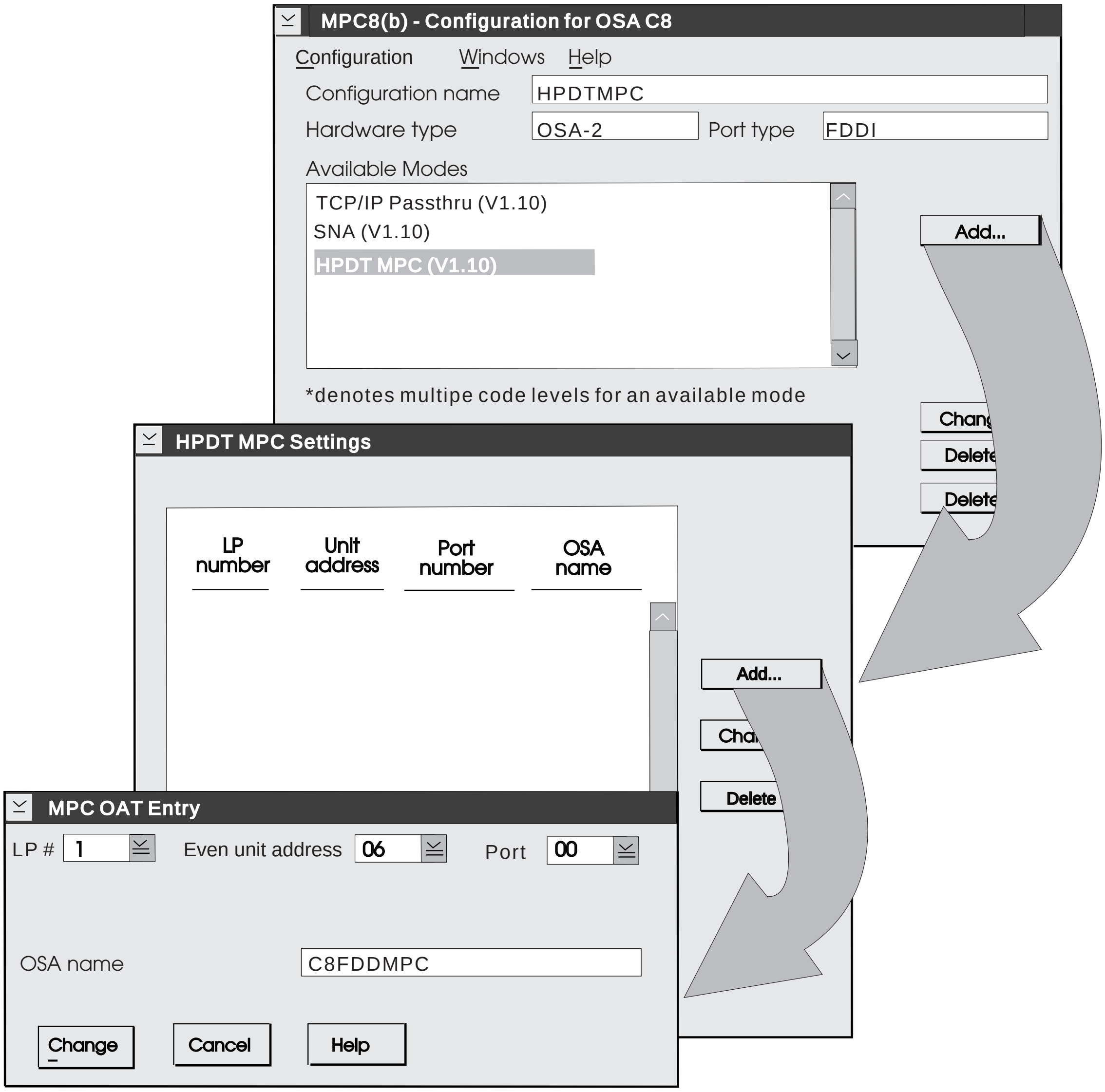
```
Goto    Filter    Backup    Query    Help

                         Add Control Unit

Specify or revise the following values

Control unit number     . : C800          Type . . . . . . . . : OSA
Processor ID    . . . . . . : OS390S1

Channel path IDs  . . . . .  C8 __ __ __ __ __ __ __ +
Link address  . . . . . . . . __ __ __ __ __ __ __ __ +

Unit address    . . . . . . .  06 __ __ __ __ __ __ __ +
Number of units . . . . . . . 255 ___ ___ ___ ___ ___ ___ ___

Logical address . . . . . . . 1 + (same as CUADD)

Protocol . . . . . . . . . . . . . __ + (D,S or S4)
I/O concurrency level . . . . _ + (1, 2 or 3)

F1=Help   F2=Split   F4=Prompt   F5=Reset   F9=Swap   F12=Cancel
```

```
Goto    Filter    Backup    Query    Help

                     Define Device / Processor

Specify or revise the following values

Device number    . :  C806          Number of devices . . . : 2
Device type    . . . :  OSA
Processor ID  . . . :  OS390S1

Unit address  . . . . . . . . . . . . 06 + (Only necessary when different from
                                         the last 2 digits of device number)
Time-out  . . . . . . . . . . . . . . No (Yes or No)
STADET  . . . . . . . . . . . . . . . Yes (Yes or No)

Preferred CHPID  . . . . . . . . . __  +
Explicit device candidate list . . . No (Yes or No)


F1=Help   F2=Split   F4=Prompt   F5=Reset   F9=Swap   F12=Cancel
```

```
Goto    Filter    Backup    Query    Help

                           Add Device

Specify or revise the following values

Device number . . . . . . . . C806     (0000 - FFFF)
Number of devices . . . . . . 2__
Device type                   OSA ______  +

Serial number . . . . . . . .  _________
Description . . . . . . . . . . _________________________

Connected to CUs . .  C800 ____ ____ ____ ____ ____ ____ ____ +




F1=Help   F2=Split   F4=Prompt   F5=Reset   F9=Swap   F12=Cancel
```

6.6.3 MPC OAT Entry

6.6.3.1 Creating an MPC Entry



LP #

If the system is running in LPAR mode and the OSA channel path is defined to be shared by more than one logical partition, specify the LP number of the LP that is associated with this data path. Otherwise, specify 0.

If the FDDI or FENET OSA-2 is being run in the TCP/IP Passthru mode concurrently with the HPDT MPC mode, make sure the Home IP address or addresses to be used in the concurrent TCP/IP Passthru mode are specified in the OSA's Passthru entry (page 104).

Even unit address

Specify the unit address that you associated in the system hardware I/O configuration (IOCDS) with the even device number for this mode because you are specifying the inbound data path.

OSA/SF will automatically create the corresponding outbound data path with the uneven (odd) unit address.

Port number

A FDDI or FENET OSA-2 has only port 0 (00).

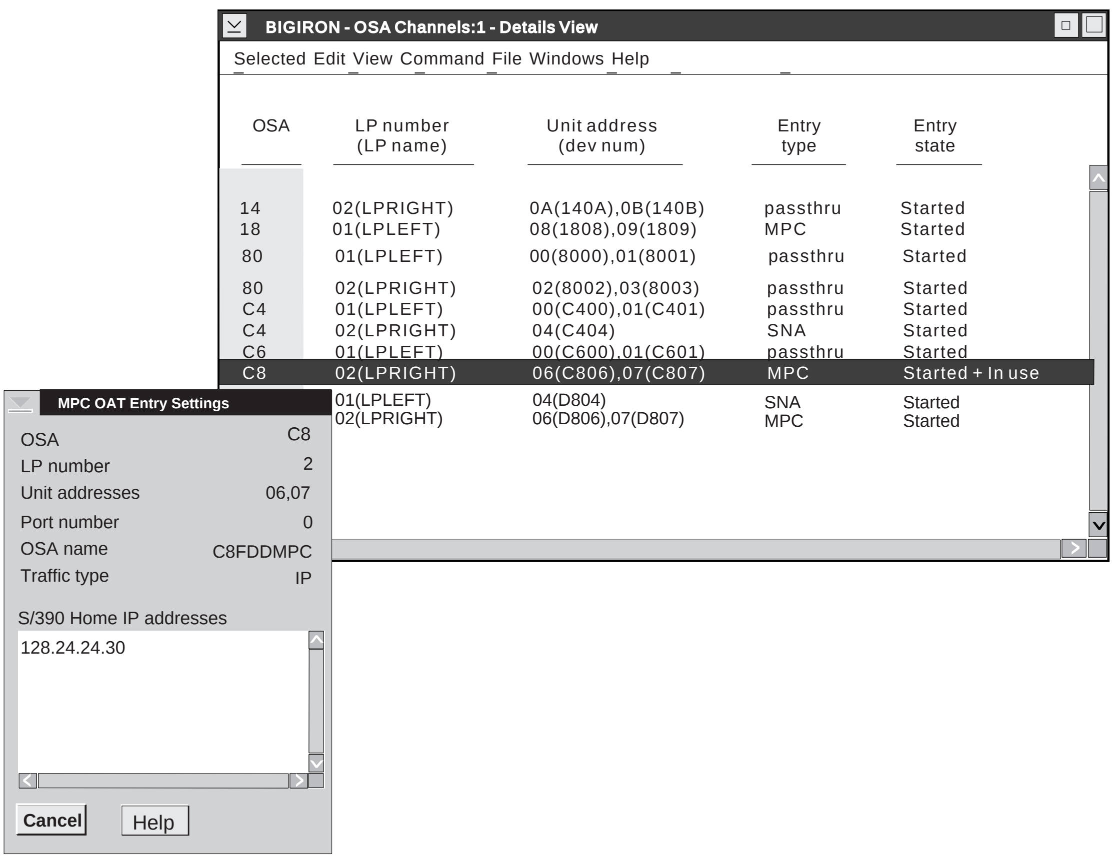
OSA name

Specify an OSA name of 1 through 8 of the following characters: A through Z in upper case, @, #, $, and–starting with the second character–0 through 9. Do not specify duplicate OSA names for two or more OSAs that will be defined to the same LP and be run in the same mode.

Specify the same OSA name that you specify for the OSA in this mode to VTAM or CS for OS/390 SNA in the TRLE statement as the VTAM resources definition and in the applicable OEIFCONFIG network interface command.

6.6.3.2 Viewing an MPC Entry

With the PTF Resolution to OSA/SF APAR OW33393: If this PTF has been applied, the OSA MPC OAT entry looks like the panel shown in the following figure. In this case, the Home IP address is shown for OSA CHPID X'C8' that is transferring IP packets.



Without OSA/SF APAR OW33393: OSA/SF does not display or list the Home IP address in the MPC OAT entry. Therefore, OSA/SF lists only those data items that you entered when you created the MPC OAT entry.

6.6.4 VTAM Resource Definition

To VTAM or CS for OS/390 SNA, specify a VTAM resource definition in the TRL macro TRLE statement as shown in the figure on page 130. Note that the statement label must be the OSA name that you define in the HPDT MPC OAT entry to the OSA and in the OEIFCONFIG command that defines the network address.

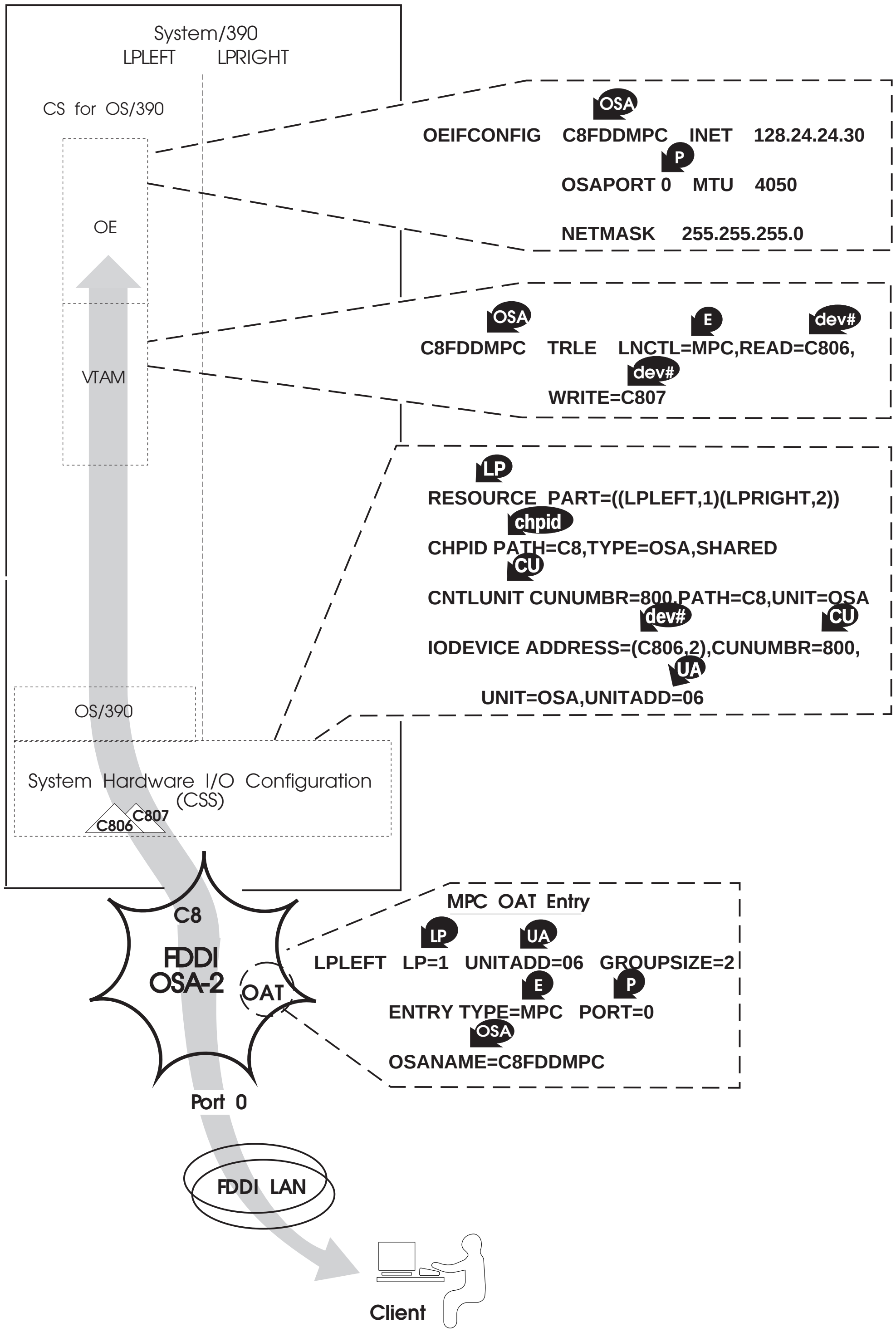
6.6.5 OEIFCONFIG Commands

To define a network interface to the S/390 program, start the connection, or stop it, use the OS/390 OEIFCONFIG, or equivalent commands. For more information, refer to the IP books listed in the bibliography (page xix) especially:

- *OS/390 eNetwork Communications Server: IP Configuration Guide.*
- *OS/390 eNetwork Communications Server: High Speed Access Services User's Guide.*

6.6.6 An Example

In the following example, a FDDI OSA-2 is used. If a FENET OSA-2 is used, the maximum transmission units (MTU) should not exceed 1492.



Chapter 7. HPDT MPC Mode for the IPX Protocol

A Fast Ethernet (FENET) OSA-2 can be run in the High Performance Data Transfer Multipath Channel (HPDT MPC) mode to support the transfer of data packets using either the IP or IP Exchange (IPX) protocol. The OSA-related parameters to support IPX data packet transfer are described in this chapter. The discussion on IP data packet transfer starts on page 124 in the preceding chapter.

7.1 Task Planning Checklist

__ 1. Ensure the FENET OSA-2 supports one of the following frame protocols:

- Ethernet II using the DEC Ethernet V 2.0 envelope, which is displayed or listed by OSA/SF as Ethernet II.
- Ethernet 802.2 IEEE 802.3 LAN MAC (802.3 i.e. using the 802.2 envelope), which is displayed or listed by OSA/SF as Ethernet 802.2.
- Ethernet SNAP (Ethernet 802.3 using an 802.2 envelope with SNAP, which is displayed or listed by OSA/SF as Ethernet SNAP.

__ 2. Make sure that an instance of OSA/SF running on OS/390 is defined and available to customize the OSA-2 in this mode.

- The PTF resolution to OSA/SF APAR OW30222 is required to allow you to create an HPDT MPC OAT entry.
- The PTF resolution to OSA/SF APAR OW33393 is required to allow you to view the IPX protocol data.

__ 3. In the system hardware I/O configuration (IOCDS), associate one even/odd, read/write pair of device numbers with the channel path of the FENET OSA-2 that is to be run in this mode.

If a FENET OSA-2 is defined to be shared among logical partitions in a system that is running in logically-partitioned (LPAR) mode with the EMIF facility, the FENET OSA-2 can be run concurrently in any combination of the HPDT MPC, TCP/IP Passthru, and SNA modes.

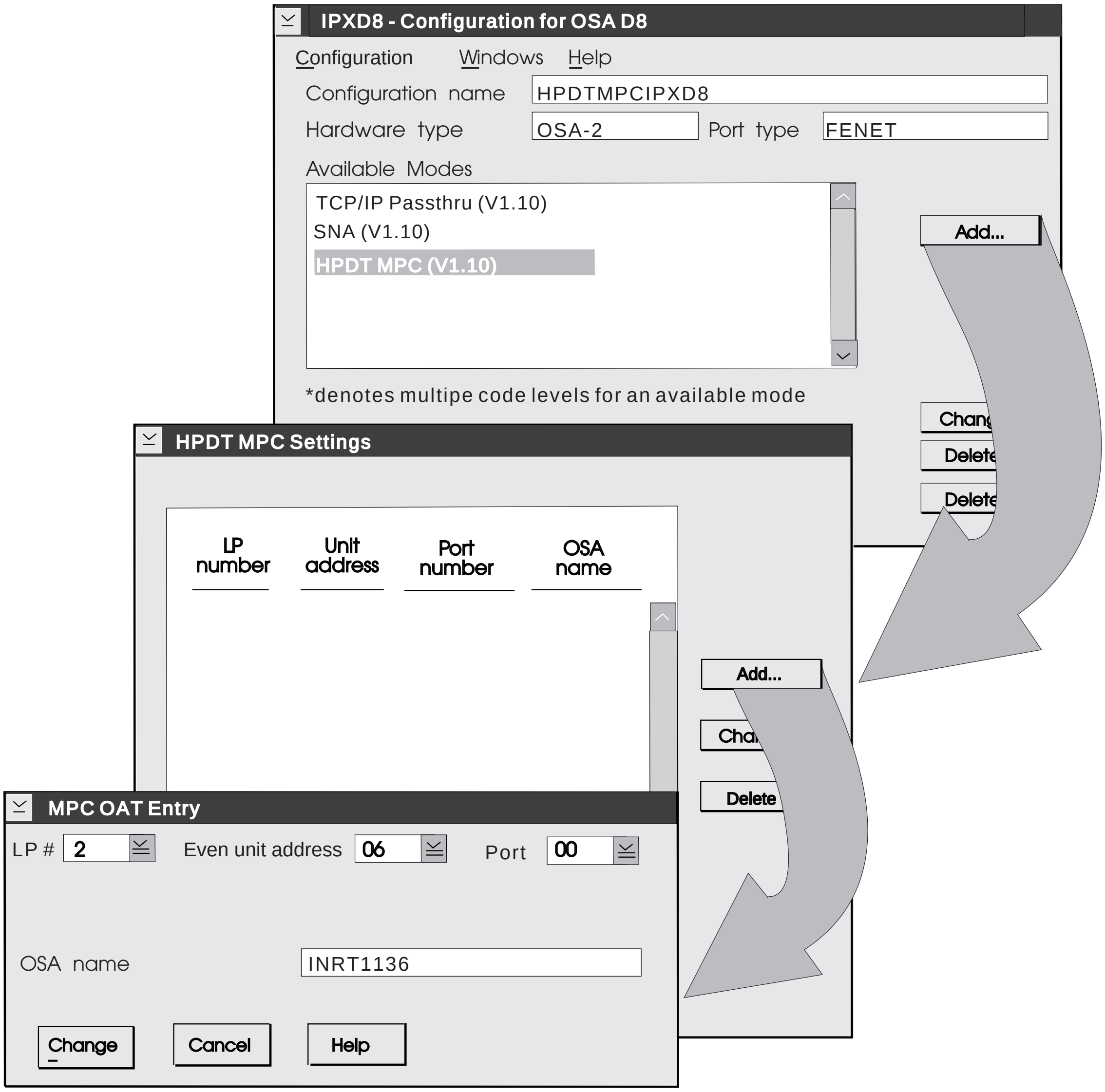
__ 4. Using OSA/SF, create an MPC OAT entry for IPX protocol as described in the next section.

Activate the HPDT MPC mode on the OSA-2 as described in *OS/390 OSA/SF User's Guide,* which is listed in the bibliography (page xv).

__ 5. Define the OSA name and the pair of OSA device numbers in the TRLE statement of the TRL macro of VTAM or the SNA function of CS for OS/390, whichever is running on the OS/390 system image.

- Define the OSA name as ***INRT11****nn*, where *nn* is an integer from 00 through 99 in decimal notation.
- For more information on the TRL macro, refer to the relevant system books, some of which are listed in the bibliography (page xx).
- For more information on Novell Directory Services (NDS), refer to *Novell NetWare Services Utilities Reference*, which is listed in the bibliography (page xix).

7.2 An MPC OAT Entry



LP

If the system is running in LPAR mode and the OSA CHPID is defined as shared, specify the LP number of the logical partition in which NDS is running that forms the S/390 end of this data path. Otherwise, specify 0.

Even unit address

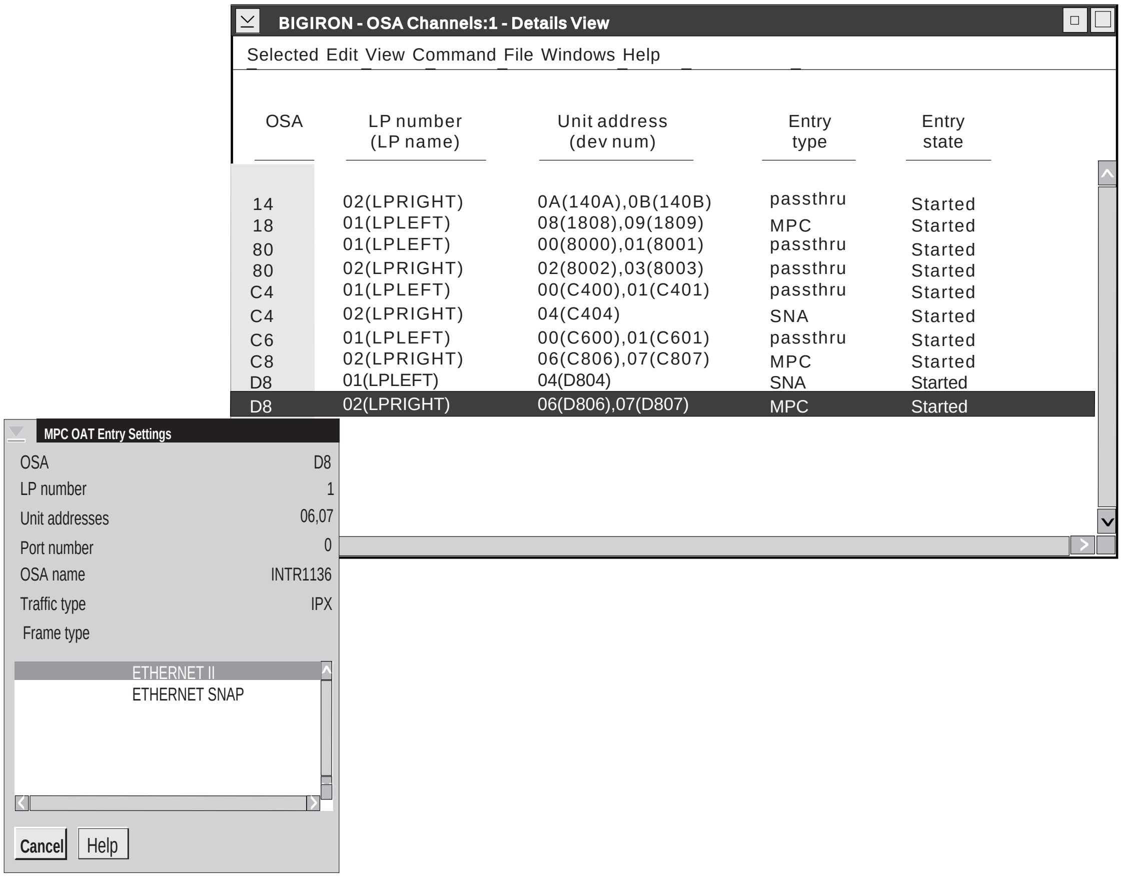
Specify the unit address of the even device number that you defined in the system hardware I/O configuration (IOCDS) and on the TRLE statement to VTAM or CS for OS/390 SNA that is transferring the IPX data packets.

Port number

Specify 00 because a FENET OSA-2 has only one port.

OSA name

Specify the OSA name as ***INRT11****nn*, where *nn* is an integer from 00 through 99 in decimal notation. Also, specify this OSA name in the VTAM TRL macro TRLE statement.



Chapter 8. SNA Mode

If an OSA is being run in the SNA mode, it is viewed by VTAM and the SNA function of CS OS/390 as an external communications adapter (XCA) that can have either switched or non-switched lines of communications.

In this mode, an OSA acts as an SNA passthrough agent to the clients that use the SNA protocol on the LAN that is directly attached to the OSA or, in the case of an ATM OSA-2, that are bridged from the ATM network in an emulated LAN (ELAN) configuration. Any OSA can be run in the SNA mode in any of the system environments in which it is supported. To make this chapter applicable for all the environments, VTAM examples are used, not examples that show the SNA function of CS for OS/390.

8.1 General Notes

1. A FDDI OSA-2 and a FENET OSA-2 can be run in the SNA mode concurrently with the TCP/IP Passthru mode or the HPDT MPC mode, or both modes, in those environments that support those modes.
2. An ENTR OSA-2 and an ATM OSA-2 can be run in the SNA mode concurrently with the TCP/IP Passthru mode.
3. In the SNA mode, the OSA transfers data across one of the following:
   - An Ethernet LAN that is physically attached to an ENTR OSA-2 or a FENET OSA-2 port or logically attached to an ATM OSA-2 LAN emulation client (LEC), or logical, port, and supports the following frame protocol:

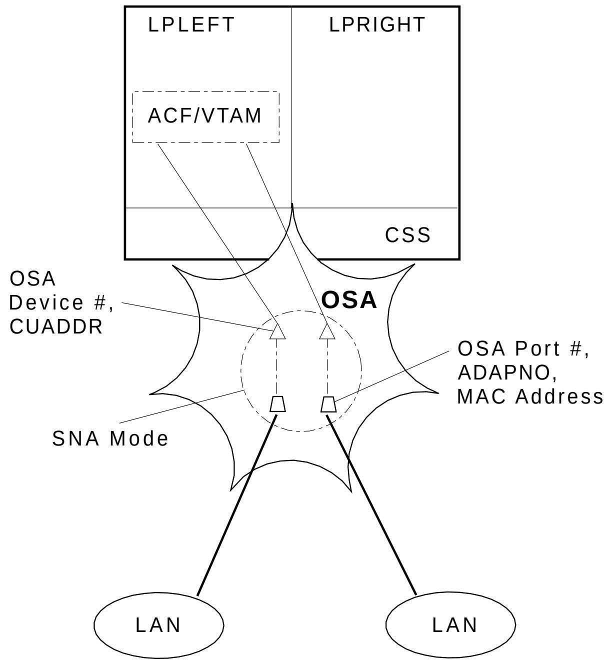
     Ethernet 802.2 LAN MAC (802.3 using the 802.2 envelope)
   - A FDDI LAN that is attached to a FDDI OSA and supports the following frame protocol:

     IEEE 802.2 LAN MAC (ANSI X3T9.5 using the 802.2 envelope)
   - A token-ring LAN that is physically attached to an ENTR OSA-2 port or logically attached to a LAN emulation client (LEC), or logical, ATM OSA-2 port, and supports the following frame protocol:

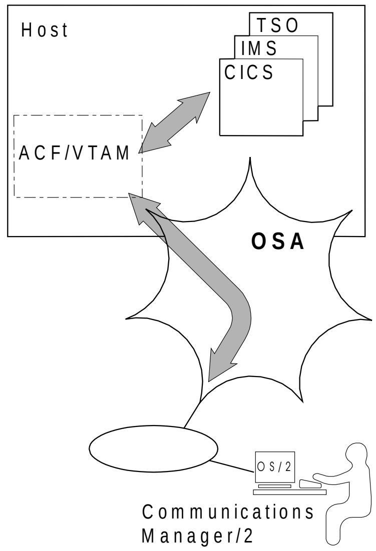
     IEEE 802.2 LAN MAC (802.5 using the 802.2 envelope)
4. For more information on the OS/390 eNetwork Communications Server (CS for OS/390), refer to the books listed in the bibliography (page xix).
5. For more information on VTAM, including VTAM high performance routing (HPR), refer to the VTAM books listed in the bibliography (page xx).
6. In the following two figures, the identifiers for an OSA are shown that are needed for an OSA to be run in the SNA mode. A FDDI OSA is depicted, but the definitions apply to the other OSAs as well.

   In these figures, a triangle depicts a S/390 device that you have associated with the OSA channel path. VTAM recognizes this device number as the CUADDR. A trapezoid depicts an OSA port, which VTAM recognizes as the ADAPNO and the LAN nodes recognize by its MAC address. Two logical partitions are shown: LPLEFT (LP 1) and LPRIGHT (LP 2).

Definitions for the SNA mode



Data flow in the SNA mode



8.2 Task Planning Checklist

8.2.1 Preparatory Tasks

1 It is advisable to prepare worksheets for each OSA to keep track of the data items you need to input.

2 Check which OSAs will be run in this mode and whether they will be run concurrently in either the TCP/IP Passthru mode or the HPDT MPC mode, or both modes. (An ENTR OSA-2 and ATM OSA-2 cannot be run in the HPDT MPC mode.)

3 Ensure the programming requisites and installation factors for this mode are taken into account.

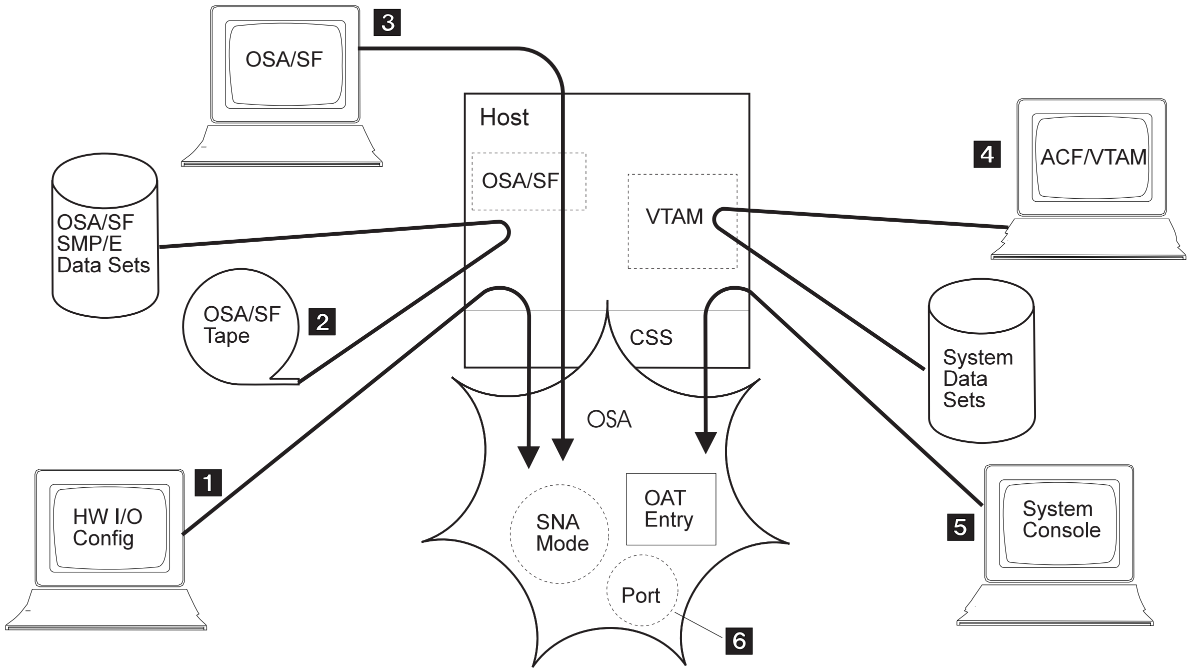
4 Ensure OSA/SF is set up. See the appropriate OSA/SF User Guides whose titles are listed in the bibliography (page xv).

5 Assess your network configuration to determine whether it is useful to set the SNA mode parameters that are discussed on pages 140 and 151.

6 Plan for the use of this mode, including how to handle problems that can occur.

For information on alertable conditions reported by an ATM or FENET OSA-2, see page 197. Information on alertable conditions reported by an ENTR and FDDI OSA-2 is provided on page 202. Also, refer to the OSA/SF User's Guides whose titles are listed in the bibliography (page xv).

8.2.2 SNA Mode Tasks



1 Using a system I/O configuration component, such as the Hardware Configuration Definition (HCD) panels or the I/O Configuration Program (IOCP), define one device number for each OSA port to be used (page 138).

If you need to define a Box Manager node (page 202) for an SNA network management program such as NetView, define a separate device number for the OSA's virtual port.

2 If the SNA mode is not already installed from the OSA/SF tape, do so now.

3 Using OSA/SF, create a SNA OAT entry for each port being used for data traffic in the SNA mode (page 138).

If a Box Manager node is needed to support an SNA network management service program, for example, NetView, (page 202) for the OSA's virtual port X'FF'.

4 Identify the OSA to each XCA and SWNET major nodes (page 156). If the OSA mode requires an SNA network management program, such as NetView, enable that program as well.

5 To activate an OSA mode, the OSA channel and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA CHPID must be reset.)

6 Some port parameters are required to be set and some are optionally settable.

If an ATM OSA-2 LAN emulation client (LEC) port is being customized in the SNA mode, its port parameters must be defined for each emulated LAN (ELAN) that it supports (page 185).

Each port has an SNA notebook page. See page 140 for the expanded SNA notebook page and page 151 for the basic SNA notebook page.

8.3 System Hardware I/O Configuration Definitions

- Any OSA can be run in the SNA mode, which is supported by all the S/390 systems that support OSA. For an introduction to this mode, see page 135.
- You must define one device number for each OSA port to be used for data transfer. On an ATM OSA-2, define a device number for each LAN emulation client (LEC) port to be used in this mode.
- Specify a unit address value from X'00' through X'FB' for each of these device numbers. Consider specifying a unique range of unit addresses for the SNA mode, although you might want to exclude the range X'00' through X'09', which is the range of default range of unit addresses used in the TCP/IP Passthru mode.
- A device number is also called the channel unit address (CUADDR) or subchannel address.
- Given the foregoing factors, here's how you would specify (in IOCP format) port 0 on OSA CHPID X'C4' for the SNA mode:

  dev# CU UA

  IODEVICE ADDRESS=(C404),CUNUMBR=100,UNIT=OSA, UNITADD=04

- If a Box Manager node is required, define a device for the OSA's virtual port X'FF'.

  A Box Manager node is required only for communications with an SNA network management service such as NetView and only if the NetView program-to-program interface (PPI) is not being used. The PPI is used by a FENET OSA-2 and by an ATM OSA-2 if the PTF resolution to OSA/SF APAR OW30222 (OS/390 or MVS/ESA) has been applied.

  To define a Box Manager node, see the following example:

  dev# CU UA

  IODEVICE ADDRESS=(C40E),CUNUMBR=100,UNIT=OSA, UNITADD=0E

8.4 SNA OAT Entry for the SNA Mode

To customize, or configure, an OSA in the SNA mode, you must create an SNA OAT entry using OSA/SF. OSA/SF then stores, or downloads, the SNA OAT image on the OSA. Optionally, you can change some of the OSA port parameters that are also stored on the OSA. You make those changes using OSA/SF as well. Whenever these images are changed on the OSA, you must configure the CHPID and its associated devices off from all the logical partitions (LPs) to which it is defined, and then configure them back on. Obviously, therefore, it is prudent to plan for each OSA mode with care to minimize this effort.

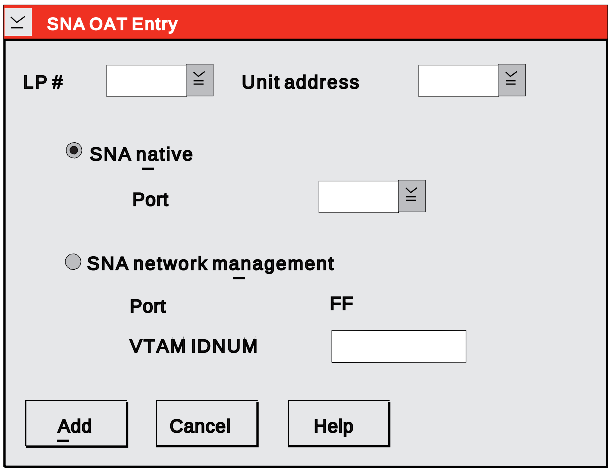
Create an SNA OAT entry for each pair of read/write, inbound/outbound data paths for a unit address and LP.t and LP being used in this mode. In this book, the OSA/SF OS/2 interface (GUI) panels are shown, but you can use any of the other OSA/SF user interfaces. In an OS/390 environment, for example, you can access OSA/SF through IOACMD at the TSO/E command line.

Notes:

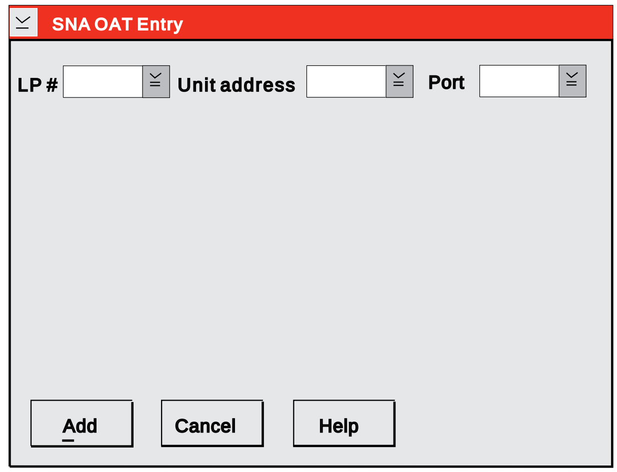
1. If you are creating an SNA mode configuration for an ATM OSA-2, plan for the ATM LAN emulation client (LEC) settings (page 185).
2. If an SNA network management service, such as NetView, is being used for an ATM OSA-2 to which the PTF resolution to OSA/SF APAR OW30222 (OS/390 or MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) has*not* been applied or for an ENTR OSA-2 or for a FDDI OSA-2, create an additional SNA OAT entry of the SNA network management type for the Box Manager node.
3. You do not have to specify the LAN type to OSA because OSA/SF does that automatically. However, you must specify this as the medium parameter value in the XCA Port Definition statement:

- A FDDI LAN attachment matches VTAM MEDIUM=FDDI
- An Ethernet LAN attachment (or its emulation in an ATM-based network) matches MEDIUM=CSMACD in the XCA node. (carrier sense medium access collision detection)
- A token-ring LAN attachment (or its emulation in an ATM-based network) matches MEDIUM=RING in the XCA node.

An ATM or ENTR or FDDI OSA-2 Panel



A FENET OSA-2 Panel



LP #

For a FENET OSA-2 and for an SNA native OAT entry for any other OSA-2, specify:

- The logical partition (LP) number of the LP in which the S/390 program is running if the system is running in LPAR mode and the OSA is defined as shared.
- Otherwise, enter 0 regardless whether the system is running in LPAR or basic mode.

For an SNA network management OAT entry, specify the logical partition (LP) number of the LP in which the SNA network management service, for example, NetView, is running.

Unit address

Specify the unit address of the OSA device number that you associated with this OSA CHPID in this mode for this LP or system in basic mode. (See the discussion on the system hardware I/O configuration that starts on page 138.)

SNA native

Accept this default SNA record type if you are specifying an OAT entry for a physical or logical OSA port, that is, for port 0 or port 1.

SNA network management

Specify this record type if you are specifying a Box Manager node (page 202). The associated port number is automatically virtual port X'FF'. Note that a FENET OSA-2 does not support a Box Manager node. An ATM OSA-2 also does not support it if the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) is applied. In those cases, OSA supports the program-to-program interface (PPI) instead.

For a Box manager node, additionally:

- Specify the IDNUM V in the SWNET VBUILD statement as 1–5 hexadecimal characters for the Format 1 XID exchange with the OSA task. Remember to specify the same number in the OSA PU parameter in the SWNET major node.
- In the Port Definition statement of the XCA major node for this connection, specify BOXMGR.
- Activate the SWNET major node before the XCA major node. Otherwise the Boxmanager PU stays in a connectable (CONCT) state. The line does not become active; you get the IST690I message instead.
- Remember to specify a separate device number for the OSA *virtual port* FF in the system hardware I/O configuration (page 138) and in the Port Definition statement of the XCA Mode.
- If you are specifying this OAT entry for an ATM OSA-2 to which the PTF resolution of OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW3030932 VM/ESA), or PQ11504 (VSE/ESA) has been applied, the OAT entry will not be valid if and when you activate the SNA image on that ATM OSA-2.

8.5 Expanded Set of SNA Mode Port Parameters

Notice!

The expanded set of SNA mode port parameters requires that the PTF resolution to one of the following OSA/SF APARs has been applied: OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA).

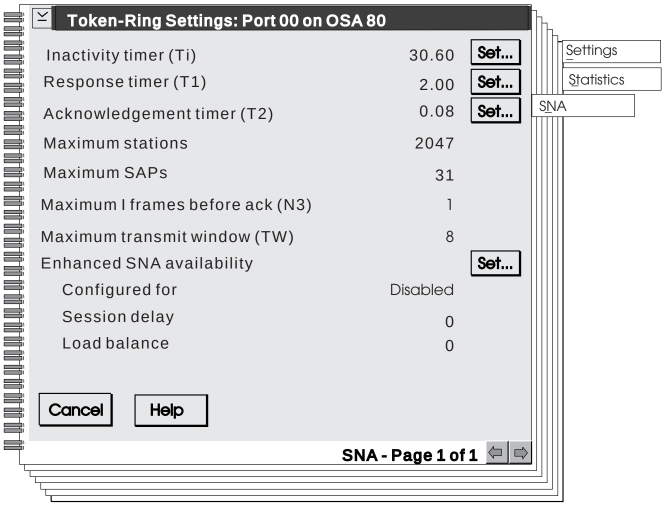
- If the PTF to any of these APARs has been applied, read the following descriptions.
- If the PTF to none of these APARs has been applied, refer to the discussion on the basic set of SNA mode port parameters that starts on page 151.

If an OSA-2 is being run in the SNA mode, you can set a number of SNA mode port parameters. They are illustrated in this book with the OSA/SF OS/2 interface (GUI) panels. You can, however, use another OSA/SF interface.

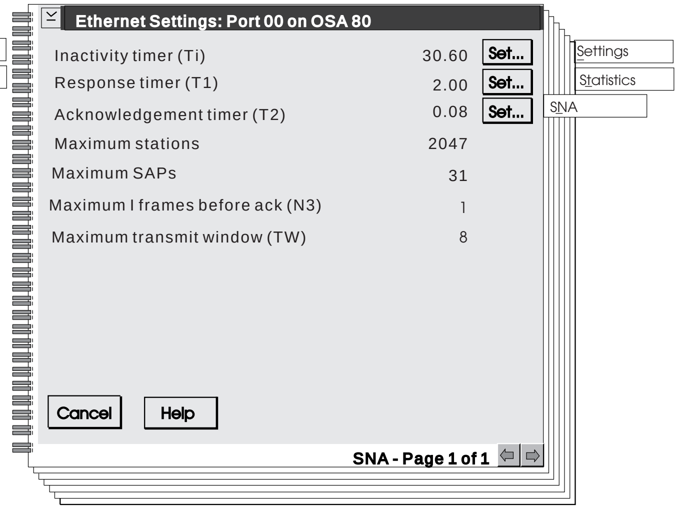
8.5.1 An OSA Port's Expanded SNA Notebook Page

The following panels are shown in their initialized states.

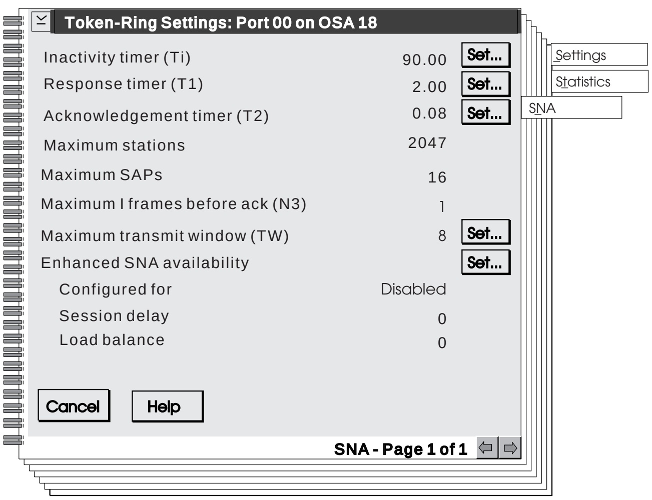
ENTR OSA-2 X'80' (TR LAN)



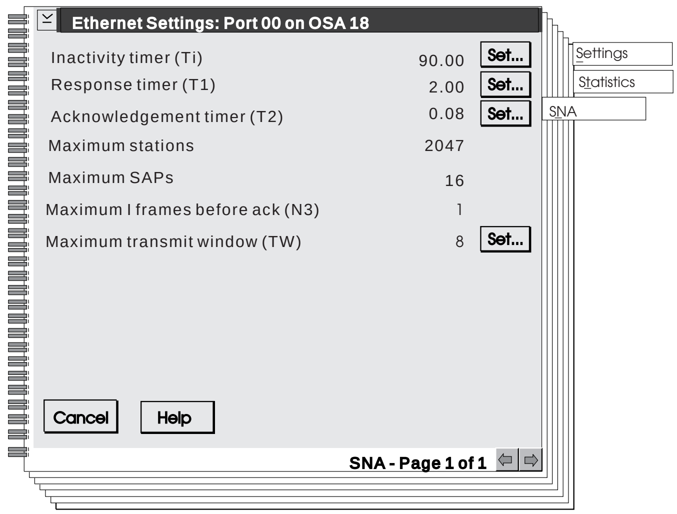
ENTR OSA-2 X'80' (Ethernet LAN)



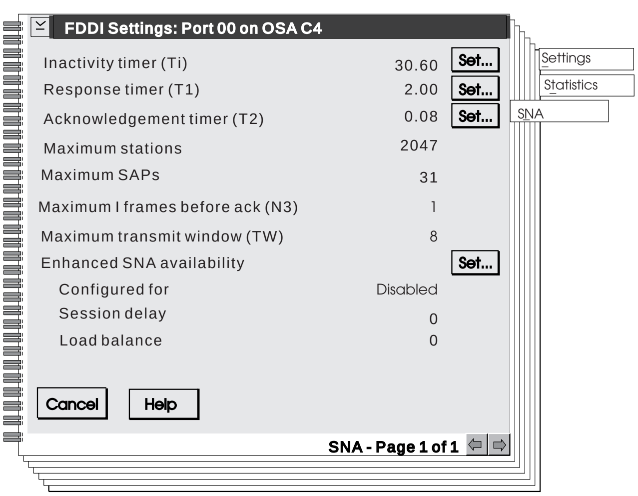
ATM OSA-2 X'18' (TR ELAN)



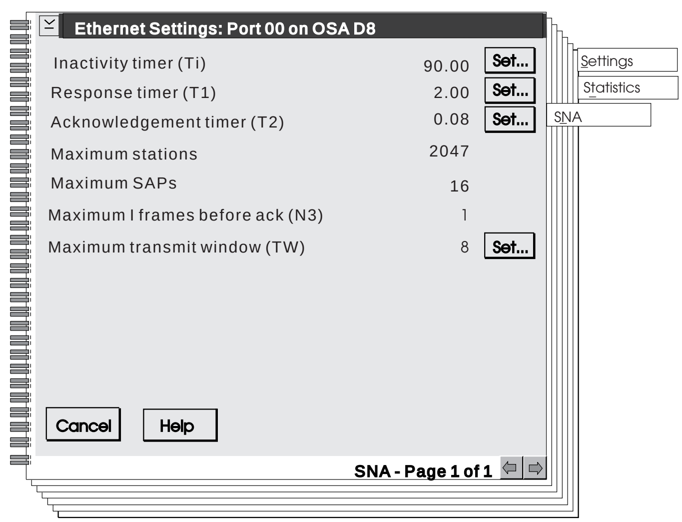
ATM OSA-2 X'18' (Ethernet ELAN)



FDDI OSA-2 X'C4'



FENET OSA-2 X'D8'



In Summary:	ENTR OSA-2	FDDI OSA-2	ATM OSA-2	FENET OSA-2
Ti and T1 LLC timers	Settable	Settable	Settable	Settable
T2 LLC timer	Settable but not effective (N3=1)	Settable but not effective (N3=1)	Settable if N3>1	Settable if N3>1
N3 count	Settable but not effective (N3=1)	Not settable (N3=1)	Settable (N3=1–4)	Settable (N3=1–4)
TW count	Not settable (TW=8)	Not settable (TW=8)	Settable (TW=1–16)	Settable (TW=1–16)
Maximum PUs supported (Note 1)	APAR dependent (255 or 2047)	APAR dependent (255 or 2047)	APAR dependent (255 or 1000)	2047
Maximum SAPs supported (Note 2)	31	31	16	16
SNA session availability options available? (Note 2)	If connected to a TR LAN	Yes	If defined for a TR ELAN	No

Notes:

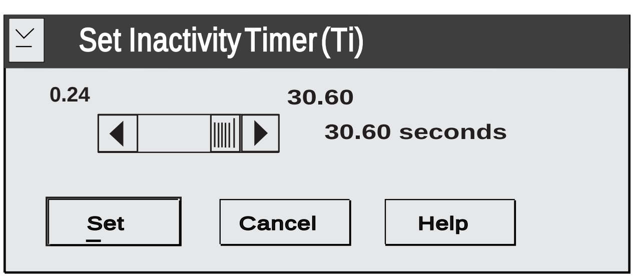
1. The maximum PU limit depends on the OSA and the level of the SNA image that is downloaded on it. See page 157 and the requirements for the SNA mode for each operating system in the earlier chapters.
2. The maximum number of SAPs that can be opened is one for each application in each logical partition (LP). This number is 16 although the maximum is a theoretical 31 on the ENTR and FDDI OSA-2 panels.

   This number of SAPs excludes the null SAP or a SAP needed for a Box Manager node for NetView communications (page 202).

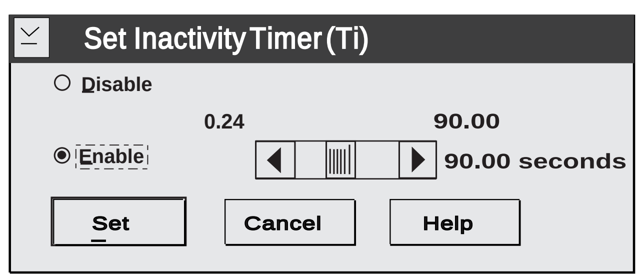
   For the SNA session enhancement options (page 140), only one SAP can be opened per port with the exception of the Redundancy option for an ATM OSA-2 LEC port (page 149).

8.5.2 Inactivity Timer (Ti)

An ENTR or FDDI OSA-2 Panel



An ATM or FENET OSA-2 Panel

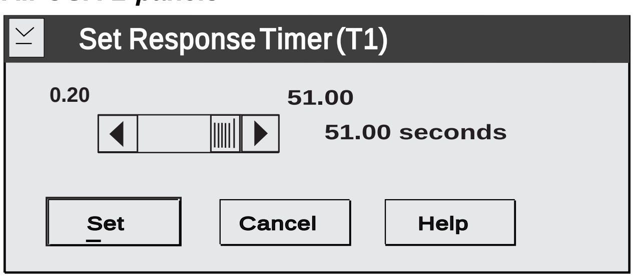


Notes:

1. For an ATM or FENET OSA-2 port, the Ti timer is initialized to be enabled and set to its maximum value of 90 seconds.
   - You can disable or enable the Ti timer.
   - If the Ti timer is enabled, you can set its timeout value in increments of 0.12 seconds from 0.24 to 90.00 seconds.
2. For an ENTR or FDDI OSA-2 port, the Ti timer is initialized to be enabled and set to its maximum value of 30.60 seconds. You cannot disable the Ti timer; you can set a timeout value in increments of 0.12 seconds from 0.24 to 30.60 seconds.
3. An enabled inactivity timer (Ti) periodically tests the viability of the network media. The timer setting applies to all the clients on the target LAN, not to individual clients. The timer interval indicates how quickly a failure of the network media can be detected when the connection is quiescent.
   - If the Ti timer times out, a supervisory poll frame is sent over the connection. The T1 response, or reply, timer clocks the supervisory poll.
   - If the T1 timer times out, the supervisory poll is retransmitted. OSA can retransmit a supervisory poll up to 8 times.
   - If no response is received after the last retransmission, the link is declared inoperative, and the S/390 program issues a message.
4. If you set the Ti timer, make sure its interval exceeds the T1 timer limit. Consider setting the Ti timer to a value that is at least 5 times greater than the T1 timer.
5. If you set the Ti timer using the REXX interface and you do not specify the increment properly, OSA/SF rounds the value up to the nearest increment.

8.5.3 Response, or Reply, Timer (T1)

All OSA-2 panels



Notes:

1. T1 timer is initialized to 2 seconds and can be set to a timeout value from 0.20 up to 51.00 seconds in increments of 0.20 seconds.
2. The T1 timer clocks link events that require responses from clients on the network. These link events include SABME / UA exchanges, I-frame link protocol data unit (LPDU) transmissions, and supervisory polls.
3. Set the T1 timer to a value that is not less than the average round-trip transit time from the OSA to the clients and back.

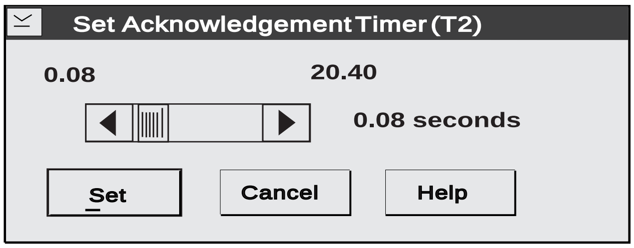
   If the round-trip transit time is small, consider setting the T1 timer to a relatively low value because recovery will be initiated more quickly when an I frame is dropped. Further, a T1 timer interval that exceeds 2 seconds can result in noticeable delays to those responses that must be retransmitted.

However, retransmissions should occur infrequently and only during bursts of peak activity on the network.

4. Check the timer parameter value that is specified in the XCA Port Definition statement. Make sure the XCA timer is set to a value that is greater than (N2+1)*T1. Since N2=8 (retransmissions) for OSA, set the timer to a value that is greater than (9*T1). N2 = the maximum number of retransmissions.
5. If you set the T1 timer using the REXX interface and you do not specify a multiple of 0.20 seconds, OSA/SF rounds the value up to the nearest increment of 0.20 seconds to a maximum of 51 seconds.

8.5.4 Receiver Acknowledgment Timer (T2)

An ATM or FENET OSA-2 Panel



Set the T2 timer only for an ATM or FENET OSA-2. Do not set the T2 timer for an ENTR or FDDI OSA-2 because it is not effective for these OSAs.

Notes:

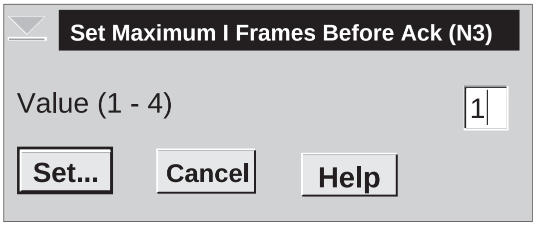
1. If N3=1 (page 144), which means only one I frame can be received before an acknowledgment is sent, the T2 timer is disabled. For an ENTR or FDDI OSA-2, N3 = 1.
2. If N3>1 for an ATM or FENET OSA-2, this allows a maximum of N3 I-format link protocol data unit (LPDU) frames to be received before the OSA sends an acknowledgment.

   An OSA starts the T2 timer when it receives an I-format LPDU and stops when it sends an acknowledgment. An acknowledgment is sent either when an outgoing I frame is sent, which acts as the acknowledgment, or when N3 number of I-format LPDUs has been received. If the T2 timer times out, the OSA must send an acknowledgment.
3. If you set the T2 timer, bear the following in mind.
   - Set it to a value from 0.08 seconds up to 20.40 seconds in increments of 0.08 seconds.
   - Set it to a value that is less than the T1 interval to ensure that the remote link station receives the delayed acknowledgment before the T1 timer expires. A typical value for the T2 timer is 0.08 seconds.
   - Set it to a value that depends on the media speed and the maximum latency that can be tolerated to complete a transaction. This latency will be realized when a transaction contains a number of packets that is not divisible by the N3 value.
4. If you set the T2 timer using the REXX interface and you do not specify a multiple of 0.08 seconds, OSA/SF rounds the value up to the nearest increment of 0.08 seconds to a maximum of 20.40 seconds.

8.5.5 N3 and TW Counts

In determining the maximum I-frames that can be sent before an acknowledgment is sent (N3 count) and the maximum number of outstanding I-format link protocol data units (LPDUs) (TW count), consider the N3 and TW counts that are set at the clients as well.

An ATM or FENET OSA-2 Panel



The N3 count is initialized to 1.

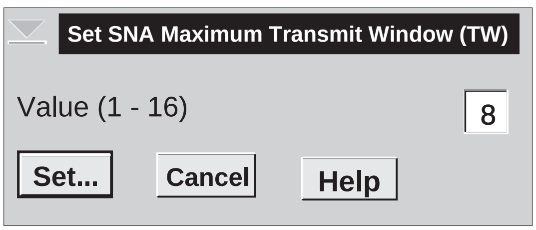
For an ATM or FENET OSA-2, you can set the N3 count as an integer from 1–4.

For an ENTR or FDDI OSA-2, you can not change the N3=1 count.

Notes:

1. The maximum number of I-format link protocol data units (LPDUs) that can be received by an OSA before it sends an acknowledgment (N3 count) is also called the receive window count.
2. For an ATM or FENET OSA-2, set N3>1 only if you want to reduce the number of acknowledgment frames sent by the OSA. Bear in mind that N3>1 can result in increased latency.
3. Do not set the N3 count to a value that is greater than the TW count set any of the clients. Otherwise, network response can be severely degraded.

An ATM or FENET OSA-2 Panel



The TW count is initialized to 8.

You can set it only for an ATM or FENET OSA-2. Set it as an integer from 1–16.

Notes:

1. The maximum number of outstanding I-format link protocol data units (LPDUs) (TW count) is also called the maximum transmit window count or the maximum window out count.

   The TW count allows the sender to transmit frames before that sender is forced to halt and wait for an acknowledgment. Therefore, the receiver should be able to absorb that number of frames, either in its service access point (SAP) buffers or within the buffers in workstation memory.
2. A small TW count reduces the chances that frames are retransmitted owing to buffer congestion at the receiver.

8.5.6 SNA Session Availability Options

You can enhance the availability of SNA sessions for FDDI OSA-2 ports, ENTR OSA-2 ports that are attached to token-ring LANs, and ATM OSA-2 LAN emulation client (LEC) ports that provide LEC services on emulated token ring LANs (token-ring ELANs).

8.5.6.1 Planning Tasks: *1. Decide which OSA-2 ports to use.*

- Assess the network configuration and user community in terms of their traffic distribution and potential tolerance for delay times. Because these factors are site-dependent, they fall outside the scope of this book.
- Specify the same local MAC address for the following ports:
  - All the ports for which you specify the Overflow option and their backup ports for which you specified the Overflow and Redundancy option.

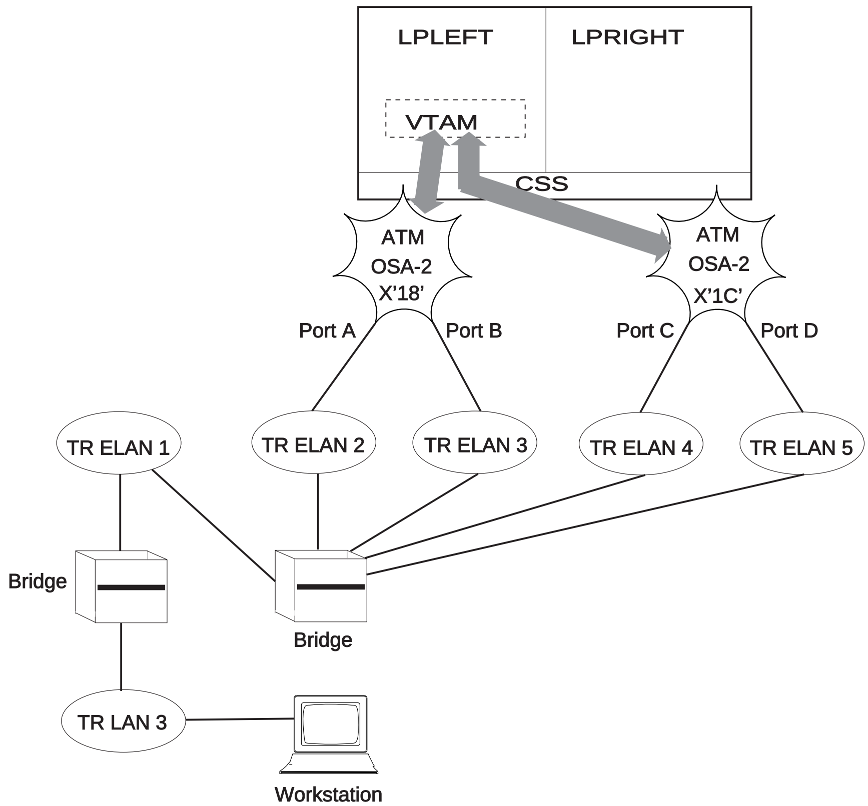
– All the ports for which you specify the Load Balancing option and their backup ports for which you specified the Loading Balancing and Redundancy option.

– The ATM OSA-2 LEC port for which you specify the Redundancy option and the primary port for which the Disabled option is specified.

These local MAC addresses should be active before an OSA is being run in the SNA mode. Note that you can set a local MAC address (page 210) using OSA/SF if the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) has been applied.

2. Make sure the ports with identical local MAC addresses are attached to different LAN segments.

An illustration of bridging ELANs for four ATM OSA-2 LEC ports is shown in the following figure.



3. In the XCA major node, set the maximum number of stations (PUs) that can be logged on to each OSA port. The maximum number of PUs depends on several factors. For a list, see page 157 and the requirements listed in the earlier chapters for each operating system that OSA supports.

4. Ensure that the S/390 program, such as the OS/390 eNetwork Communications Server SNA application or VTAM, has paths defined through all the ports with the same local MAC address.

- Open only one SAP for each S/390 application that is communicating with a port.

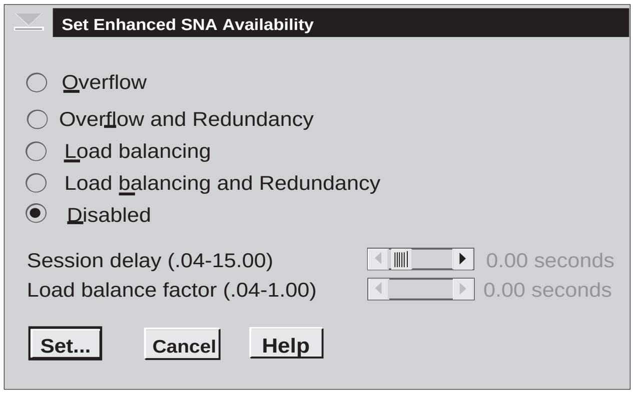
  The only exception is if you specify the Redundancy option for an ATM LEC port (page 149).

- Do not configure the XCA macro to use NETBIOS SAP `X'F0'`.

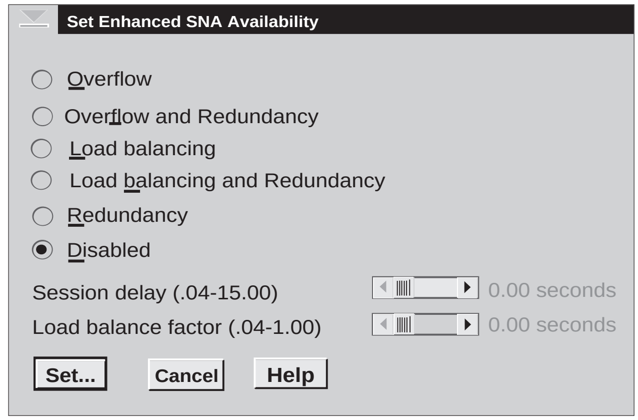
- In the SWNET major node, ensure the MAXPATH value is large enough to accommodate all the paths that will be used.

5. Specify the OSA/SF SNA session availability options by selecting them from the OSA/SF ***Enhanced SNA Availability*** panel. After setting these options, reset the OSA channel path of each member so the changes can take effect.

An ENTR or FDDI OSA-2 panel



An ATM OSA-2 panel



8.5.6.2 Overflow Option (ATM, ENTR, FDDI OSA-2):

This option causes the specified port to stop responding to connection requests when it reaches its maximum station count, or PU limit. The maximum PU limit, which is defined for the port to VTAM (page 157) or the SNA function of CS for OS/390, defines that port's overflow threshold. Once the OSA port is in an overflow condition, it stops responding to connection requests.

Note that OSA makes no attempt to ensure an even distribution of the clients across the participating OSA ports. If more than one port is responding to connection requests, the first response that the client receives typically determines which OSA port is selected for the connection. However, other factors can affect this selection. Therefore, the exact distribution of connections across the OSA ports depends on delays in the network and the implementation of the clients.

For example, assume the following configuration and current state.

Port	Option	Max PU limit	Current session count	Status
A	Overflow	347	347	Online (Note 1)
B	Overflow	300	183	Online (Note 2)
C	Overflow	347	27	Online (Note 2)

Notes:

1. With the current session count equal to the maximum PU limit, port A has reached its overflow threshold and stopped responding to connection requests.
2. Whether port B or port C is selected for a connection is governed by delays in the network.

8.5.6.3 Overflow and Redundancy Option (ATM, ENTR, FDDI OSA-2):

This option together with the session-delay time that you define for the port prescribes that the specified port delays its response to a connection request by that amount of time. This delay allows the port to provide a backup, or redundant, path for a port for which the overflow option is specified.

For example, assume the following configuration and current state.

Port	Option	Session delay	Max PU limit	Current session count	Status
A	Overflow	N/A	347	0	Failed
B	Overflow	N/A	300	300	Online (Note 1)
C	Overflow and Redundancy	0.32 sec	347	5	Online (Note 2)
D	Overflow and Redundancy	0.32 sec	300	62	Online (Note 2)

Notes:

1. With its current session count equal to its maximum PU limit, port B has reached its overflow threshold and stopped responding to connection requests.
2. Ports C and D will respond after their specified session delays, which is 0.32 seconds in this example. Additional connections will be established to ports C and D in an order that depends on delays in the network. The first port that reaches its maximum PU limit will stop responding, and any remaining connection requests will be logged onto the other port.

   For instance, suppose there are more connection requests and port D reaches its maximum PU limit first. Now, port C will respond to the remaining connection requests until it reaches its overflow threshold.

   In this example, a satisfactory redundant configuration is represented for up to 647 connections assuming that it was intended to accommodate a simultaneous failure of both ports A and B.

8.5.6.4 Load Balancing Option (ATM, ENTR, FDDI OSA-2): With this option, you allow two or more ports to balance their connection requests. Load balancing is only related to the *number* of connections (PUs); it is not related to either the traffic volume or the workload across those connections.

For example, assume the following configuration and current state.

Port	Option	Load balance factor	Max PU limit	Current session count	Status
A	Load balancing	0.08 sec	256	256	Online (Note 1)
B	Load balancing	0.08 sec	480	256	Online (Note 2)
C	Load balancing	0.08 sec	1024	238	Online (Note 2)

Notes:

1. Port A has a maximum PU limit that is much lower (256) than the limit for ports B (480) and C (1024). Because port A has reached its maximum PU limit, it has stopped responding to connection requests.
2. The current session count for port B is 256 and for port C it is 238 sessions. Both ports will respond to connection requests.

   Because the load balancing option has been specified for both of them, the delay for each port is proportional to the number of connections it has before the response to the next connection request is issued.

   To calculate the total delay for the next connection request for each port, obtain the multiplier factor from the table on page 150.

   - With a current session count of 256 sessions, port B's total delay time = 0.08 * 6 = 0.48 seconds.
   - With a current session count of 238 sessions, port C's total delay time = 0.08 * 5 = 0.40 seconds.

Port C would therefore respond to a new connection request before port B. Hence, a connection would be established for port C, which would bring its session count up to 239. Although, typically the first response that a client receives determines which OSA port is selected for the connection, note that other factors can affect this selection.

8.5.6.5 Load Balancing and Redundancy Option (ATM, ENTR, FDDI OSA-2): This option allows you to specify redundant paths for the ports for which you specified the load-balancing option.

For example, assume this configuration and current state.

Port	Option	Load balance factor	Session delay	Max PU limit	Current session count	Status
A	Load balancing	0.08 sec	N/A	1000	324	Online (Note 1)
B	Load balancing	0.08 sec	N/A	1000	362	Online (Note 1)
C	Load balancing and redundancy	0.08 sec	0.80 sec (Note 2)	1000	0	Online
D	Load balancing and redundancy	0.08 sec	0.80 sec (Note 2)	1000	0	Online

Notes:

1. As you can see from the table on page 150 , the multiplier factor is 6 for both ports A and B. Since ports C and D have a 0 current session count, it is currently 0 for these ports.

   In the current state, the total delay for ports A and B is 0.48 seconds (0.08 * 6), so the port that acquires the next connection will be determined by delays in the network. When either port A or port B reaches 384 connections, its delay will be 0.54 seconds (0.08 * 7). At that time, the other port will respond 0.08 seconds sooner until its total connection count reaches 384.

2. When deciding on the session delay time for the two redundant ports C and D, look at the maximum delay that can occur for the primary ports, which are ports A and B in this example.

   In this example, the maximum delay for the primary load-balancing ports (A and B) cannot exceed 0.72 seconds (0.08 * 9), and is reached when 1000 connections are logged onto either of these two ports.

   To prevent any traffic from being established on the redundant ports C and D while ports A and B are still responding to connection requests, set the session delay for the redundant ports (C and D) to a value that at least equals the longest potential delay for the primary ports (A and B). Since a connection request for port A or B can be delayed by 0.72 seconds, 0.80 seconds was chosen for the session delay time for the two redundant ports (C and D).

8.5.6.6 Redundancy Option (ATM OSA-2 Only): This option can be used for ATM OSA-2 LEC ports only. It allows you to open more than one SAP for a primary path and a secondary path by disallowing an overflow of connections between the two paths.

This option requires that you specify the Redundancy option for the secondary path and the Disabled option for the primary path. For example, assume the following configuration and current state.

Port	Option	Max PU limit	Session delay	SAPs open	Max connections	Current session count	Status
A	Disabled	1000	N/A	SAP 04 SAP 08 SAP 0C	256 511 324	424	Online: responding
B	Redundancy	1000	0.32 sec	SAP 04 SAP 08 SAP 0C	256 511 324	0	Online

8.5.6.7 Disabled Option (ATM, ENTR, FDDI OSA-2): When each OSA-2 is shipped, its SNA session availability option is initialized to the Disabled option. In this context, Disabled means that none of the other SNA session availability enhancement options are active for this port.

Note: If you specify the Redundancy option for an ATM OSA-2 LEC port, that port can provide a secondary path. You must, however, specify the Disabled option for the primary path, which must also be an ATM OSA-2 LEC port.

8.5.6.8 Session Delay (0.4–15.00 Seconds) for Redundancy: When each OSA-2 is shipped, its session delay is initialized to 0 seconds. For the Redundancy, Load balancing and Redundancy, and Overflow and Redundancy options:

- Specify a nonzero delay time in increments of 0.04 seconds up to 15 seconds.

  Base the value on the longest delay time that can be incurred by the non-redundant members of the set for which the port is a backup. For example, you could specify a session delay of 10 seconds.

- To calculate the total delay time for a port if you specify the Load balancing and Redundancy option, add the session delay time to the delay that you calculated for the load balancing option.

8.5.6.9 Load Balance Factor (0.4-1.00 Seconds): The load balance factor is initialized to 0 seconds. For the two options, Load balancing and Load balancing and Redundancy, specify a nonzero factor in 0.04-second increments up to 1 second.

In general, the load balancing factor should be set to the same value for all the ports configured for load balancing. Although the optimal setting depends on the network configuration, a reasonably high degree of balance can be obtained with a small load balance factor. For most networks, a load balance factor of .08 seconds is suitable. You should set the same load balance factor for all the ports in the set for which you specify this option.

To calculate the total delay time for a session, multiply the load balance factor by a multiplier factor (*m*). For the Load balancing and Redundancy option, add the session delay time to this result. As the following table shows, *m* is a function of the number of sessions that are logged on to the port.

Current Session Count	Multiplier factor *m*	Current Session Count	Multiplier factor *m*	Current Session Count	Multiplier factor *m*
0–15	0	64–127	4	512– 767	8
16–31	1	128–255	5	768–1023	9
32–47	2	256–383	6	1024–1535	10
48–63	3	384–511	7	1536–2047	11

For the Load Balancing option: the total delay is not just the load balance factor. For example, assume that you specified a load balance factor of 0.08 seconds. There is no delay for the first 15 sessions logged on to a port (0 * 0.08); the 16th through the 31st sessions are delayed by 0.08 seconds (1 * 0.08); the 32nd through 47th session are delayed by 0.16 seconds (2 * 0.08), and so on.

For the Load Balancing and Redundancy option: add the session delay time to the delay that you would calculate for load balancing. Continuing with the example, assume that you had specified a session delay of 1.2 seconds in addition to the load balance factor of 0.08 seconds for the redundant ports for which you select the Load balance and redundancy option.

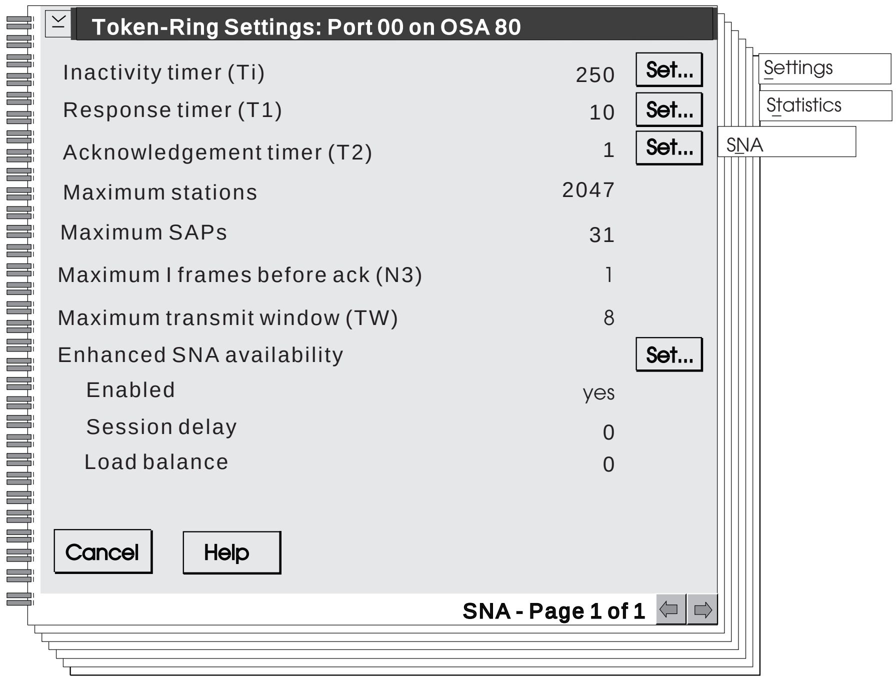
- The total delay for each of the first 15 connections is 0.12 seconds (0 * 0.08 + 1.2).
- The delays for connections 16 through 31 is 1.28 seconds by 1.28 seconds (1 * 0.08 + 1.2); the 32nd through 47th session are
- The delays for connections 32 through 47 is 1.36 seconds (2 * 0.08 + 1.2), and so on.

8.6 Basic Set of SNA Mode Port Parameters

Notice!

- Read this section on the basic set of SNA mode port parameters if the PTF resolution to any of the following OSA/SF APARs has ***not*** been applied: OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA).
- If the PTF resolution to any of these APARs has been applied, read the description of the expanded SNA mode port parameters that starts on page 140.
- OSA-Fenet only supports the expanded set of SNA session availability parameters described on page 140.

The port notebook for each port has one SNA page, which is shown in the following figure for port 0 on ENTR OSA-2 CHPID X'80' that is connected to a token-ring LAN. The parameters would also be available for a FDDI OSA-2. For an ATM OSA-2 LAN emulation client (LEC) port, however, SNA session enhancement options are not available in the basic SNA mode port parameter set.



Notes:

1. You can change the values of the SNA timers as described in the next section using OSA/SF.
2. The maximum number of stations supported by an OSA-2 is either 255 or 2047 PUs depending on the level of the SNA image that has been loaded onto it.

   A maximum of 2047 PUs per port requires the PTF resolution to the appropriate APARs as stated for each S/390 operating system. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), and page 84 (VSE/ESA).
3. The network must be able to handle the data traffic.
4. You can set values to enhance the availability of SNA sessions (page 154) for a group of not fewer than two FDDI OSA-2s or not fewer than two ENTR OSA-2s, each of which is attached to a different token-ring LAN segment.

   In the OS/390, MVS/ESA, and VM/ESA environments, this function requires the PTF resolutions to the appropriate APARs. See page 45 (OS/390), page 49 (MVS/ESA), and page 68 (VM/ESA).

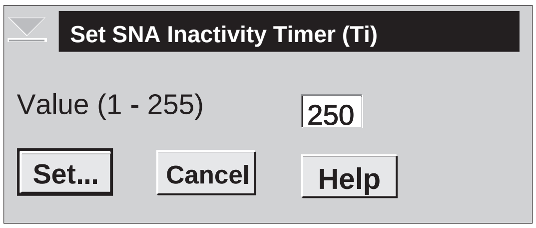
8.6.1 Basic Set of SNA Timers

The initialized settings are in effect unless they are changed by user input to OSA/SF GUI or through the OSA/SF Set Parameters command.

8.6.1.1 Conversion Table Between Time Ticks and Limits: Without the PTF resolution to the relevant OSA/SF APARs noted above, you cannot set the timers in seconds, but must set them in a number of ticks. Each tick represents a period of milliseconds (msec). You can set the Ti and T1 timers effectively. Although you can set the T2 timer, it is not effective.

SNA Timer	1 Tick = Msec	Initialized value Msec (Ticks)	Maximum Setting Msec (Ticks)
Inactivity Timer (Ti) 1 Tick = 0.12 seconds	120	30,000 (250)	30,600 (255)
Response Timer (T1) 1 Tick = 0.20 seconds	200	2,000 (10)	51,000 (255)
Receiver Acknowledgment Timer (T2) 1 Tick = 0.08 seconds	80	80 (1)	20,400 (255)

Inactivity Timer (Ti):

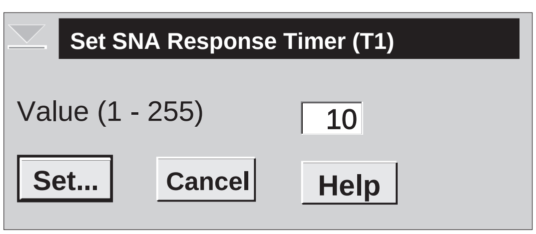


The Inactivity timer (Ti) runs whenever the Response timer (T1) is not running. If the Ti timer expires, the link may have been lost. The time limit for the Ti timer should be at least 5–10 times greater than the time limit for the T1 timer. See the foregoing table for the tick values.

Response Timer (T1):

The Response timer (T1) is maintained by the sending adapter whenever an I-format LLC protocol data unit (LPDU) or a command LPDU with the poll bit set to B'1' is sent. If the T1 timer expires before a response is received, the sending adapter solicits remote link station status by sending a supervisory command LPDU with the poll bit set to B'1'.

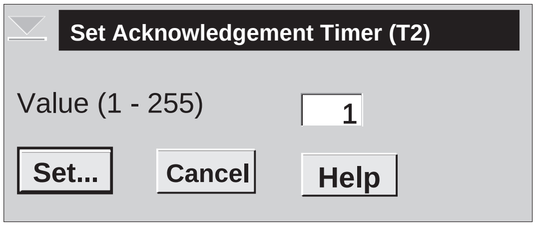
- The time limit for the T1 timer should exceed the total delay time that the frame can encounter within the sending node, the network, and the receiving node.
- If you do not accept the initialized Ti value (2 seconds) and default timer (30 seconds) in the XCA Port Definition statement, make sure the XCA timer is set to a value that exceeds the T1 timer * 9. (Multiply by 9 because the XCA timer must exceed the value of the T1 timer multiplied by the number of transmissions. An OSA uses 8 retransmissions.)



A normal setting for the T1 timer should be in the range of 1 to 2 seconds. A longer time limit can result in noticeable delays to those responses that must be retransmitted. Typically, retransmissions occur in less than 3% of the total frames.
See the table on page 152 for the tick values.

Receiver Acknowledgment Timer (T2):

A link station starts the T2 timer when an I-format LPDU is received into workstation memory. T2 is stopped when an acknowledgment is sent either with an outgoing frame or when the number of I-format LPDUs received before the sending acknowledgment value is reached.



If the T2 timer expires, the link station must send an acknowledgment as soon as possible. The time limit for T2 must be less than the time limit for T1 to ensure that the remote link station receives the delayed acknowledgment before the T1 timer expires. Typical values for T2 are 80 to 240 msec. See the table on page 152 for the tick values.

8.6.2 Basic Set of SNA Session Availability Options

Optionally and after the preparation discussed in this section, you can enhance the availability of SNA sessions for sets of ENTR OSA-2 ports, each attached to a different token-ring LAN segment and FDDI OSA-2 ports, each attached to a different FDDI LAN segment.

8.6.2.1 Take These Steps

1. Decide which OSA-2 ports will become members in the same set.

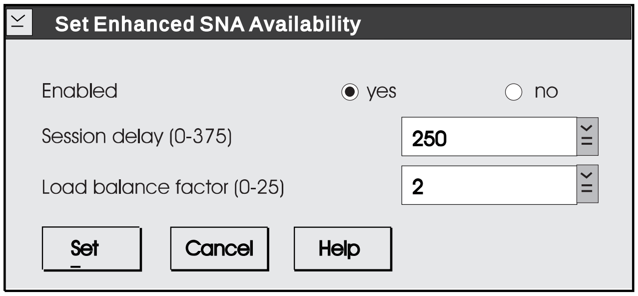
   Note that an ATM OSA-2 port cannot be used in a basic set of SNA session-availability enhancements. The expanded set must be used (page 140).

2. Ensure that the network hardware is set up. For example, if bridges connect the LAN segments to which the participating OSA ports are attached, ensure that they are set up.
3. Ensure that each participating port is attached to a different LAN segment so that all the participants can be assigned the same local MAC address.
4. Specify the same local MAC address using either the support element (SE) functions of the hardware management console (HMC) or the standalone SE (page 210) for the ports with interdependent options.
5. Ensure that this local MAC address is activated not later than when the SNA mode is active on the OSA CHPID or CHPIDs.
6. Ensure that the relevant S/390 program has paths defined through all the OSA-2 ports that have been defined with the same SNA session availability option and their backup ports.
7. Open only one SAP for each participating OSA port.
8. Do not configure VTAM to use NETBIOS SAP `X'F0'`.
9. In the VTAM XCA major node, set the maximum number of PUs that you want to establish sessions for this port. Note that the maximum number of PUs that an OSA-2 supports is either 255 or 2047 depending on the level of the SNA image that has been downloaded onto it. For the other OSAs, refer to the requirements that are listed for each S/390 operating system in the preceding chapters.

   A maximum of 2047 PUs per port requires the PTF resolution to the appropriate APARs as stated for each S/390 operating system. See page 45 (OS/390), page 49 (MVS/ESA), page 68 (VM/ESA), and page 84 (VSE/ESA).

10. In the VTAM SWNET major node, ensure the MAXPATH value is large enough to accommodate all the paths that will be used.
11. Set the SNA session availability parameters in OSA/SF for the participants. Check the requirements for the OS/390 (page 45), MVS/ESA (page 49), and VM/ESA (page 68) into account.
12. Reset the OSA channel path so the changes can take effect.

8.6.2.2 Here are the Parameters as Displayed by OSA/SF GUI



Enabled

Specify Yes to enable an enhanced SNA availability option and to cause the PU limit, which you set in the VTAM XCA major node for this port, to become the port's session overflow limit. This means that once the port has reached this limit, it will neither accept nor respond to a request to establish a new session. The next request will be handled by a secondary member of the set.

Session delay (0–375)

Specify to delay this port's response to a new session request and by the specified length of time. By establishing a longer session delay timeout for this port compared with another port in the same set, this port serves as a backup for another port in an overflow condition.

Specify a delay in time ticks. Each time tick = 0.04 seconds. Either accept the initialized value of 250 ticks (=10 seconds) or specify another non-zero number.

Note: The system operator may have to deactivate the VTAM XCA major node definitions of the failed OSA-2 port to allow the sessions to be re-established through this OSA-2 port. Users will have to log back onto the S/390 program.

Load balance factor (0–25)

Specifies whether this port will be delayed and, if so, by how much time, in establishing a session.

Note that this factor is related to the number of connections (PUs) through the OSA-2 port, not the type nor the amount of work that is being done on those connections.

- This factor is specified in time ticks. Each tick = 0.04 seconds of delay.
- Since a reasonably high degree of balance can be obtained with a small load balance factor, the recommended number of ticks is 2 (0.08 seconds), which is the initialized value.
- However, you can specify any nonzero number of time ticks to delay this port's establishment of a session request.
- Specify 0 (zero) ticks to specify no delay.
- Specify the same value for all the ports that you want to balance the same workload of sessions.

The total delay for a participating port is as follows. (((#_of_sessions * load_balance_factor)/*m* + session_delay) * 0.04 sec), where the value of *m* is taken from the following table.

Current Session Count	**Multiplier factor** *m*	**Current Session Count**	**Multiplier factor** *m*	**Current Session Count**	**Multiplier factor** *m*
0–15	0	64–127	4	512– 767	8
16–31	1	128–255	5	768–1023	9
32–47	2	256–383	6	1024–1535	10
48–63	3	384–511	7	1536–2047	11

For example, assume you have taken both defaults: 250 ticks for the session delay and 2 ticks as the load balance factor for a network of 120 stations (PUs), the total delay for the next connection request is:

```
(12 * 2)/4 + 250 * 0.04 = 256 * 0.04 = 10.24 seconds
```

8.7 XCA and SWNET Definitions Relevant to the OSA Mode

In this section, the OSA-related VTAM statements are described. For more information on these VTAM macros, refer to the VTAM books listed in the bibliography (page xviii). For example, *VTAM V4R2 Resource Definition Samples,* which is listed in the bibliography (page xviii), provides detailed examples.

For information on the OS/390 eNetwork Communications Server SNA, also refer to the books listed in the bibliography (page xix).

Notes:

1. Define each OSA port in the XCA mode to provide APPN-to-APPN communications via an OSA.

   An OSA port can be used to connect a composite network node or an end node or a network node with any other type of APPN node.

2. Define each OSA port in the XCA mode and each peripheral device in the SWNET node to provide peripheral support.

   Peripheral support attaches VTAM to peripheral nodes connected to the directly-attached LAN or emulated LAN (ELAN).

3. Define each OSA port in the XCA mode and each subarea connection in the SWNET to provide subarea support.

   Subarea support attaches VTAM to a subarea node that is connected to the LAN or ELAN.

4. Specify the maximum number of stations, or PUs, for each port. See page 157 and the SNA mode requirements for each operating system in the earlier chapters.

   Note also that once a PU is activated within an XCA for a given OSA port, it cannot become available for another instance of VTAM.

5. For parameter values need for HPR over XCA support, refer to the VTAM books listed in the bibliography (page xx).

6. For the VTAM definitions for the optional SNA network management service, such as NetView, see page 204 first.

8.7.1 External Communication Adapter (XCA) Major Node

Associate one XCA major node for each OSA port that will be used. If an SNA network management service is being used, specify an XCA mode for the virtual port (X'FF') that is used. Define:

1. The node type in the VBUILD Definition statement

2. The OSA port used in the PORT Definition statement

3. The switched peripheral nodes that are attached to the LAN or ELAN through the OSA port in the GROUP, LINE, and PU Definition statements.

   If you have both subarea nodes (type 4 and type 5 nodes) and peripheral nodes (type 1, type 2, type 2.1, and subarea nodes that appear as type 2.1 nodes) attached to the LAN or ELAN, you must code two GROUP definition statements in this XCA major node (one for the peripheral devices, and one for the subareas).

8.7.1.1 VBUILD Definition statement:

Specify one VBUILD Definition statement for each OSA port, that is, for each connection between VTAM and the LAN, ELAN, or SNA network management service.

```
name VBUILD TYPE=XCA
```

name
Specify the unique name for this major node.

8.7.1.2 PORT Definition statement:

Specify one PORT Definition statement for each VBUILD statement to define the OSA port number and port type as well as the device address (OSA device number) for VTAM to use.

```
name PORT ADAPNO=adapter_number, CUADDR=device_address,
        MEDIUM=medium_type, SAPADDR=address, TIMER=timeout_value
```

name label
Specify the VTAM name you want to associate with the OSA port.

adapter_number
Specify the OSA port number for data transfer (0 or 1). If this statement is for a Box Manager node, do not specify this parameter.

device_address
Specify the device address to be used by VTAM. This value is the OSA device number. In the device address, the unit address defaults to the last 2 digits of the device number.

medium_type
Define the type of LAN (or ELAN) connected to this OSA port. Specify RING for token ring, CSMACD for Ethernet, and FDDI for FDDI. If this statement is for a Box Manager node, specify BOXMGR.

SAP address
Specify the service access point (SAP) address for the connection to a LAN attached through an OSA that is defined by this XCA major node. This value must be a multiple of 4 and must be unique for each VTAM that is sharing an OSA port.

timer
Specify a value that exceeds (T1 * 9). If you accept the default T1 value of 2 seconds, the default XCA timeout value of 30 seconds meets this requirement. The T1 value is described on page 143.

8.7.1.3 GROUP Definition statement:

Specify a line group for type 2 or 2.1 nodes attached through OSA. You also need to define LINE and PU statements for each switched line and each peripheral node with which VTAM will communicate.

You must set a maximum PU limit for each OSA-2 port.

Notes:

1. This total consists of the number of Autogens in the Autogen statement and the line and PU Definition statements that you specify separately.
2. If the PTF resolution to OSA/SF APAR OW30222 (OS/390 or MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) is applied, you can set a maximum PU limit for an ATM OSA-2 to any value that does not exceed the highest maximum allowed by the other APARs that have been applied to the OSA.

For example, if the PTF resolutions are applied to OSA/SF for OS/390 and MVS/ESA APAR PW28666 and VTAM APAR OW1403, you can set a maximum PU limit for an ATM LAN emulation client (LEC) port as high as 1000 stations with distinct MAC addresses.

Also, if only one LEC port is active on an ATM OSA-2 and multiple SAPs have been defined over a single client's MAC address, up to 2047 connections can be logged on to that LEC port.

3. You must set the maximum PU limit for any other OSA to either 255 or 2047, depending on the OSA/SF APARs that have been installed. For these APAR numbers, refer to the SNA mode requirements that are stated in the earlier chapters for each operating system that OSA supports.
4. For the SNA mode requirements, refer to page 45 (OS/390), page 49 (MVS/ESA), page 66 (VM/ESA), and page 84 (VSE/ESA).

GRP

name GROUP AUTOGEN=(number_of_autogens, line_seed_char, pu_seed_char)
    DIAL=dial_value

name
Specify the minor node name of the line group.

number_of_autogens
Specify the number of VTAM generated LINE and PU statements.

line_seed_char
Define the first character to be used by VTAM to create a name for the generated LINE statements.

pu_seed_char
Define the first character to be used by VTAM to create a name for the generated PU statements.

dial_value
Specify DIAl=Yes for a peripheral node to specify that the lines under the GROUP statement require switched line control protocols. Do not specify this parameter if the statement is for a NetView (SNA network management service) connection.

8.7.1.4 LINE and PU Definition statements: Either specify them separately or let them be generated automatically with the AUTOGEN parameter on the GROUP definition statement.

8.7.2 Switched Network (SWNET) Major Node

Define one SWNET major node for the switched connections to the peripheral nodes that are attached to the LAN or ELAN connected to the OSA port.

- Define the node type in the VBUILD Definition statement.
- Define one remote physical unit (PU) in the PU Definition statement. Make sure the number of PUs that you define are supported by the OSA. A FENET OSA-2 supports up to 2047 PUs. The other OSAs support a maximum of either 255 PUs or 2047 PUs, depending on the code level and whether the proper PTF has been applied. Refer to the requirements that are listed for each S/390 operating system in the preceding chapters.
- For each PU, define its associated logical units (LUs).
- Optionally, you define a path in the Path Definition statement.

8.7.2.1 VBUILD Definition statement: Define one SWNET major node for any peripheral devices connected to the LAN defined by the associated XCA major node.

```
name VBUILD TYPE=SWNET MAXNO=max_number MAXGRP=max_group
```

name
Specify the name for this major node.

max_number
Specify the number of unique numbers that are defined in the DIALNO operand of all PATH definition statements with the switched major node.

max_group
Specify the number of unique path groups (group names) that are defined in the GRPNM operand of all PATH definition statements within the switched major node.

8.7.2.2 PU Definition statement:

Define one PU for each physical unit that is connected to the LAN defined by the associated XCA major node.

U
name PU ADDR=link_station_address CPNAME=control_point_name
PUTYPE=pu_type

name
Specify the minor node name of the physical unit represented by this definition statement.

link_station_address
Specify the hexadecimal station address for the physical unit.

control_point_name
Specify the control point name of a type 2.1 peripheral node. A type 2.1 node requires the CPNAME of both IDBLK and IDNUM on the PU definition statement.

pu_type
Specify the PU type for this peripheral. Specify 2 for PU type 2 or 2.1 and for the BOXMGR medium that is needed for communications with an SNA network management service.

8.7.2.3 PATH Definition statement:

Define a path to a physical unit (PU) in a switched major node.

SAP M GRP
name PATH DIALNO=number GRPNM=group_name

name
Specify the name for the Path definition statement.

SAP M **number**
The 1st byte is a placeholder (usually 01). The 2nd byte is the SAP address, and the 3rd through 8th bytes are the MAC address of the peripheral (attached workstation).

If an Ethernet LAN station, or PU, is connected across a LAN bridge to a non-Ethernet LAN, the destination MAC address must be coded differently in the DIALNO. Because the LAN bridge flips the bits in every byte of the MAC address, the MAC address should be coded in the inverted (noncanonical) order in the DIALNO parameter. (See the notes on MAC addresses on page 210.)

GRP **group name**
Specify this name as the name of the logical group definition of the associated XCA major node.

8.7.2.4 LU Definition statement:

Define one LU for each logical unit associated with a type 1 or 2 PU within a switched major node.

```
name LU LOCADDR=loc_address
```

name
Specify the minor node name of the logical unit represented by this definition statement.

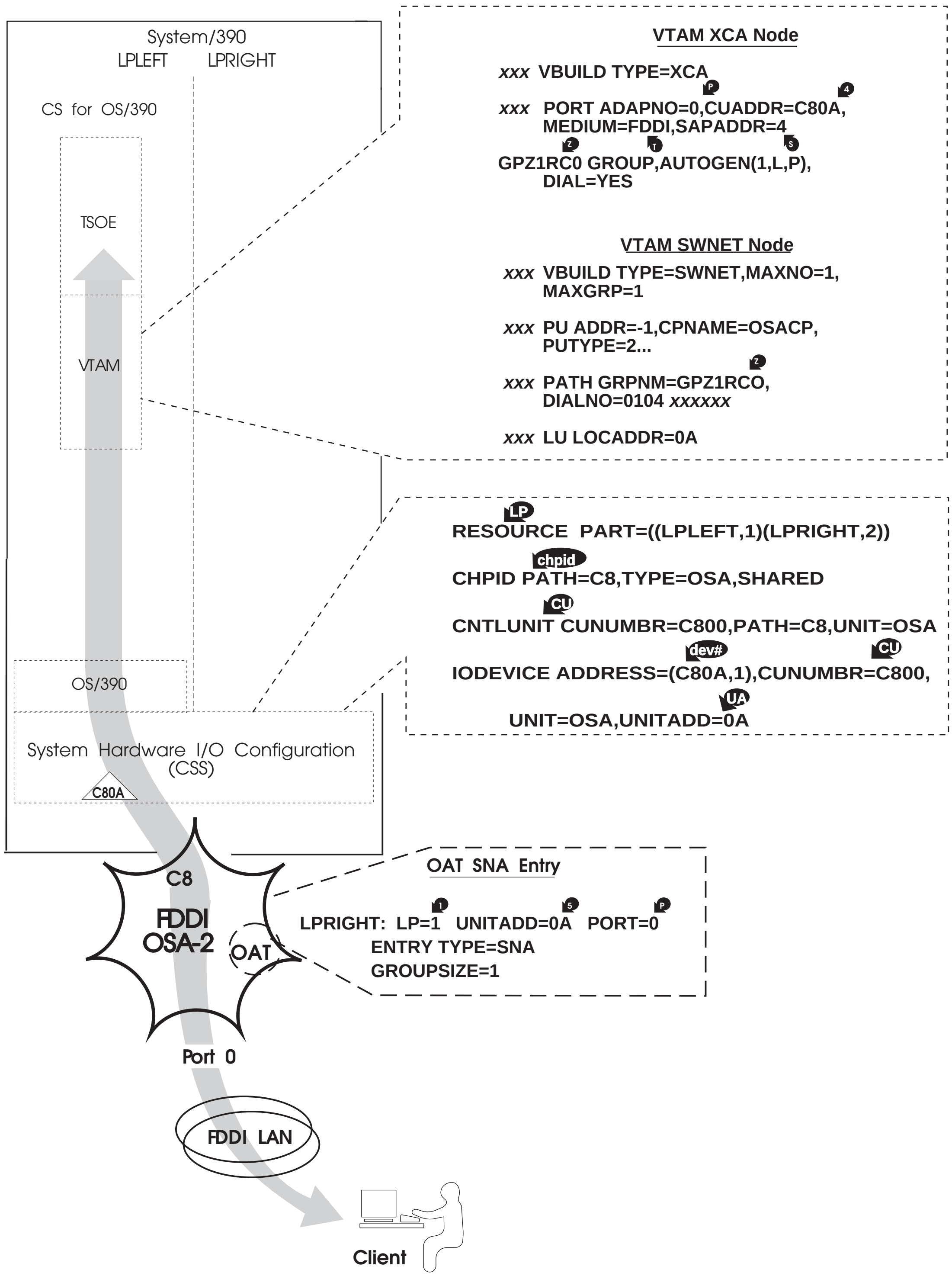
loc_address
Specify the logical unit's local address at the physical unit.

8.7.3 At the Physical Unit (PU)

- Configure the unit to support the SNA protocol.
- Specify the CPNAME or the IDBLK/IDNUM pair. This must match the information specified on the PU definition statement under the switched major node.
- Define the MAC address of the OSA port that should be used to connect to VTAM. An OSA port's MAC address can be set to a local MAC address (page 210) to help you avoid reconfiguring existing units.

8.8 An Example of the SNA Mode

In this example, a FDDI OSA-2 has been configured to be run in the SNA mode and TCP/IP Passthru mode concurrently. Access to port 0 is therefore shared between the two LPs.


System/390
LPLEFT
LPRIGHT
CS for OS/390
TSOE
VTAM
OS/390
System Hardware I/O Configuration (CSS)
C80A
VTAM XCA Node
xxx VBUILD TYPE=XCA
xxx PORT ADAPNO=0,CUADDR=C80A,
MEDIUM=FDDI,SAPADDR=4
GPZ1RC0 GROUP,AUTOGEN(1,L,P),
DIAL=YES
VTAM SWNET Node
xxx VBUILD TYPE=SWNET,MAXNO=1,
MAXGRP=1
xxx PU ADDR=-1,CPNAME=OSACP,
PUTYPE=2...
xxx PATH GRPNM=GPZ1RCO,
DIALNO=0104 xxxxxx
xxx LU LOCADDR=0A
LP
RESOURCE PART=((LPLEFT,1)(LPRIGHT,2))
chpid
CHPID PATH=C8,TYPE=OSA,SHARED
CU
CNTLUNIT CUNUMBR=C800,PATH=C8,UNIT=OSA
dev#
CU
IODEVICE ADDRESS=(C80A,1),CUNUMBR=C800,
UA
UNIT=OSA,UNITADD=0A
C8
FDDI
OSA-2
OAT
OAT SNA Entry
LPRIGHT: LP=1 UNITADD=0A PORT=0
ENTRY TYPE=SNA
GROUPSIZE=1
Port 0
FDDI LAN
Client

Chapter 9. HPDT ATM Native Mode

The High Performance Data Transfer (HPDT) ATM Native mode allows you to take full advantage of the facilities of the ATM network to which the ATM OSA-2 is attached. For this mode, which requires the exclusive use of the OSA, you can specify that the ATM OSA-2 transfers data across both permanent virtual circuits (PVCs) and switched virtual circuits (SVCs).

This mode is available for SNA data transfer in the OS/390 and MVS/ESA environments. It is available for IP packet transfer only with the TCP/IP function of CS for OS/390.

| This mode is available for TCP/IP 2.3.0 for the TCP/IP function of eNetwork Communications Server for VM/ESA 2.4.0.

9.1 Task Planning Checklist

9.1.1 Preparatory Tasks

1 It is advisable to prepare worksheets for each OSA to keep track of the data items that you need to input.

| **2** Ensure the programming requisites that are listed for this mode are met. An ATM OSA-2 can be run in the HPDT ATM Native mode only in an OS/390 (page 48), MVS/ESA (page 51), or VM/ESA (page 66) environment. For more information, refer to the OSA/SF for MVS/ESA and OS/390 program directory or the OSA/SF for VM/ESA program directory, which is listed in the bibliography (page xv).

- For data transfer to SNA network clients, you must define the OSA to either ACF/VTAM High Performance Routing (HPR) or the SNA function of CS for OS/390. An example of the definitions starts on page 174. These system elements utilize both best-effort (BE) and reserved bandwidth (RB) virtual circuits.
- For data transfer to IP network clients, you must define the OSA to the TCP/IP function of CS for OS/390 (RCF 1577 for high speed IP networks) or the TCP/IP function of eNetwork Communications Server for VM/ESA. Note that this function considers all the virtual circuits that you define to be best effort (BE) virtual circuits. Therefore, it does not utilize reserved bandwidth. An example of the IP definitions starts on page 179.

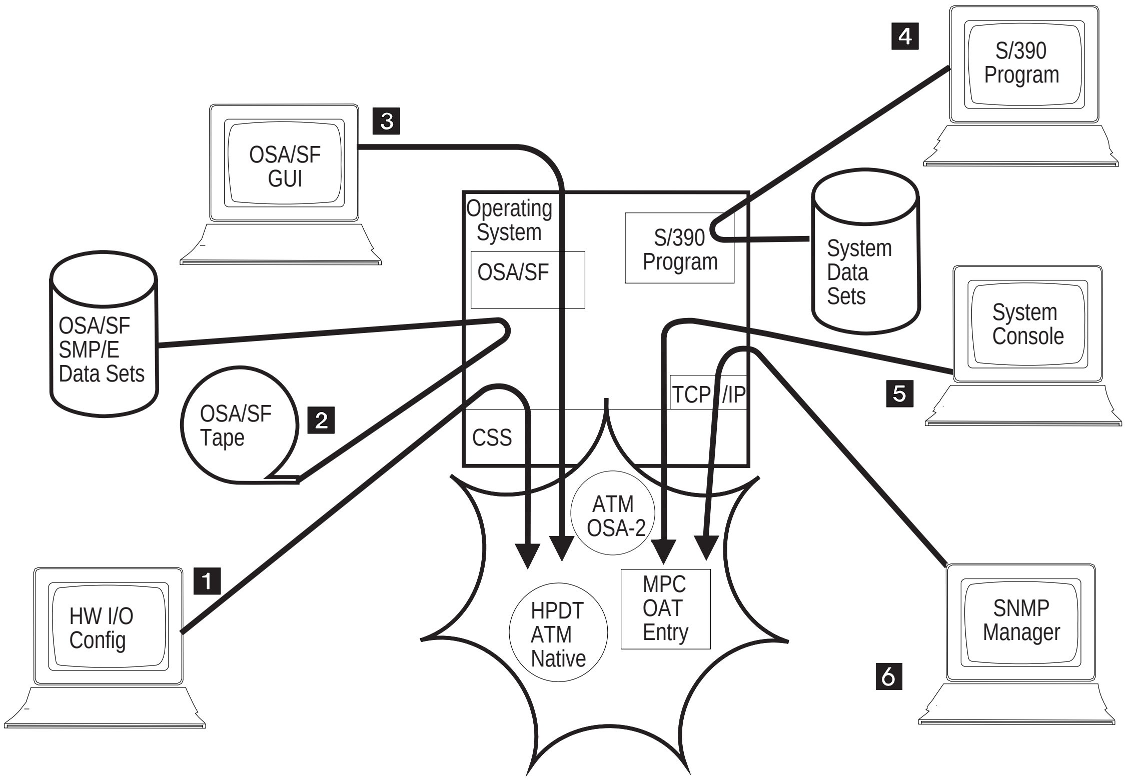
3 Ensure the user documentation is available for the type of ATM switch that is attached to each ATM OSA-2. For a public network, also have the documentation of the network provider available. The values of several parameters that require user input must be allowed, if not determined, by the values set at the ATM switch to which the ATM OSA-2 is attached.

4 Ensure that OSA/SF is available because it is required to support an ATM OSA-2 in any mode of operation. Refer to the OSA/SF MVS/ESA and OS/390 user's guides that are listed in the bibliography (page xv).

5 Ensure you are familiar with the discussion on virtual circuits (page 36) to help you decide on the virtual circuits that you define.

- The HPDT ATM Native mode is introduced on page 36.
- SVCs and PVCs are introduced on page 34.
- For extensive information on ATM virtual circuits, refer to the ATM books that are listed in the bibliography (page xxi).

9.1.2 HPDT ATM Native Mode Tasks



1 In the hardware I/O configuration, define one even/odd, read/write pair of device numbers for the ATM OSA-2's single physical port for each logical partition or for the system in basic mode. (The ATM OSA-2's LAN emulation client (LEC) ports are not involved in the HPDT ATM Native mode.)

2 Install the OSA/SF HPDT ATM Native mode so that you can use OSA/SF to customize the ATM OSA-2 in this mode in an OS/390 (page 45), MVS/ESA (page 49), or VM/ESA (page 66) environment. Also, refer to the OSA/SF for MVS/ESA and OS/390 program directory listed in the bibliography (page xv).

3 To the ATM OSA-2, define the mixture of best-effort (BE) and reserved bandwidth (BE) virtual circuits to be used (page 165), the MPC OAT entries (page169), and any PVCs to be used (page 170).

4 Define the OSA channel, device number, and link to the S/390 program endpoint, which is one of the following: VTAM, CS for OS/390 SNA for data transfer to SNA network clients, and the TCP/IP function of CS for OS/390 for data transfer to IP network clients.

For complete information on the VTAM parameters, refer to the section on “Defining ATM Native Connections,“ in the chapter on “Connecting an APPN Node to VTAM” in the VTAM Network Implementation Guides listed in the bibliography (page xix). For more information on CS for OS/390, refer to the CS for OS/390 books that are also listed in the bibliography at the front of this book.

5 Install and activate the mode image. The OSA channel path and its associated device numbers must be configured off from all the partitions in which the CHPID is defined, and then configured back on. (The OSA feature must be reset.)

Note: Ensure that the ATM OSA-2 will not be run concurrently in this mode with any other OSA mode.

6 If you want IP SNMP management support for this mode in an OS/390 R3 or higher environment, specify the OSA-related parameters in the relevant IP statements that are described on page 206.

9.2 IOCDS Definitions

In the following example, the IOCP statements are shown that would be used to define the OSA in the system hardware I/O configuration for the SNA example in this chapter, whose CHPID is X'18'. The CHPID for the IP example is X'1C'.

Refer to page 21 for more information on the system hardware I/O definitions required for an OSA CHPID. For information on HCD or another system I/O definition program, refer to the system manuals listed in the bibliography (page xviii).

```
                 LP
RESOURCE  PART=((LPLEFT,1)(LPRIGHT,2))
              chpid
CHPID PATH=18,TYPE=OSA,SHARED
           CU
CNTLUNIT CUNUMBR=100,PATH=18,UNIT=OSA
                            dev#              CU                        UA
IODEVICE ADDRESS=(1808,2),CUNUMBR=100,UNIT=OSA,UNITADD=08
```

The IOCP statement to define the OSAD, or FE, or OSA/SF device is:

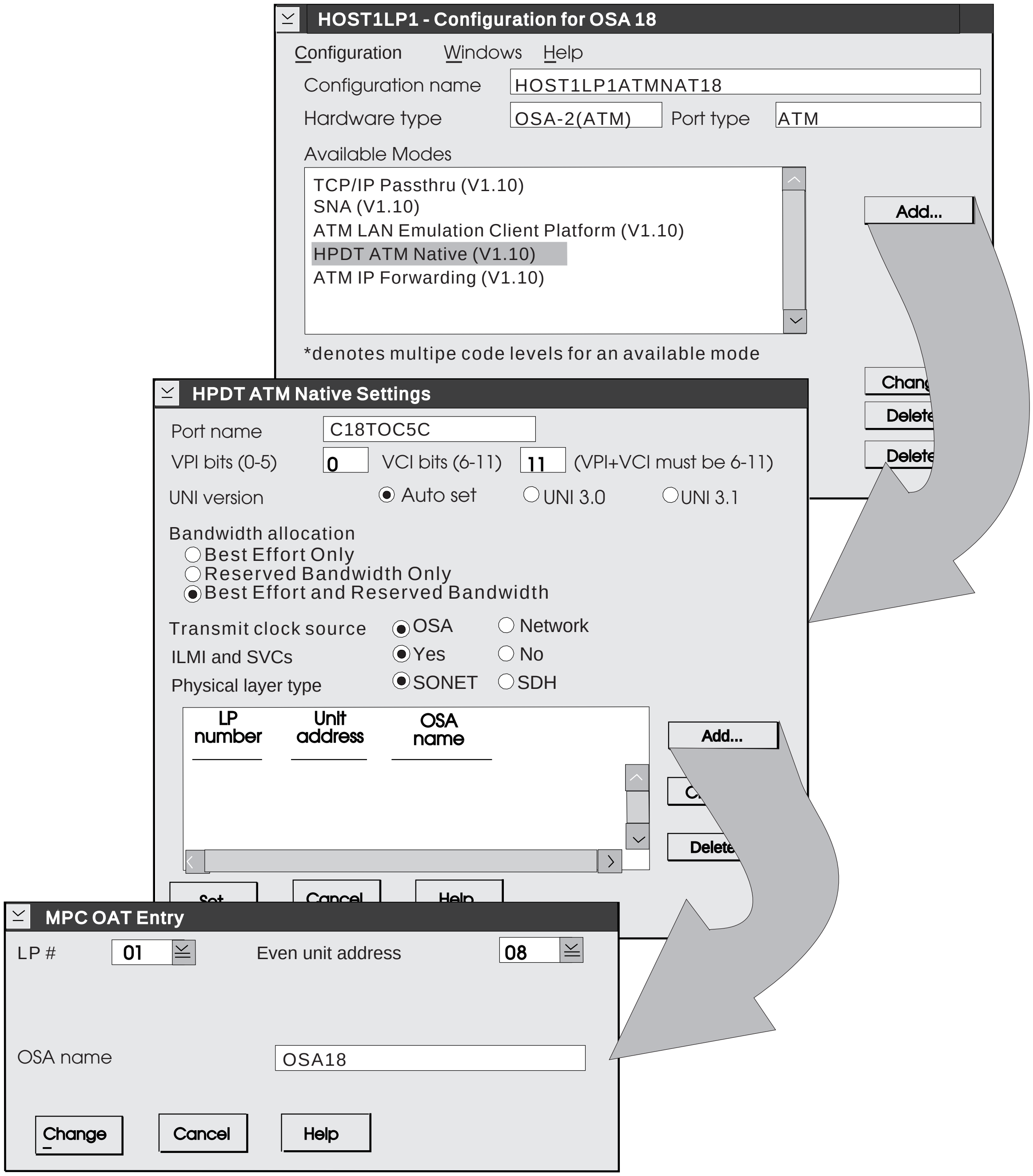
```
                          OSAD              CU                        UA
IODEVICE ADDRESS=(180F),CUNUMBR=100,UNIT=OSAD,UNITADD=FE
```

9.3 OSA Definitions

The OSA definitions are the same for SNA and IP data transfer. The OSA/SF GUI panels shown in this section are the values for the SNA example in this chapter. The IP example port, configuration, and OSA names are different for the IP example. Also, the TCP/IP function of CS for OS/390 and the TCP/IP function of eNetwork Communications Server for VM/ESA do not utilize reserved bandwidth, so the IP example shows only best effort (BE) virtual circuits.

- Define the port traffic parameters to the OSA as shown in the next section that presents the OSA/SF GUI ***HPDT ATM Native Settings*** panel.
- Create an MPC OAT entry as shown on page 169.
- If you define one or more PVCs, define each one to the OSA as shown on page 170 that presents the OSA/SF ***Port Definitions*** panel.

9.3.1 Port Traffic Definitions



The ATM OSA-2 traffic specifications are shown in the above figure as they are presented by OSA/SF GUI in the ***HPDT ATM Native Settings*** panel, which is the middle panel in the above figure.

Port name

- Specify 1 through 8 of any of the following characters: A through Z in upper case, @, #, $ and–starting with the second character–0 through 9.
- Do not duplicate a port name across ATM OSA-2s that are to be used in the same mode in the same logical partition.
- Do not specify identical names for the port name and the OSA name of the same ATM OSA-2.

- You must also specify the port name in the XCA Port statement and the TRL TRLE statement (page 176).
- If you want SNMP management support, you must also specify the port name in the TCP/IP Device and Link statements (page 206).

pbit cbit VPI and VCI bit settings

- Check the documentation of the ATM switch to which this ATM OSA-2 is attached to find out how many VCI bits it supports. VPI and VCI bit settings in the context of ATM OSA-2 are described on page 34.
- If the switch supports at least 11 VCI bits, let the ATM OSA-2 VCI bit value default to 11 and do not change the default value of 0 for the VPI bit setting.
- If the switch supports 6–10 VCI bit settings, specify that many VCI bits. As described on page 34, you can also set the VPI bit setting to a nonzero value as long as the sum of the VPI+VCI bit settings is in the range 6–11.

UNI UNI version

This parameter is settable only if you also accept ILMI and SVCs = Yes. After checking the documentation of the ATM switch to which this ATM OSA-2 is attached.

- Accept the default of Autoset if the ATM switch specifies either UNI 3.0 or UNI 3.1.
- Select UNI 3.0 or UNI 3.1 if the ATM switch specifies Autoset.

Bandwidth allocation

- You can reserve bandwidth on an ATM OSA-2 for the virtual circuits that you define for the HPDT ATM Native mode. Note that VTAM and the SNA function of CS for OS/390 utilize reserved bandwidth, but the TCP/IP function of CS for OS/390 and the TCP/IP function of eNetwork Communications Server do not. For a general discussion in this book on bandwidth, see page 36.
- Specify **Best Effort Only** if you define only BE SVCs and BE PVCs in this mode for this ATM OSA-2 and do not reserve any bandwidth.

  Notes:

  1. You can specify up to 1,000 BE virtual circuits.
  2. You can define up to 256 PVCs as long as the total number of virtual circuits does not exceed 1,000.
  3. The number of SVCs that you can define is the remainder from subtracting the number of PVCs from 1,000.
  4. For each virtual circuit that you define, specify a peak cell rate only, not a sustained cell rate (pages 36 and 170).

     The default and maximum peak cell rate for an ATM OSA-2 is 353,207 ATM cells/second, which is approximately 149.76 Mbps including the cell headers or 135.63 Mbps calculating the 48 bytes/cell payload only.

- Specify **Reserved Bandwidth Only** if you reserve bandwidth for each virtual circuit that you define in this mode for this ATM OSA-2 and do not define any BE virtual circuits.

Notes:

1. Reserving bandwidth is not meaningful if you are defining for the transfer of IP packets because the TCP/IP function of CS for OS/390 and the TCP/IP function of eNetwork Communications Server do not utilize reserved bandwidth.
2. The aggregate amount of bandwidth that you can reserve across the ATM OSA-2 port is:
   – 4.5 MBps (36 Mbps) for both the outbound and inbound data traffic through the port.

     ```
     4,500,000 / 48 (payload bytes/cell) = 93,750 ATM cells/sec.
     4,500,000 / 53 (payload+cell header bytes/cell) = 84,906 ATM cells/sec.
     ```

   – 3 MBps (24 Mbps) for either the outbound or inbound data traffic through the port as long as the maximum for both directions is not exceeded.

     ```
     3,000,000 / 48 (payload bytes/cell) = 62,500 ATM cells/sec.
     3,000,000 / 53 (payload+cell header bytes/cell) = 56,604 ATM cells/sec.
     ```

3. You can define up to 400 virtual circuits if you reserve bandwidth for all of them.
4. Of these virtual circuits, 256 can be PVCs.
5. Define a sustained cell rate for each virtual circuit. This cell rate, or bandwidth, will be reserved for the specified virtual circuit, when it is active.
6. If the specifications of the ATM switch and network provider allow it, you can also specify a peak cell rate and the size of the cell burst to be sent at the peak cell rate (page 170).

- Accept the default of **Best Effort and Reserved Bandwidth** if you reserve bandwidth for some but not all, the virtual circuits that you defined in this mode for this ATM OSA-2.

  Notes:

  1. The aggregate amount of bandwidth that you can reserve is the same as if you reserve all the bandwidth: 4.5 MBps (36 Mbps) for data traffic across the OSA port in both directions; 3 MBps (24 Mbps) for data traffic that is either outbound from, or inbound to, the OSA port.
  2. You can reserve bandwidth in any combination of SVCs and PVCs for up to 200 of the virtual circuits that you define as long as you do not exceed the aggregate amount of bandwidth available. Reserving bandwidth is meaningful for a virtual circuit whose S/390 endpoint is VTAM or a CS of OS/390 SNA application. For a CS of OS/390 IP application, it has not affect.
  3. You can define a total of 1,000 virtual circuits.
  4. You can define up to 256 PVCs as long as you do not exceed the total of 1,000 virtual circuits.
  5. The number of SVCs that you can define is the remainder left from subtracting the number of PVCs from 1,000.

XMT Transmit clock source

Either setting should be acceptable to most ATM switches, but you should generally accept the default. The SONET/SDH protocols accommodate differences in clocking by adjusting the pointers in the SONET/SDH frame. OSA synchronizes its transmit clock to the derived receive clock. If the received data stream is lost, OSA reverts to its locally-generated clock.

- Accept the default of OSA if the ATM OSA-2 generates the transmit clock.
- Select Network if the source of the transmit clock comes from the ATM network.

ILMI and SVCs

Check the documentation of the ATM switch to which the ATM OSA-2 is attached.

- Accept the default of Yes if the ATM switch supports the Interim Local Management Interface (ILMI) protocol. If you accept Yes, you must also select a value for the UNI version parameter.

  ILMI is required for signaling, which is required for SVCs. With ILMI, the ATM switch can provide the ATM 13-byte network prefix for this ATM OSA-2's complete physical address (page 214), which is used for SVCs.

- Specify No if the ATM switch does not support ILMI and SVCs. The UNI version parameter will then not be displayed on this panel and OSA/SF GUI lists it in the ATM OSA-2 port notebook as “Unused”.

Physical layer type

Check with the documentation of the ATM switch or the network provider to see which type of physical layer is used to provide, through a framing structure, the payload envelope necessary for the transport of ATM cells.

- Accept the default of SONET if the network uses the Synchronous Optical Network (SONET) physical layer. SONET is the replacement for the digital hierarchy called plesiochronous digital hierarchy (PDH), or NADH by some, and consists of DS0 through DS4 in the United States of America.
- Select SDH if the network uses the Synchronous Data Hierarchy physical layer. SDH is recommended by ITU as the counterpart to SONET and replaces the international community's existing digital hierarchy that consists of E1 through E3 transmission links.

9.3.2 MPC OAT Entry

Specify an MPC OAT entry for this mode as shown in the format that is presented by OSA/SF GUI in the ***MPC OAT Entry*** panel, which is the lowest panel in the 3-panel figure shown on page 165.

LP number

- If the OSA CHPID is defined as shared in the hardware I/O configuration (IOCDS), specify the LP number of the LP in which the instance of VTAM is running to which this OAT entry applies.
- Otherwise, specify 0.

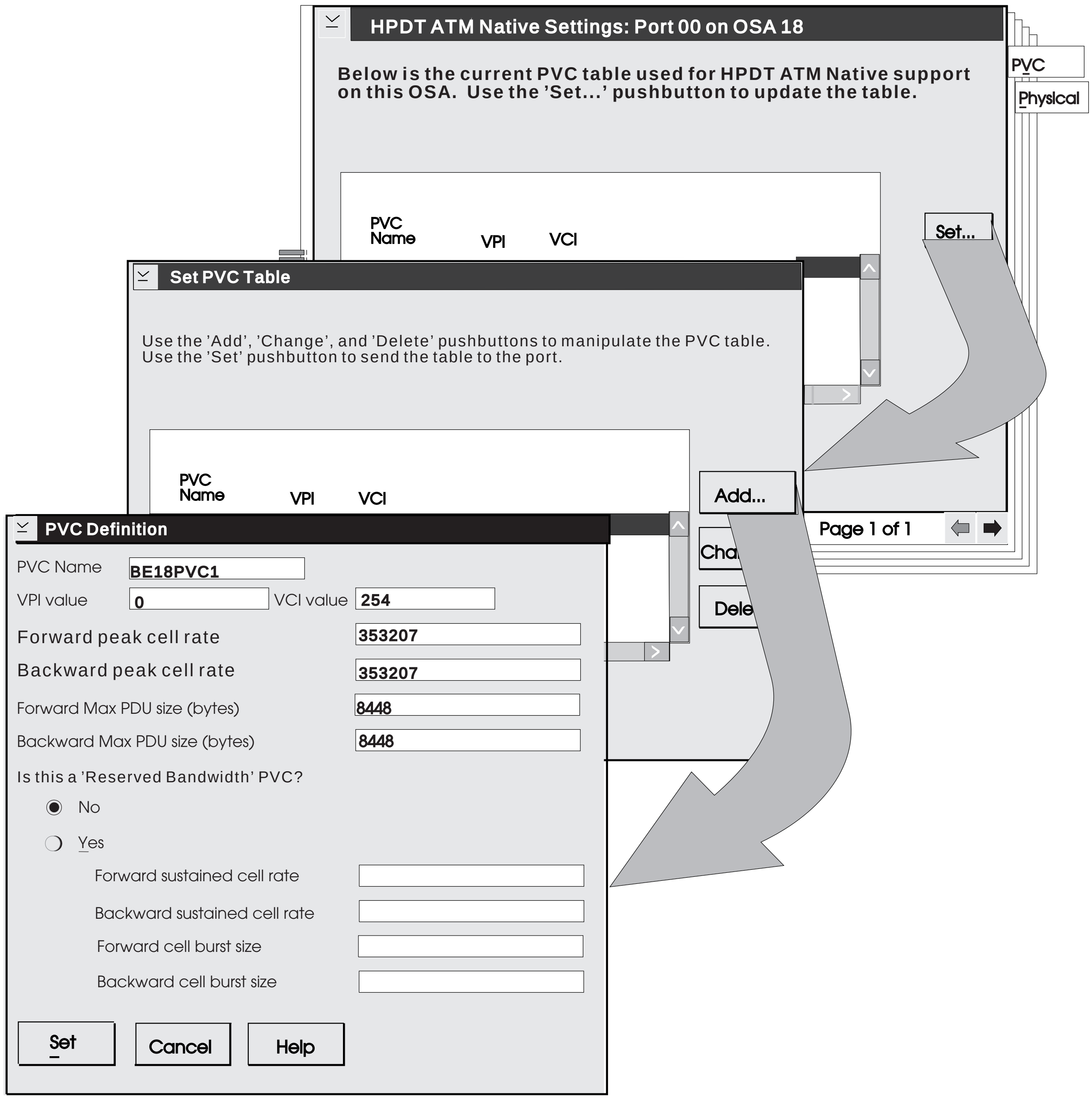
Even unit address
is the unit address of the even-numbered device of the device pair that you defined in the system hardware I/O configuration for this ATM OSA-2 when it is running in HPDT ATM Native mode in this LP. (It is also displayed on the ***OSA Channels - Detailed View*** panel.)

OSA name
is the OSA name for the ATM OSA-2 on this panel and specify it in the TRL macro (page 176). If you want IP SNMP management of this ATM OSA-2, also specify the OSA name to the IP program (page 206).

- Specify 1 through 8 of the following characters: A through Z in upper case, @, #, $, and–starting with the second character–0 through 9.

- Do not duplicate an OSA name for ATM OSA-2s that are defined to the same logical partition and will all run in the HPDT ATM Native mode.
- Do not duplicate the OSA name with the port name for the same ATM OSA-2 nor for any of the PVC names.

9.3.3 PVC Definitions



Notice!

- All the parameters shown in the preceding figure apply to a PVC. This example is for a best-effort PVC to be used for SNA data transfer.
- The first three parameters (PVC name, VPI value, and VCI value) do not apply to an SVC because you define an SVC dynamically, not by pre-arrangement.
- The remaining parameters do apply to an SVC, but you specify them to VTAM (page 174), not on this OSA/SF panel. The information is provided in this section, however, so that it does not have to be duplicated.
- These parameters do not include other OSA-related data items that you provide to VTAM and which are discussed in that section (page 174).

For an introduction to PVCs and SVCs in the context of an ATM OSA-2, see page 34. For more general information, refer to the ATM books listed in the bibliography (page xxi).

PVC PVC name

- Provide a name for each PVC. In the example at the end of this section, the PVC is named RB18PVC1.
- Specify 1 through 8 of the following characters: A through Z in uppercase, @, #, $, and–starting with the second character–0 through 9.
- Also specify the PVC name to VTAM on the LINE statement for the PVC group in the XCA macro.

pval VPI value

- Identify each PVC with a unique (VPI+VCI) value.
- For the VPI *value*, do not exceed the maximum value of the VPI *bit* setting that you set for the ATM OSA-2 port (page 165).

  For example, if you set a VPI bit setting of 3 for the port, you could set a VPI value in the range from 0 through 7 to stay within the result of (2**3–1).

cval VCI value

For each PVC, specify a VCI *value* from 32 up to and including the maximum that you specified for the VCI *bit* setting on the ATM OSA-2 HPDT ATM Native Settings page for the port (page 165).

Suppose you have set a VCI bit setting for the ATM OSA-2 of 8 for the port. You can now set a VCI value from 32 up to and including 255, which is (2**8–1). The combination of VPI value and VCI value uniquely identifies this PVC.

fpk bpk Forward and backward peak cell rates

- You must specify a peak cell rate for each direction, but do not exceed 353207 ATM cells/second.

  `353,207 * 48 (payload bytes/cell) * 8 (bits) = about 135.63 Mbps.`

- For a BE virtual circuit, it is recommended that you specify the highest peak cell rate that is acceptable to both endpoints.
- If you also specify a sustained cell rate and a non-zero cell burst size, note that some practical results indicate that a peak cell rate at 33% higher than the sustained cell rate can help to achieve a sustained rate over an extended period of time.
- If you also specify a sustained cell rate and a 0 (zero) cell burst size, the peak cell rate is ignored.

fpdu bpdu Forward and backward maximum PDU sizes

Specify the maximum protocol data unit (PDU) size for each direction in a PVC. The maximum PDU size is equal to the size of one frame that can be processed in that direction for the ATM AAL5 SDU layer.

For either SNA or IP data transfer. specify a number from 64 through 9188. There is no default.

For SNA data transfer, correlate the maximum PDU size with the maximum RU size that you specify in the VTAM logmode table as stated below. The same guidelines apply to the maximum PDU size that you specify for an SVC in the SWNET macro.

- If the maximum RU size is 8192 bytes or greater, set the maximum PDU size at 8448 bytes (8192 + 256).
- If the maximum RU size is 1024 bytes, set the maximum PDU size at 1280 bytes (1024 + 256).
- If the maximum RU size is greater than 1024 bytes and less than 8192 bytes, set the maximum PDU size at (maximum_RU_size + 256) bytes.
- For an SVC, you do not have to specify a maximum PDU size of 8448 bytes. If you specify a different maximum PDU size, you must specify this value on the PATH DLCADDR with operand 61 statement in the SWNET macro.
- For a PVC, you specify the maximum PDU size on the OSA/SF GUI ***PVC Definition*** panel.
- For more information on maximum RU sizes, see page 176 and *VTAM V4R4 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference,* which is listed in the bibliography (page xviii).

Is this a 'Reserved Bandwidth' PVC?

If you have not already done so, check the documentation of the ATM switch and network provider to make sure the cell rates and cell burst sizes, as applicable, that you specify are allowed at both endpoints. For more information, see pages 36 and 36.

- If you are not reserving bandwidth for this PVC, accept the default of No. You are finished defining this BE PVC.
- If you are not reserving bandwidth for an SVC, you are finished defining this BE SVC.
- If you are reserving bandwidth for this PVC, select Yes and specify the sustained cell rates.
- If you are reserving bandwidth for an SVC, specify the sustained cell rates.

For IP data packet transfer,

- The maximum PDU size must be at least equal to the size of the TCP/IP MTU plus 8 bytes.
- If you accept the default MTU size in the IP ATM LIS statement of 9180 bytes, specify a maximum PDU size of 9188 (9180 + 8). Note that you can change the TCP/IP MTU in the

ATMLIS statement. For that information, see the IP Configuration books listed in the bibliography (page xix).

fsus bsus Forward and backward sustained cell rates

For information on how much bandwidth you can reserve, refer to page 36.

fcell bcell Forward and backward cell burst sizes

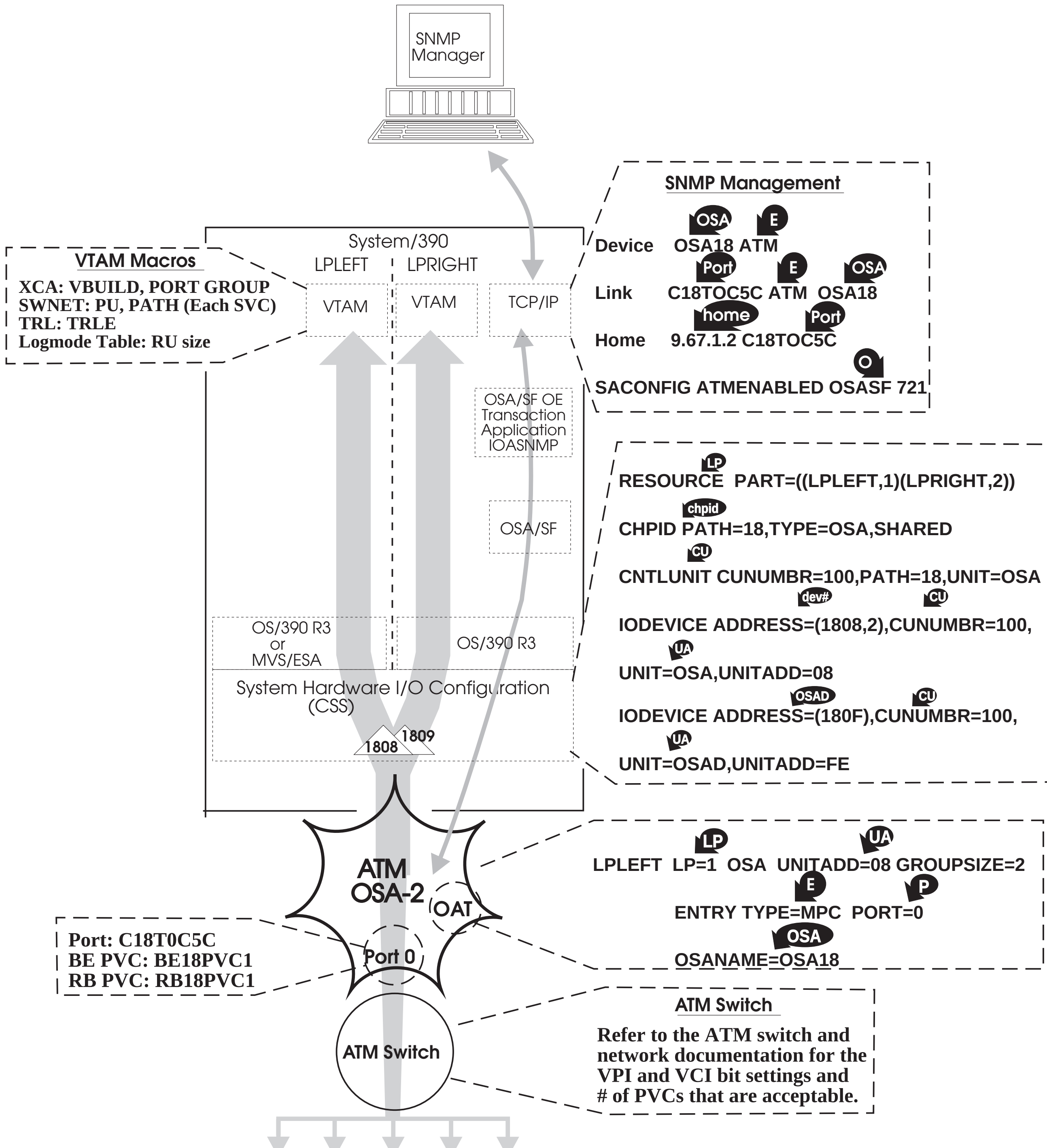
- Specify a cell burst size if you also specify a sustained cell rate.
- Do not specify a cell burst size if you do not specify a sustained cell rate.
- Specify 0 if you want to negate the peak cell rate. You are finished defining this virtual circuit.
- Specify a non-zero number if you want cell bursts of this size to be transferred at the peak cell rate if and when the peak cell rate is being used.

  If you specify a non-zero cell burst size, results indicate that it is advisable to specify a cell burst size that equates with the maximum PDU size. Using the example that is shown in the next section, the calculation is:

```
8448 (bytes) divided by 48 (payload bytes/cell) = 176 (cells)
```

9.4 An Example of SNA Data Transfer

The OSA-related parameters needed to define the ATM OSA-2, the SVCs, and the PVCs to VTAM or CS for OS/390 SNA are shown in the following example. VTAM macro statements are used, and the OSA-related definitions for SNMP management, which is discussed on page 206, are shown as well.



9.4.1 OSA Definitions

Note: The discussion on the OSA definitions starts on page 165.

For the MPC OAT Entry for the OSA whose name is OSA18:

LP UA

LPLEFT LP=1 OSA UNITADD=08 GROUPSIZE=2

E P

ENTRY TYPE=MPC PORT=0

OSA

OSANAME=OSA18

For the OSA Port whose name is C18T0C5C:

Port UNI

Port name=C18TOC5C UNI=AUTO

pbit cbit

VPI bit = 0 VCI bit = 11

XMT ilmi PL

Transmit clock source = OSA ILMI=Yes Physical layer type = SONET

For the BE PVC:

PVC pval cval

PVC Name=BE18PVC1 VPI value = 0 VCI value = 254

fpk bpk

Forward peak cell rate = 353207 Backward peak cell rate = 353207

fpdu bpdu

Forward max PDU size = 8448 Backward max PDU size = 8448

For the RB PVC whose name is RB18PVC1:

PVC pval cval

PVC Name=RB18PVC1 VPI value = 0 VCI value = 255

fsus fcell

Forward sustained cell rate = 0020833 Forward cell burst size = 00000176

fpdu fpk

Forward max PDU size = 00008448 Forward peak cell rate = 00027706

bsus bcell

Backward sustained cell rate = 00002083 Backward cell burst size = 00000176

bpdu bpk

Backward max PDU size = 00008448 Backward peak cell rate = 00002270

9.4.2 VTAM Definitions

Because an ATM OSA-2 is viewed as an external communications adapter, define:

- The ATM OSA-2's single physical port number which is always 0, in the XCA macro.
- The VTAM's link to the ATM OSA-2 channel path in the TRL macro.

Additionally, the VTAM values that you enter can influence the throughput of data packet transfer in this mode. The maximum RU size and the Capacity parameter are discussed in the following subsections. For more information on:

- VTAM HPR, including factors such as window sizes and COS tables, refer to “Defining ATM Native Connections to VTAM“ in the chapter on “Connecting an APPN Node to VTAM“ in the VTAM Network Implementation Guides listed in the bibliography (page xix). Other factors fall outside the scope of this book.
- API crossing size for a VTAM application, refer to the books on the application or in the VTAM Resource Definition books listed in the bibliography (page xix).
- The SNA function of CS for OS/390, refer to the CS for OS/390 books listed in the bibliography (page xix).

9.4.2.1 Maximum RU size: RU The maximum RU size is correlated with the size of the maximum PDU size that you specify for a virtual circuit. Take note of the following points.

- An ATM OSA-2 supports a minimum maximum RU size of 1024 bytes. However, it is strongly recommended that you specify a maximum RU size in the VTAM logmode table of either 8192 or 16384 bytes.
- A maximum RU size greater than 16K bytes can reduce CPU utilization, but at some expense in throughput.
- A maximum RU size less than 8K bytes can have a negative impact on achieving the rated speeds. Therefore, you should specify a maximum RU size smaller than 8K only if some non-ATM medium is in the path and that medium does not support a frame size of 8K bytes. This could be the case, for example, if traffic is bridged to a legacy LAN in the ATM network.
- The maximum RU size is specified in the VTAM logmode table. Because the example in this book does not show that table, the maximum RU size is also not shown in the example.
- For more information, refer to *VTAM V4R4 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference,* which is listed in the bibliography on page xix.

9.4.2.2 Capacity Parameter: Cap Specify 1 capacity value for each virtual circuit, not for each direction, and specify that value explicitly to VTAM. Do not assume the default Capacity value.

- For an SVC, specify the capacity parameter value in the SWNET PU statement.
- For a PVC, specify the capacity parameter value in the XCA PU statement.
- You can specify a value up to the line speed. Since an ATM OSA-2 supports a line speed of 155 Mbps, you can specify a maximum capacity value of 155M.
- Round the capacity value down to the next lower integer. For example, round down 151.6 Mbps to 151M as the capacity parameter value.
- Capacity statements for the same virtual circuit should have the same value at both end points.
- For a BE virtual circuit:

- Specify the maximum capacity value (155M) if you also specify the maximum peak cell rate (353,207 cells/second).
- Otherwise, specify a capacity value that is 10 times greater than the peak cell rate. If you specify a different peak cell rate for each direction, use the larger peak rate as the base.

- For an RB virtual circuit, specify a capacity value that is 10 times greater than the sustained cell rate. If you specify a different sustained cell rate for each direction, use the larger sustained rate as the base.

For example, suppose you specify a sustained cell rate for an RB PVC of 20,833 cells/second, which is shown in the example on page 175.

```
1 cell * 48 (payload bytes) * 8 (bits) = 384
20833 * 384 * 10 = 79,998,720 = 79M
```

9.4.2.3 XCA VBUILD and PORT Statements:

XCAOSA VBUILD TYPE=XCA

XCA18 PORT MEDIUM=ATM,PORTNAME=C18TOC5C

9.4.2.4 XCA GROUP Statements: *For the SVC:*

OSA18GR1 GROUP DIAL=YES,CALL=INOUT,DYNPU=YES
LN1A2A LINE
P1A2A PU
LN1A2B LINE
P1A2B PU

For the two PVCs:

OSA18GR2 GROUP DIAL=NO

LN2A2AP0 LINE PVCNAME=BE18PVC1

P2A2AP0 PU CAPACITY=155M

LN1A2AP0 LINE PVCNAME=RB18PVC1

P1A2AP0 PU CAPACITY=79M

9.4.2.5 SWNET VBUILD Statement:

```
SWXCA1A  VBUILD TYPE=SWNET
```

9.4.2.6 SWNET PU and PATH Statements

Note: Although the PATH DLCADDR operand 61 statement is listed in the example, you do not have to specify it if the maximum PDU sizes = 8448 bytes, which is the default for an SVC. If a PATH DLCADDR operand 8 statement is defined, note that ATM OSA-2 supports QoS class 0 only. So, set QoS=0.

For the BE SVC:

```
SW1A2B   PU     CPNAME=A02N,CPCP=YES,HPR=YES,CONNTYPE=APPN,ADDR=01,          X
                                Cap
                PUTYPE=2,CAPACITY=155M
PATH1B   PATH   DLCADDR=(1,C,ATMSVC,EXCLUSIVE),                              X
                DLCADDR=(7,BCD,00,01,00353207,00353207),                     X
                                                                ESI
                DLCADDR=(21,X,0002,39999999999999999999980101315045,         X
                5354360),                                                    X
                                            fpdu        bpdu
                DLCADDR=(61,BCD,00,05,00008448,00008448),                    X
                       GRP
                GRPNM=OSA18GR1
```

For the RB SVC:

```
SW1A2A   PU     CPNAME=A02N,CPCP=YES,HPR=YES,CONNTYPE=APPN,ADDR=01,   X
                                Cap
                PUTYPE=2,CAPACITY=79M
PATH1A   PATH   DLCADDR=(1,C,ATMSVC,EXCLUSIVE),                       X
                                          fpk      fsus       fcell
                DLCADDR=(7,BCD,00,00,00027706,00020832,00000176,00,   X
                      bpk      bsus      bcell
                00002770,00002083,00000176,00),                       X
                                                               ESI
                DLCADDR=(21,X,0002,39999999999999999999980101315045,  X
                53543460),                                            X
                                           fpdu         bpdu
                DLCADDR=(61,BCD,00,05,00008448,00008448),             X
                     GRP
                GRPNM=OSA18GR1
```

9.4.2.7 TRL TRLE Statement:

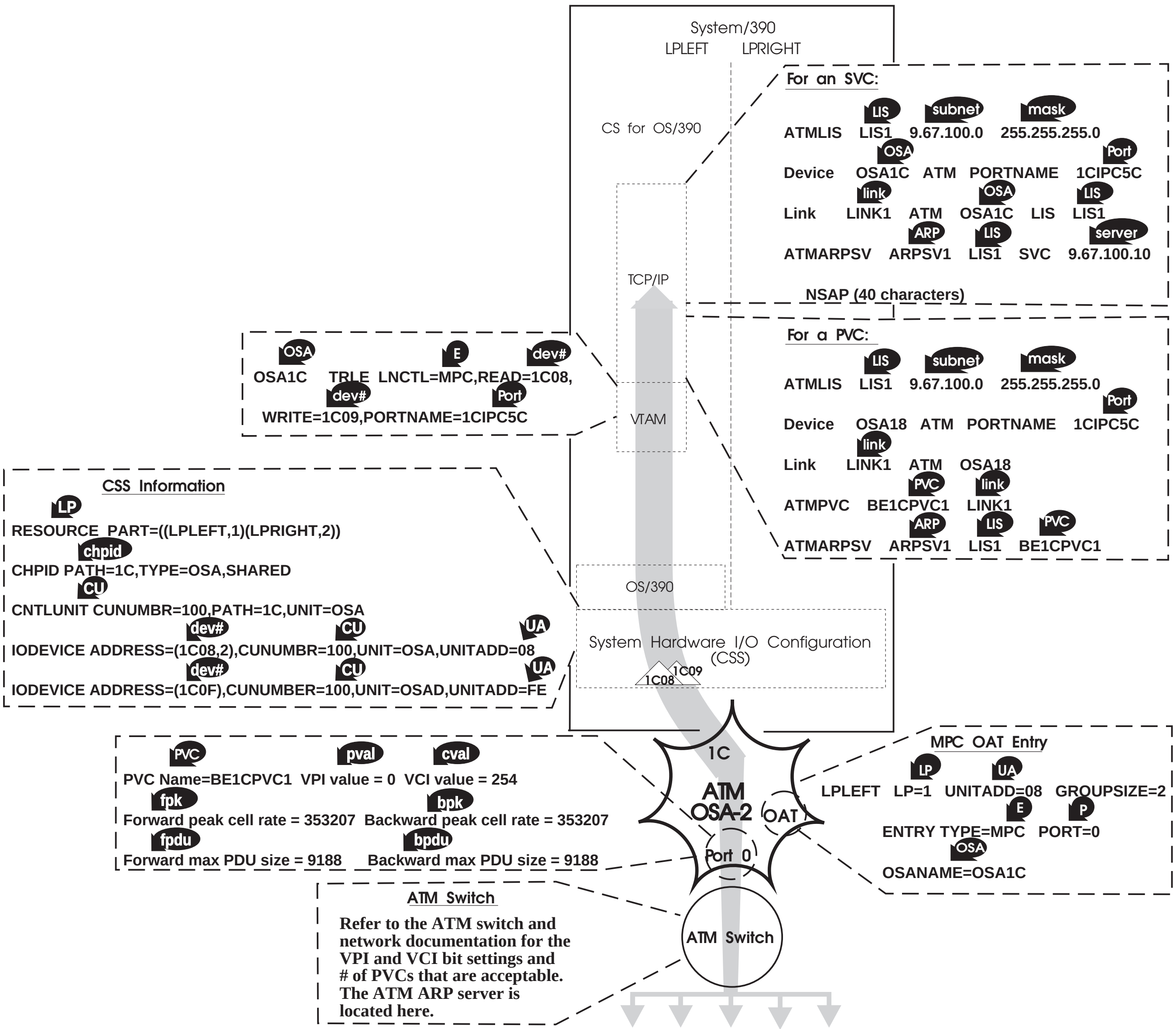
```
TRLOSA  VBUILD  TYPE=TRL
  OSA                           dev#                    Port
OSA18    TRLE  LNCTL=MPC,READ=1808,WRITE=1809,PORTNAME=C18TOC5C,      X
               STORAGE=ECSA,MAXBFRU=16
```

9.5 An Example of IP Data Packet Transfer

An ATM OSA-2 that is being run in the HPDT ATM Native mode can support the transfer of IP data packets in an OS/390 or VM environment to which it has been defined.

For VM, the definitions are completed in the TCP/IP profile. For more information on the IP data packet transfer for VM, see *TCP/IP Function Level 320 Planning and Customization.*

Note: A TRL is **not** required for VM. This is a MVS only contruct.



9.5.1 OSA Definitions

Note: The discussion on the OSA definitions starts on page 165.

MPC OAT Entry:

LP UA
LPLEFT LP=1 UNITADD=08 GROUPSIZE=2
E P
ENTRY TYPE=MPC PORT=0
OSA
OSANAME=OSA1C

Port Traffic Definitions:

PVC pval cval
PVC Name=BE1CPVC1 VPI value = 0 VCI value = 254
fpk bpk
Forward peak cell rate = 353207 Backward peak cell rate = 353207
fpdu bpdu
Forward max PDU size = 8448 Backward max PDU size = 8448

9.5.2 TCP/IP Definitions

Note: The ATM OSA-2 must be defined to the TCP/IP function of CS for OS/390 as described in *OS/390 eNetwork Communications Server IP Configuration* that is listed in the bibliography (page xix).

9.5.2.1 Virtual Circuit Definitions:

The ATMLIS statement is required for both a PVC and an SVC. This statement specifies the characteristics of the ATM logical IP subnet (LIS) as follows:

```
ATMLIS <lis_name> <subnet_value> <subnet_mask>
```

The ATMPVC statement is needed only for a PVC. Its format is:

```
ATMPVC <PVC_name> <link name>
```

The ATMARPSV statement is required for both a PVC and an SVC to define the virtual circuit for the ATMARP server at the ATM switch, hub, or router to which the ATM OSA-2 is attached.

- For a PVC, the format is:

  ```
  ATMARPSV <arpsrv_name> <lis_name> PVC <PVC_name> <link_name>
  ```

- For an SVC, the format is:

  ```
  ATMARPSV <arpsrv_name> <lis_name> SVC <IP address> NSAP <physical_address>
  ```

9.5.2.2 OSA Data Path Definitions:

The Device statement associates CS for OS/390 IP device name with the ATM OSA-2 physical port as follows. Note that the NETMAN parameter is not supported for OSA.

```
DEVICE <device_name> ATM PORTNAME <port_name>
```

The Link statement defines the network interface link associated with the ATM device. The ***LIS*** parameter is used to specify the logical IP subnet for this link. This parameter is only required if the link is to be used for SVC connections.

```
LINK <link_name> ATM <device_name> LIS <lis_name>
```

The Gateway statement:

GATEWAY <u>network</u> <u>first hop</u> <u>link_name</u> <u>max_packet_size</u> <u>subnet_mask</u>

Notes:

1. If there is a hop, associate it with the network address and the link name.
2. In these examples, there is no hop so '=' is used to specify that the data is routed directly to destinations on that network.
3. The most specific form of the network address, the client IP address, is used in these examples.

The Home statement:

HOME <u>home_ip_address</u> <u>link_name</u>

The Start statement

START <u>device_name</u>

Chapter 10. ATM OSA-2 LAN Emulation Client (ATM LEC) Platform

If an ATM OSA-2 is being run in either the TCP/IP Passthru or SNA mode, it provides LAN emulation client (LEC) services on one of the ATM emulated LANs (ELANs or LANEs) of the attached ATM network. LEC services are provided by each of the LEC ports that an ATM OSA-2 supports. You define the LEC ports through OSA/SF's ATM LAN emulation client (ATM LEC) platform.

Note: The ATM LEC platform is sometimes erroneously referred to as an OSA mode. Input for an OSA mode always results in an OAT entry. OSA modes are therefore the TCP/IP Passthru and ATM IP Forwarding modes, which require Passthru OAT entries; the SNA mode, which requires an SNA OAT entry; and the HPDT MPC and HPDT ATM Native modes, which require MPC OAT entries. Input to the ATM LEC platform results in customizing a LEC port to provide LEC services on an ATM emulated Ethernet or token-ring LAN.

With each LEC port, an ATM OSA-2 is set up to emulate an Ethernet or token-ring LAN's broadcasting ability, which is not a characteristic that is native to the connection-oriented, point-to-point ATM network. The ATM OSA-2 provides all of the virtual circuit parameter values automatically except the VPI and VCI bit settings (page 34) and the peak cell rate. Each LEC port can communicate with another LEC station in the same emulated LAN (ELAN), which allows the either the VTAM or IP applications on the ATM OSA-2's S/390 server to communicate with their “legacy” Ethernet and token-ring LAN clients on the attached ATM network.

- Each LEC port can be set up with your input to the OSA/SF GUI's ATM LAN emulation client (ATM LEC) platform (page 185).
- Each LEC port can provide LEC services on either an Ethernet or a token-ring emulated LAN, but not on both ELANs concurrently.
- The two LEC ports on the same ATM OSA-2 cannot provide services to the same ELAN at the same time. You can, however, define different local MAC addresses for a LEC port and activate them selectively, so that a LEC port can function in different ELANs at different times (page 210).

10.1 S/390 Components That Play a Role

Assume the S/390 is running in logically-partitioned (LPAR) mode. The two logical partitions (LPs) involved in LAN emulation are LPLEFT (LP 1) and LPRIGHT (LP 2).

A1 is the TCP/IP host program that runs in logical partition LPLEFT and uses LEC port 0 to access its clients across the ATM network attached to the ATM OSA-2.

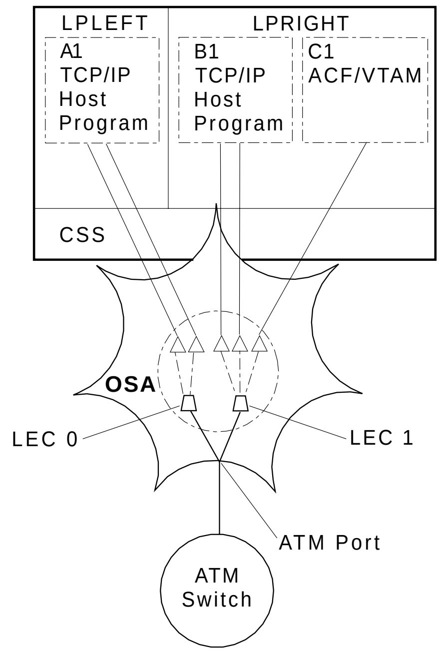
B1 is the TCP/IP host program in LPRIGHT that shares access to LEC port 1 with C1.

C1 is ACF/VTAM in LPRIGHT that shares access to LEC port 1 with B1.

LEC 0 and **LEC 1** are the two LEC ports on the ATM OSA-2. Each LEC port can join one emulated LAN (ELAN) in the ATM-based network, but the two ports cannot join the same ELAN at the same time.

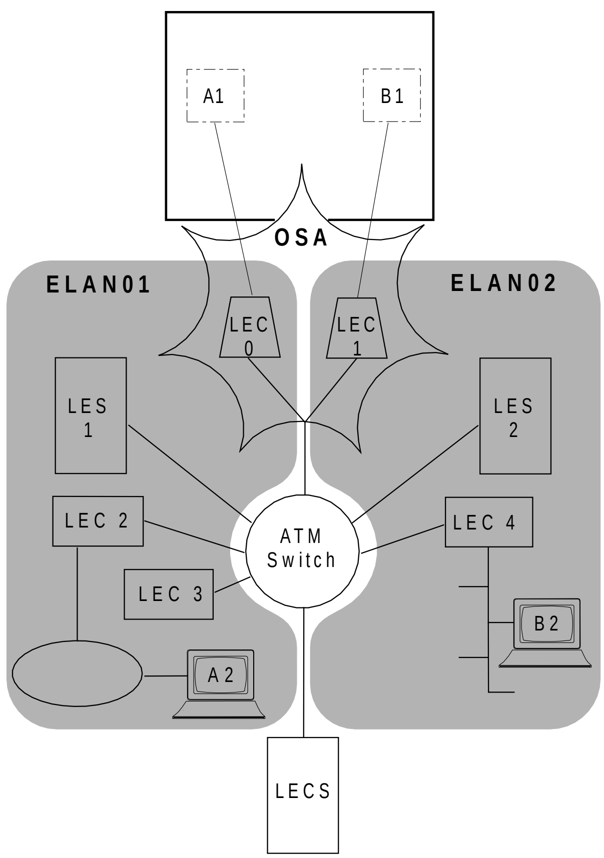
ATM Port is the physical ATM OSA-2 port that is connected to the ATM switch.

CSS is the channel subsystem. This area is sometimes shown as HW I/O Config to represent the system hardware I/O configuration.



10.2 Emulated LAN Elements

Now let's look at the other elements in an ATM network that interact with an ATM OSA-2 LAN emulation client (LEC) port. These components are the subject of ATM technology, which is far too extensive to be discussed adequately in this book. For that information, refer to the publications listed in the bibliography (page xxi).



ELAN01
The emulated token ring LAN in this network administered by LES1.

LES 1 The LAN emulation server (LES) for ELAN01 that coordinates ELAN01's functions and responds to requests from those LECs (0, 2, and 3) that have joined ELAN01.

LEC 0 ATM OSA-2 LEC port 0, which is also shown in the preceding figure, allows A1, which is TCP/IP running in LPLEFT, to communicate with its TCP/IP clients, for example A2, on ELAN01.

LEC 2 This LEC, which is not on the S/390 platform, has joined ELAN01 and services A2, which is A1's token-ring LAN client.

LEC 3 This LEC, which is not on the S/390 platform, has joined ELAN01 and can communicate with LEC0 and LEC 2.

ELAN02
The name of the emulated Ethernet LAN that is administered by LES 2.

LES 2 LES 1's counterpart on ELAN02.

LEC 1 ATM OSA-2 LEC port 1, which is also shown in the preceding figure, is the LEC port that allows B1, which is TCP/IP running in LPRIGHT, to communicate with its TCP/IP clients, for example B2, on ELAN02. Though not shown, LEC 1 also allows C1, which is VTAM running in LPRIGHT, to communicate with its SNA clients on ELAN02.

LEC 4 LEC 2's counterpart on ELAN02.

LECS The optional LAN emulation configuration server for both ELAN01 and ELAN02. (Note that this is an LECS not one of the LECs.) A LECS implements the assignment of individual LAN emulation clients to different emulated LANs that are supported in the ATM network.

10.3 ATM LEC Platform Settings

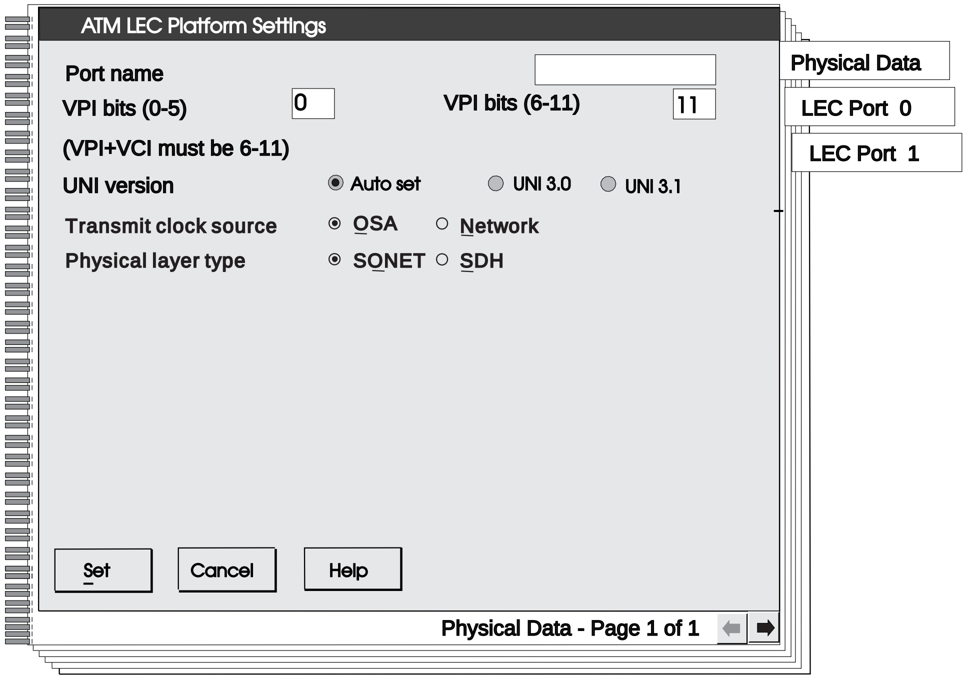
If an ATM OSA-2 is to be run in either the TCP/IP Passthru or the SNA mode, you must first enter values for the ATM LAN emulation client (ATM LEC) platform.

Arrows such as C2 indicate the C# that equates the parameter with the “LAN Emulation Over ATM” section in the *ATM Forum Specification* (page 213).

The OSA/SF OS/2 interface (GUI) ATM LEC platform consists of four notebook pages:

- One page of settings tabbed ***Physical Data***, which contains the physical data for the two LEC ports (page 185).
- Three pages for each LEC port that are tabbed ***LEC port*** *x*, where *x* is either 0 or 1 (page 190). (In older releases of OSA/SF, the tab read Logical port.)

10.3.1 ATM LAN Emulation Client Settings (Physical Data Page)



Port name

- Specify 1 through 8 of any of the following characters: A through Z in upper case, @, #, $ and–starting with the second character–0 through 9.
- Do not duplicate a port name across ATM OSA-2s that are to be used in the same mode in the same logical partition.
- Do not specify identical names for the port name and the OSA name of the same ATM OSA-2.
- You must also specify the port name to VTAM in the XCA Port statement and the TRL TRLE statement (page 176).
- If you want SNMP management support, you must also specify the port name in the TCP/IP Device and Link statements (page 206).

VPI and VCI bit settings

- Refer to page 34 for a discussion on VPI and VCI bit settings supported by ATM OSA-2 for the switched virtual circuits (SVCs) that are used in the TCP/IP Passthru and SNA modes across an ATM OSA-2. Also, check the documentation of the ATM switch to which this ATM OSA-2 is attached to find out how many VCI bits it supports.
- Accept the default of 0 for the VPI bit setting if you also accept the default of 11 for the VCI bit setting. Otherwise, you can increase the VPI bit setting up to 5 as long as the sum VPI+VCI is not greater than 11.
- If the switch supports at least 11 VCI bits, accept the default VCI bit setting of 11.
- If the switch supports 6–10 VCI bit settings, specify that VCI bit setting.

UNI version

Check the documentation of the ATM switch to which this ATM OSA-2 is attached.

- If Autoset is specified at the switch, specify either UNI 3.0 or UNI 3.1 on the OSA/SF panel, whichever applies.
- If UNI 3.0 or UNI 3.1 is specified at the switch, specify Autoset on the OSA/SF GUI panel, whichever applies.

Transmit clock source

Check the documentation of either the ATM switch or the network provider. Either setting should be acceptable, but you should generally accept the default. The SONET/SDH protocols accommodate differences in clocking by adjusting the pointers in the SONET/SDH frame. OSA synchronizes its transmit clock to the derived receive clock. If the received data stream is lost, OSA reverts to its locally-generated clock.

- Accept the default of OSA if the ATM OSA-2 generates the transmit clock.
- Select Network if the source of the transmit clock comes from the ATM network.

Physical layer type

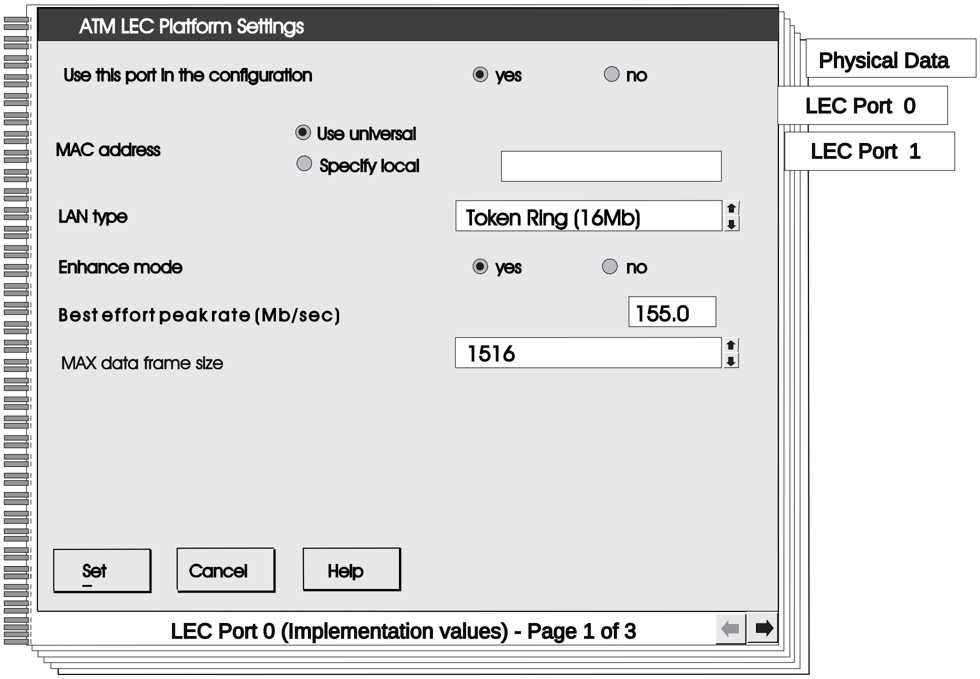
Check with the documentation of the ATM switch or the network provider to see which type of physical layer is used to provide, through a framing structure, the payload envelope necessary for the transport of ATM cells.

- Accept the default of SONET if the network uses the Synchronous Optical Network (SONET) physical layer. SONET is the replacement for the digital hierarchy called plesiochronous digital hierarchy (PDH), or NADH by some, and consists of DS0 through DS4 in the United States of America.
- Select SDH if the network uses the Synchronous Data Hierarchy physical layer. SDH is recommended by ITU as the counterpart to SONET and replaces the international community's existing digital hierarchy that consists of E1 through E3 transmission links.

10.3.2 ATM LEC Port Pages

When an ATM OSA-2 is being run in either the TCP/IP Passthru or SNA mode, you must first enter the following information for each LEC port. Only port 0 is shown in the following panels.

10.3.2.1 Page 1 of 3



Use this port

Is the parameter that ensures you will fill out the notebook page for LEC port 0 before LEC port 1.

- Accept the default of Yes if this is the logical (LEC) port you want. Before you can fill out the pages for LEC port 1, you must fill out the pages for LEC port 0.
- Select No to see the notebook page of the other LEC port displayed.
- If you are configuring the TCP/IP Passthru mode, ensure that the port number matches the link number in the Link statement in the S/390 IP program profile (page 109).
- If you are configuring the SNA mode, ensure that the port number matches the ADAPNO in the Port Definition statement of the VTAM XCA mode (page 157).

MAC address

If you override the default of the universal media access control (MAC) address that was IBM-supplied for this LEC port, specify a locally administered one that is valid for the emulated LAN to which the LEC port will be attached.

A LEC port can be logically attached to either an emulated token-ring LAN or an emulated Ethernet LAN; each LAN type has its own requirements for a locally administered MAC address (page 210).

LAN type

Accept the default of token-ring 16Mbps LAN or override it by specifying either token ring (4Mb) or Ethernet.

Enhanced mode

- Accept the default of No if you want the LEC port to drop its data direct connections to other LECs if and when it loses its connection with its LAN emulation server (LES).

- Or check Yes if you want this LEC port to keep its data direct connections to other LECs if its LES connection is lost and until that LES connection is regained. (The value for aging time is ignored in this interim period.)

  Note that this choice is not compliant with the ATM specification. Also, the LEC port cannot establish a new data direct connection until it regains its LES connection.

fpk bpk Best effort peak rate

The IBM-supplied default value is 155.0 Mbps, which is the maximum live speed supported by an ATM OSA-2, if the PTF resolution to one of the following OSA/SF APARs is applied to the system: OW33393 (OS/390 or MVS/ESA), OW3394 (VM/ESA), and PQ16071 (VSE/ESA). Otherwise, the default value is 25.6 Mbps.

- Only best effort switched virtual circuits (BE SVCs) are supported in the TCP/IP Passthru and SNA modes (page34) and require the LEC platform.
- Make sure that the peak cell rate is acceptable to the ATM switch to which the ATM OSA-2 is attached. 155.0 Mbps is the maximum line speed that an ATM-2 supports.
- Make sure the peak cell rate is acceptable to the clients on the LAN. Generally, it is advisable to set the peak cell rate on the LEC platform to the peak rate that is acceptable to the slowest LEC on the emulated LAN.

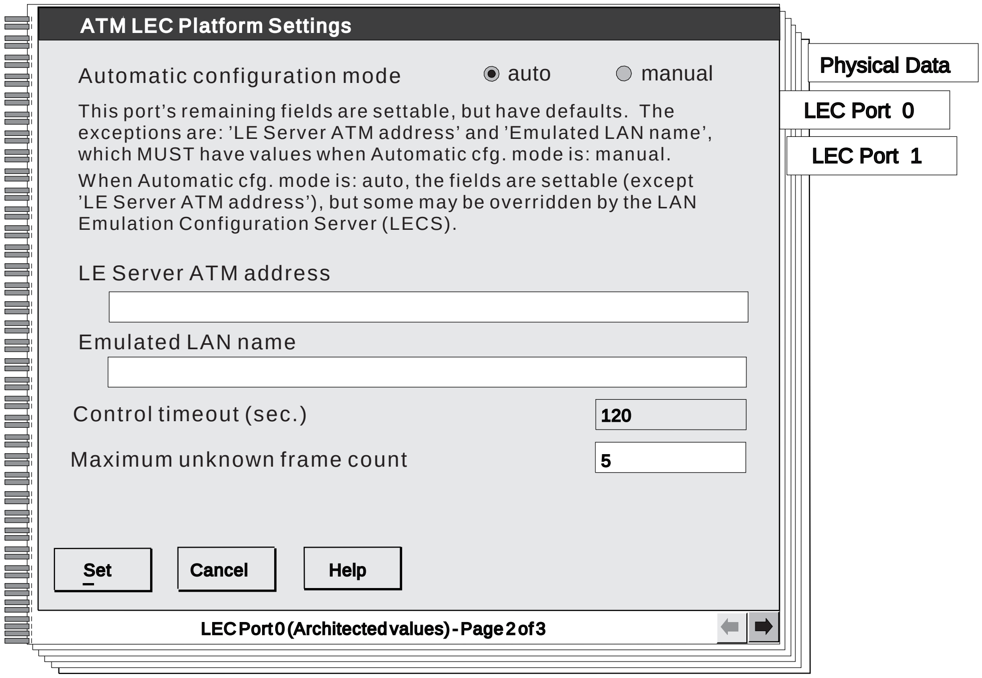
  If you set a value that is greater than the slowest LEC, make sure that communications can handle overruns from any LEC that is slower than the peak cell rate set on the LEC platform.
- If you set the peak cell rate, round off the value to .1 Mbps. For example, you can set the value to 99.0 or 99.1 Mbps, but not to 99.05 Mbps.

Max data frame size

Specify one of the following values for any of the emulated LAN types for the maximum AAL5 SDU (PDU) size that includes both the header and the payload in the frame.

1516 bytes, which is the default for an Ethernet LAN.
4544 bytes, which is the default for a 4Mbps token-ring LAN.
9234 bytes, which is a standard in *LAN Emulation Over ATM,* which is published by the ATM Forum.
18190 bytes, which is the default for a 16 Mbps token-ring LAN.

10.3.2.2 Page 2 of 3



Automatic LECS configuration mode
lets you take advantage of the automatic configuration of the LEC port by the LAN emulation configuration server (LECS) when a LECS is available in the ATM network.

- Accept the Auto default to use the LECS, but make sure that this optional element is available on the ATM network.
- Select Manual if you want to enter the following ATM LEC parameters manually or you want to override the LECS automatic configuration.

C9 **LAN Server (LES) ATM address**
is required only if you are configuring the LEC port manually. Then, specify this 40-hexadecimal-digit address, which you should be able to get from your ATM network administrator. Because the two LEC ports on an ATM OSA-2 cannot join the same emulated LAN concurrently, you cannot specify the same LES ATM address for both LEC ports.

C5 **LEC emulated LAN name**
is the name of the emulated LAN (ELAN) of this LEC port. You only have to specify the ELAN name if you are entering the LEC parameters manually. If the LES supports a default ELAN name, you can enter a null character to specify that default ELAN name.

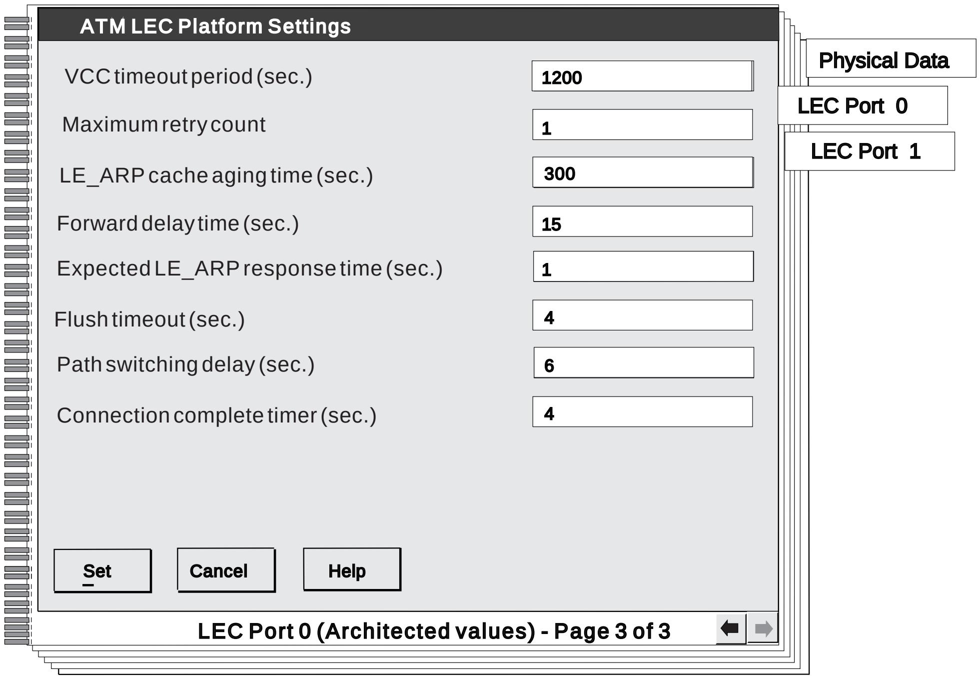
Specify the name (identity) in up to 32 ASCII characters. Note that some ATM switches, for example, the 8260, are case-sensitive. Ask your ATM network administrator for the name of the emulated LAN that this LEC port will join. (The two LEC ports on an ATM OSA-2 cannot join the same emulated LAN concurrently.)

C7 **Control time-out**
specifies the time-out period in seconds for most request/response control frame interactions. Accept the default of 120 seconds or specify a number from 10 through 300.

C10 **Maximum number of unknown frames**
specifies the maximum number of frames for a given unicast MAC address (this LEC port) that can be sent to the Broadcast and Unknown Server (BUS) within the time interval specified by the Maximum unknown frame time parameter.

Accept the default of 5 frames or specify a number from 1 through 10. The Maximum unknown frame time interval is not settable. It equates with C 11, and is displayed on the OSA/SF GUI Configuration Group notebook page 2 (page 221). (A BUS handles data sent by a LEC to a broadcast MAC address.)

10.3.2.3 Page 3 of 3



C12 **VCC time-out**
specifies the activity time-out for data direct VCCs in seconds, that is, the time the LEC port (station) will maintain an inactive data connection. The default is 1200 seconds (20 minutes). You can specify a value from 1 through 2,147,483,648.

C13 **Maximum LE_ARP retry count**
indicates the maximum times that an LAN emulation address resolution protocol (LE_ARP) request can be retried. Accept the default of 1 retry or specify 0, 1, or 2.

C17 **Aging time-out for LE_ARP cache**
is a verification timer for the LE_ARP cache entries. Accept the default of 300 seconds or specify a number from 10 through 300.

C18 **Forward delay for LE_ARP cache**
is a verification timer for non-local (destinations on the other side of a bridge from this ATM OSA-2) LE_ARP cache entries when the topology is changing in the non-local area. Accept the default of 15 seconds or specify a number from 4 through 30.

C20 **LE_ARP req./resp. time-out**
is the time-out period for LE_ARP request/response exchanges. Accept the default of 1 second or specify a number from 1 through 30.

C21 **Flush req./resp. time-out**
is the time-out period for Flush request/response exchanges. Accept the default of 1 second or specify a number from 1 through 4.

C22 **Path switching delay**
is the maximum time that frames sent to the BUS will take to be delivered. This parameter can be used to bypass flush control. Accept the default of 6 seconds or specify a number from 1 through 8.

C28 **Connection-complete time-out**
is the time-out period in which data or a READY_IND message is expected from a calling party. Accept the default of 4 seconds or specify a number from 1 through 10.

10.4 Examples of the Modes Using the ATM LEC Platform

In the next two figures, examples are shown of ATM OSA-2 CHPID X'18' being run in the TCP/IP Passthru and SNA modes. Although not indicated, the CHPID can, of course, be defined to be shared between the two logical partitions. Also TCP/IP and VTAM in both LPs can share access to both ports in any combination.

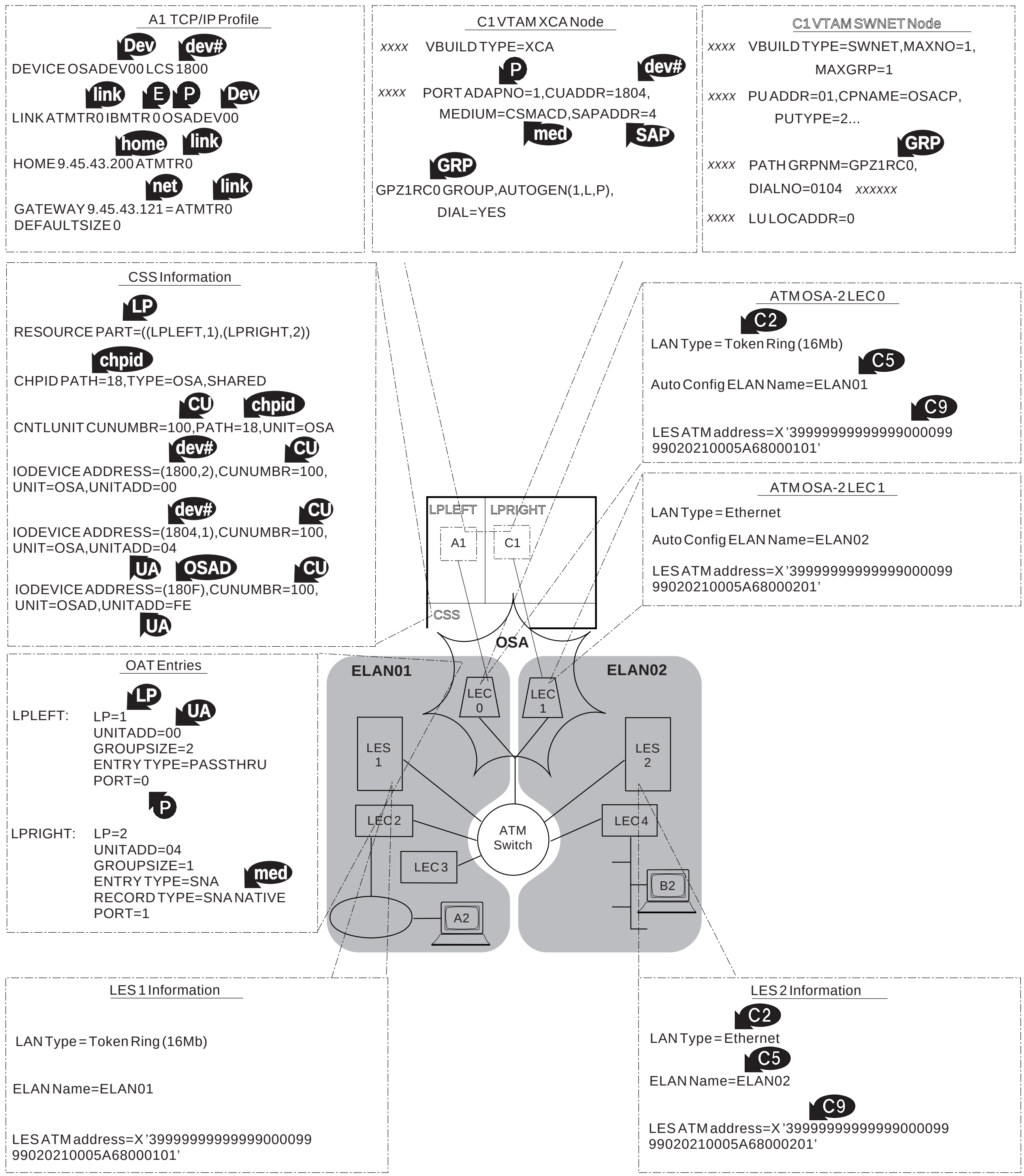
Notes:

1. Each LEC port must be logically attached to a different ELAN on the network if they are logically attached concurrently. As usual, the OSA CHPID must also be customized, or configured, and activated to be run in the TCP/IP Passthru (page 101) and SNA modes (page 135) concurrently with port sharing.
2. In this book, an ELAN is considered to encompass the actual, “legacy” LAN that is bridged to the ATM network. In some books, the ELAN is considered to end at the two nodes that provide LEC services. In other books, an ELAN is divided into a virtual LAN between the two providers of LEC services, and the real, or legacy, or attached LAN.

10.4.1 In the First Example

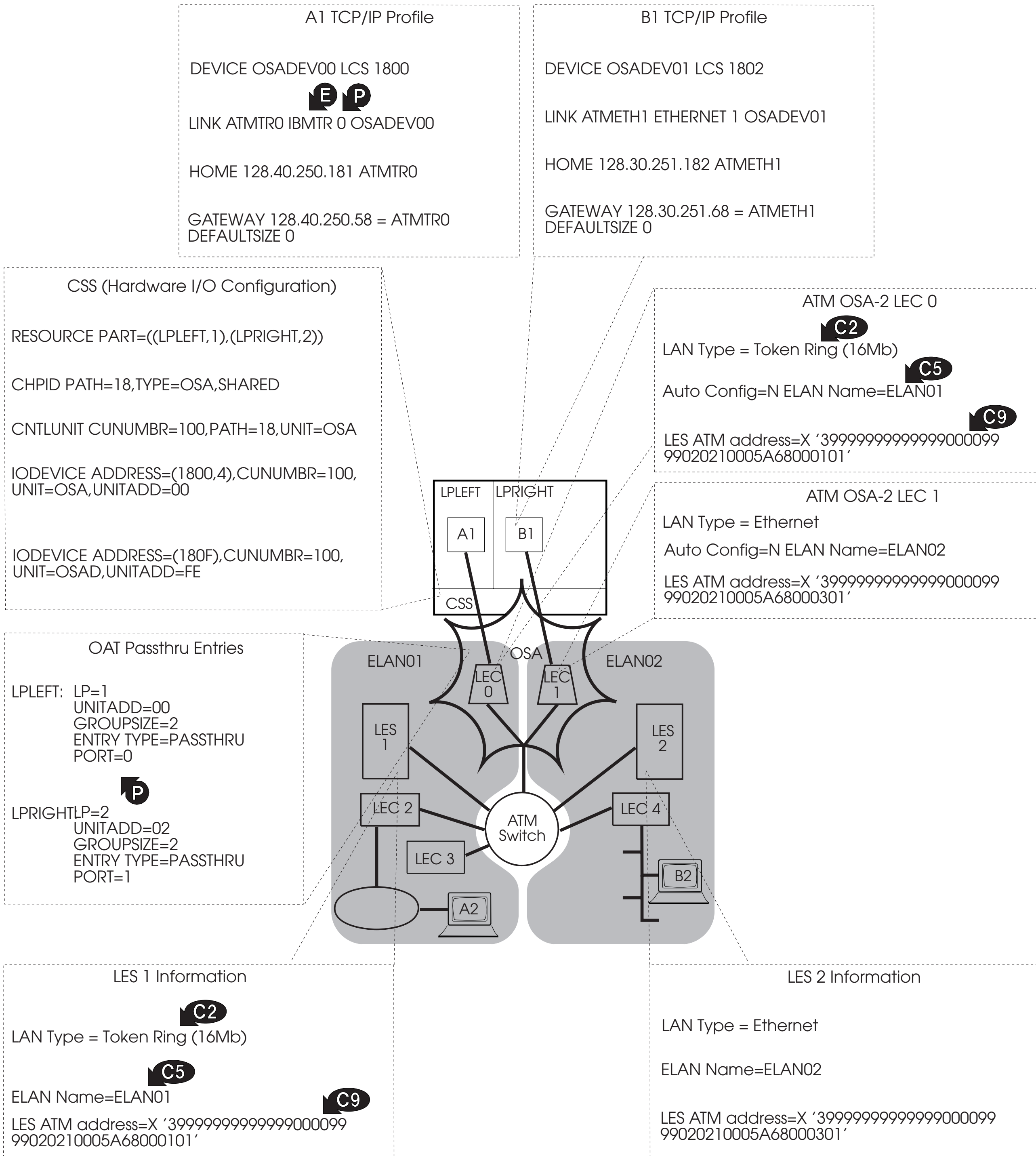
LEC port 0 (LEC0) of the OSA whose CHPID is X'18'', is defined to LP 1 (LPLEFT). LEC port 1 (LEC1) is defined to LP 2 (LPRIGHT). Both LEC ports could be defined to both logical partitions, but this is not shown to simplify the figure.

- TCP/IP in LP 1 (A1) transfers data packets with its client (A2) on the token-ring LAN that is bridged from the ATM-based network to which OSA CHPID X'18' is attached. LEC0 in the OSA and LEC2 provide the LAN emulation client (LEC) services that are required for this exchange on ELAN01, which is managed by LES1. There is no LECS.
- TCP/IP in LP 2 (B1) transfers data packets with its client on the Ethernet LAN that is bridged from the ATM-based network to which OSA CHPID X'18' is attached. LEC1 in the OSA and LEC4 provide the LAN emulation client (LEC) services that are required for this exchange on ELAN02, which is managed by LES2. There is no LECS.


A1 TCP/IP Profile
Dev
dev#
DEVICE OSADEV00 LCS 1800
link
E
P
Dev
LINK ATMTR0 IBMTR 0 OSADEV00
home
link
HOME 9.45.43.200 ATMTR0
net
link
GATEWAY 9.45.43.121 = ATMTR0
DEFAULTSIZE 0
C1 VTAM XCA Node
xxxx VBUILD TYPE=XCA
P
dev#
xxxx PORT ADAPNO=1,CUADDR=1804,
MEDIUM=CSMACD,SAPADDR=4
med
SAP
GRP
GPZ1RC0 GROUP,AUTOGEN(1,L,P),
DIAL=YES
C1 VTAM SWNET Node
xxxx VBUILD TYPE=SWNET,MAXNO=1,
MAXGRP=1
xxxx PU ADDR=01,CPNAME=OSACP,
PUTYPE=2...
GRP
xxxx PATH GRPNM=GPZ1RC0,
DIALNO=0104 xxxxxx
xxxx LU LOCADDR=0
CSS Information
LP
RESOURCE PART=((LPLEFT,1),(LPRIGHT,2))
chpid
CHPID PATH=18,TYPE=OSA,SHARED
CU
chpid
CNTLUNIT CUNUMBR=100,PATH=18,UNIT=OSA
dev#
CU
IODEVICE ADDRESS=(1800,2),CUNUMBR=100,
UNIT=OSA,UNITADD=00
dev#
CU
IODEVICE ADDRESS=(1804,1),CUNUMBR=100,
UNIT=OSA,UNITADD=04
UA
OSAD
CU
IODEVICE ADDRESS=(180F),CUNUMBR=100,
UNIT=OSAD,UNITADD=FE
UA
ATM OSA-2 LEC 0
C2
LAN Type = Token Ring (16Mb)
C5
Auto Config ELAN Name=ELAN01
C9
LES ATM address=X '39999999999999000099
99020210005A68000101'
ATM OSA-2 LEC 1
LAN Type = Ethernet
Auto Config ELAN Name=ELAN02
LES ATM address=X '39999999999999000099
99020210005A68000201'
LPLEFT
LPRIGHT
A1
C1
CSS
OSA
OAT Entries
LP
UA
LPLEFT: LP=1
UNITADD=00
GROUPSIZE=2
ENTRY TYPE=PASSTHRU
PORT=0
P
LPRIGHT: LP=2
UNITADD=04
GROUPSIZE=1
med
ENTRY TYPE=SNA
RECORD TYPE=SNA NATIVE
PORT=1
ELAN01
ELAN02
LEC 0
LEC 1
LES 1
LES 2
LEC 2
LEC 4
ATM Switch
LEC 3
B2
A2
LES 1 Information
LAN Type = Token Ring (16Mb)
ELAN Name=ELAN01
LES ATM address=X '39999999999999000099
99020210005A68000101'
LES 2 Information
C2
LAN Type = Ethernet
C5
ELAN Name=ELAN02
C9
LES ATM address=X '39999999999999000099
99020210005A68000201'

10.4.2 In the Second Example

You can see that TCP/IP (B1) in LP 2 (LPRIGHT) can also transfer data through the OSA to its client (B2) on the Ethernet LAN that is bridged from the ATM network. LEC1 in the OSA and LEC4 provide the LAN emulation client (LEC) services that are required for this exchange on ELAN02, which is managed by LES2. There is no LECS.



Chapter 11. OSA Network Management Services

An OSA's network activities can be monitored by OSA/SF, NetView, and several S/390 and network management services. Except for OSA/SF and some NetView and SNMP activities that depend on OSA/SF, refer to the books provided by the relevant product. In this OSA-centric book, the following OSA network management areas are discussed that relate to OSA/SF:

- Basic MIB II support through LCS TCP/IP support.
- Unsolicited network management alerts by an ATM or FENET OSA-2 when it is being run in the SNA mode. See the list the next section.
- Logical link control (LLC) status items that can be provided by an ATM or FENET OSA-2 to OSA/SF when the OSA is being run in the SNA mode. See the list that starts on page 199.
- Support for the Box Manager node when an OSA is being run in the SNA mode. See the discussion that starts on page 202.
- ATM OSA-2 support for SNMP management support (OS/390 only) . See the discussion that starts on page 206.

11.1 An ATM or FENET OSA-2 in the SNA Mode

The type of network management supported for an ATM or FENET OSA-2 that is being run in the SNA mode depends on whether the OSA can automatically forward a number of alertable conditions to the managing OSA/SF. If not, those OSAs and all other OSAs provide a network management interface through the Box Manager node (page 202).

An ATM or FENET OSA-2 can automatically forward a number of alertable conditions to OSA/SF when the OSA is being run in the SNA mode. These OSAs can also provide connection-level status to OSA/SF for review by the OSA/SF users.

For these functions, the following conditions must be met:

- The PTF resolution to OSA/SF for OS/390 and MVS/ESA APAR OW30222 or OSA/SF for VM/ESA APAR OW30932 or OSA/SF for VSE/ESA APAR PQ11504 must be applied.
- OSA/SF must be running on the system. If OSA/SF for VM/ESA is being used, the program must additionally be made exempt from inactivity forcing (page 76).
- At least one instance of VTAM must have an active XCA to the ATM or FENET OSA-2 port for that port to generate any asynchronous events.
- If the network management alerts are to be forwarded by OSA/SF to a network management service, for example NetView, that program must be running on the same system image as the managing OSA/SF. NetView requirements are listed in the chapters for each S/390 programming system that OSA supports. To view these alerts, the NetView Network Problem Determination Application (NPDA), or hardware monitor, must be used.

11.1.1 Unsolicited Network Management Alerts

Notes:

1. OSA/SF reports each unsolicited alert via message IOAC262I to the system operator console and logs it in the OSA/SF message log.

   The format of OSA/SF message IOAC262I is:

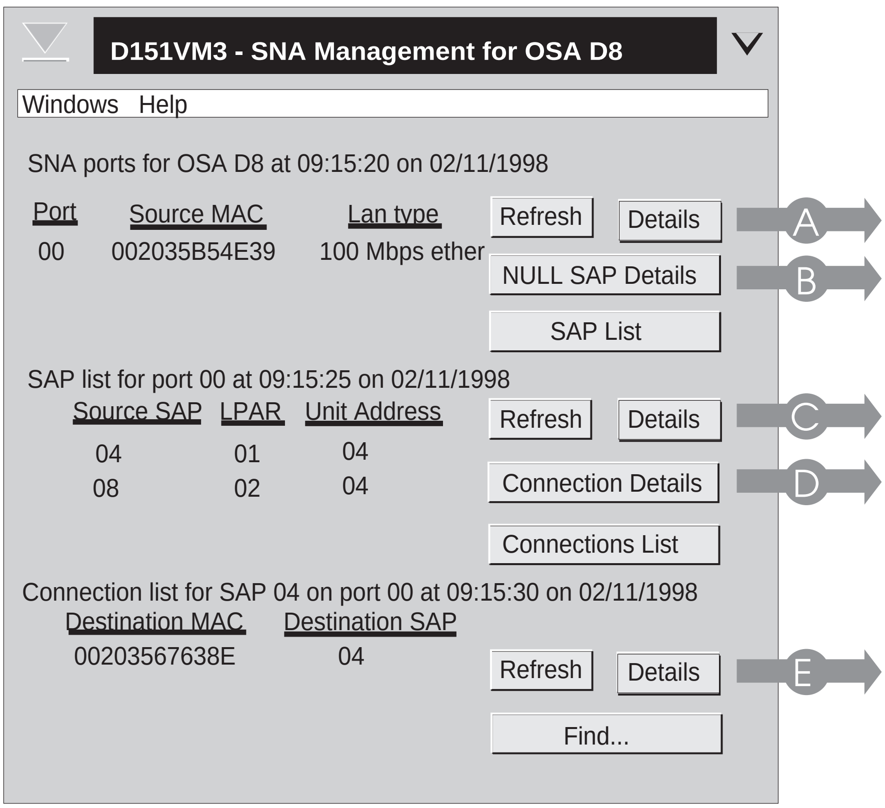
```
IOAC262I chpid port# error_code severity
```

2. Except as noted, you should report them to the IBM Support Center.
3. All of the alerts fall into Alert category 2 except 1803 (3) and 191D (10).
4. Each alert can be presented by OSA/SF to an SNA network management service such as NetView if the PTF resolution to the proper OSA/SF APAR is applied to support the NetView program-to-program interface (PPI) and the Netview PPI is enabled. For information on enabling the NetView PPI, refer to NetView books, some of whose titles are listed in the bibliography (page xx).

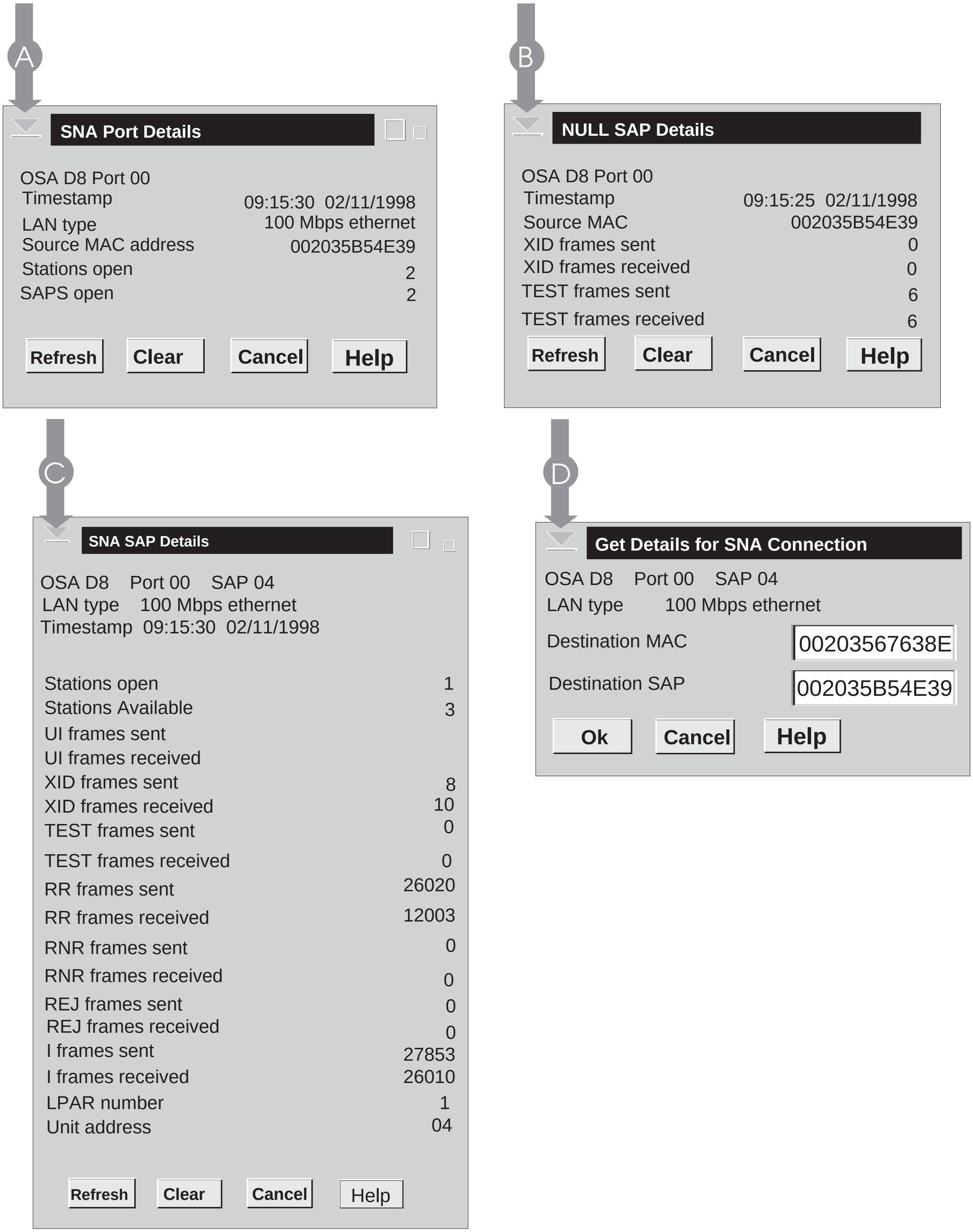
Error code	Severity	Description
1400	2	LLC reported that LAN header is not valid.
1401	2	Unsupported routing information length received from VTAM.
1402	2	User LLC station or SAP undefined.
1403	1	VTAM commands received before initialization. Reactivate the XCA major node. If the problem persists, report it to the IBM Support Center.
1404	1	VTAM commands received before LAN adapter enabled.
1405	2	Unsupported VTAM interface header length.
1406	2	Parameter data length not valid.
1407	2	Network layer identifier not supported.
1408	2	Identifier type not valid.
1409	2	Unsupported VTAM interface version.
140A	2	Padding length not valid in data from VTAM.
140C	2	Command or response bits not balid for LAN data.
140D	2	Unsupported function for network management SAP. Ensure the system is configured for network management service (NetView) or SAP, as indicated. If the problem persists, contact the IBM Support Center.
140E	1	LLC connection not opened by VTAM.
140F	2	Unsupported LLC operations received from VTAM.
1410	2	Unsupported LLC flow control options received from VTAM.
1411	2	Unsupported function request received from VTAM.
1412	1	Receive connect request or response before LLC station opened.
1413	2	Unsupported connection confirmation options received from VTAM.
1414	1	Received close LLC station response with no request outstanding.
1803	3	Token-ring cable not connected or, if connected, possible lobe wire fault or defective medium access unit (MAU). Verify cables and connections. If the problem persists, contact the IBM Support Center.
191D	3	Unspecified network error occurred for an Ethernet connection. Check that the cable and transceiver type configuration are correct. If the problem persists after the maximum number of retries are unsuccessful, report the condition to the IBM Support Center.

11.1.2 Logical Link Control Status Items

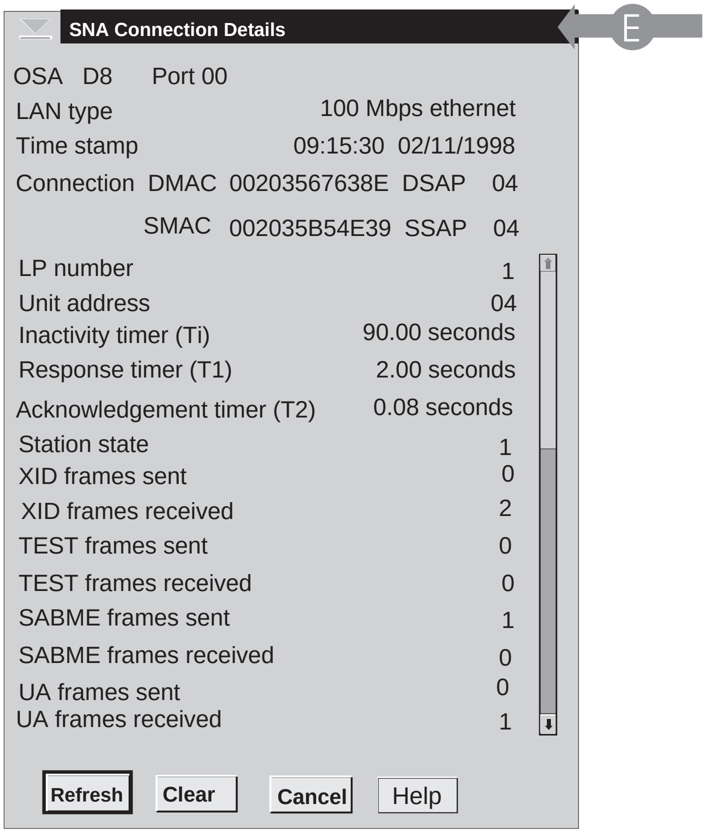
- Each ATM and FENET OSA-2 can provide logical link control (LLC) status data items to its OSA/SF users. Note that one or both of the LAN emulation client (LEC) ports on an ATM OSA-2 can be used in the SNA mode. However, a FENET OSA-2 only has one port.
- For instructions on how to obtain the LLC data items, refer to the OSA/SF use's guide for the system. In the OSA/SF GUI panels, start with the ***Management for OSA*** panel, which is shown in the next figure.
- The LLC status data items are listed in the following figures panel by panel. Note that the ***SNA Connection Details*** panel is scrollable because all the LLC items cannot be displayed on a single screen.
- To review the meanings of these items, refer to their definitions in *Token-Ring Network Architecture Reference,* which is listed in the bibliography (page xx).

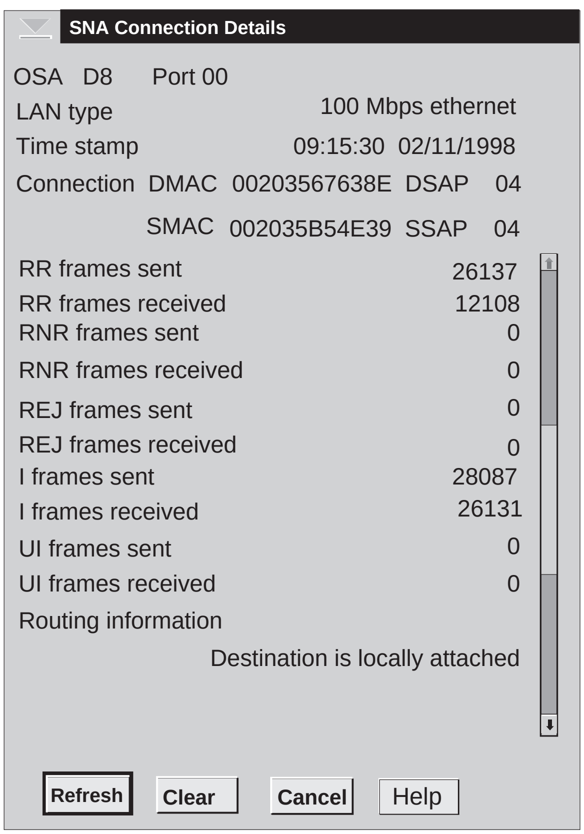


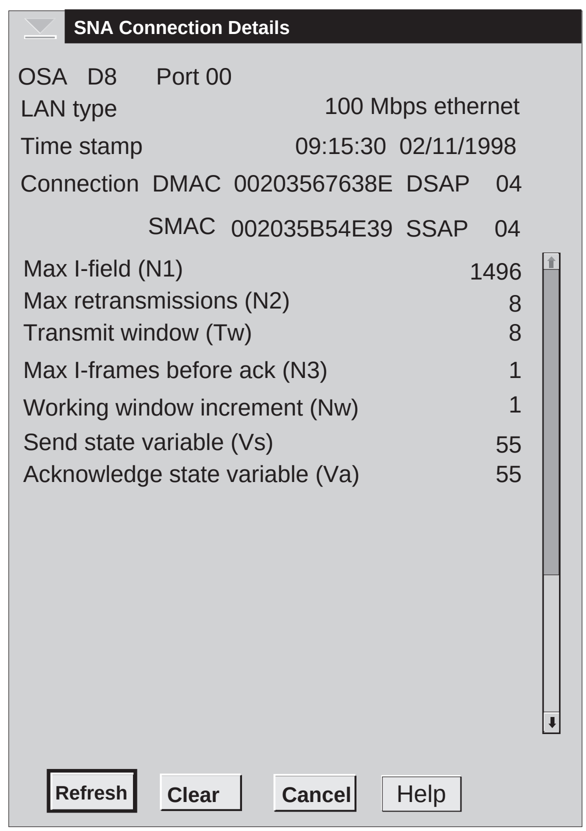
Note: From the SNA Magement for OSA panel, which is shown in the preceding figure, subsequent panels provide detailed information. The outgoing arrows (A through E) correspond with ingoing arrows on successive figures representing those panels. Note that the ***SNA Connection Details*** information is so extensive that it fills three screens (as indicated by the slide bar on the right of the panel).



Note: The SNA connection details do not fit one one screen. They are shown in the following three consecutive screens.


SNA Connection Details
E
OSA D8 Port 00
LAN type 100 Mbps ethernet
Time stamp 09:15:30 02/11/1998
Connection DMAC 00203567638E DSAP 04
SMAC 002035B54E39 SSAP 04
LP number 1
Unit address 04
Inactivity timer (Ti) 90.00 seconds
Response timer (T1) 2.00 seconds
Acknowledgement timer (T2) 0.08 seconds
Station state 1
XID frames sent 0
XID frames received 2
TEST frames sent 0
TEST frames received 0
SABME frames sent 1
SABME frames received 0
UA frames sent 0
UA frames received 1
Refresh
Clear
Cancel
Help


SNA Connection Details
OSA D8 Port 00
LAN type 100 Mbps ethernet
Time stamp 09:15:30 02/11/1998
Connection DMAC 00203567638E DSAP 04
SMAC 002035B54E39 SSAP 04
RR frames sent 26137
RR frames received 12108
RNR frames sent 0
RNR frames received 0
REJ frames sent 0
REJ frames received 0
I frames sent 28087
I frames received 26131
UI frames sent 0
UI frames received 0
Routing information
Destination is locally attached
Refresh
Clear
Cancel
Help


SNA Connection Details
OSA D8 Port 00
LAN type 100 Mbps ethernet
Time stamp 09:15:30 02/11/1998
Connection DMAC 00203567638E DSAP 04
SMAC 002035B54E39 SSAP 04
Max I-field (N1) 1496
Max retransmissions (N2) 8
Transmit window (Tw) 8
Max I-frames before ack (N3) 1
Working window increment (Nw) 1
Send state variable (Vs) 55
Acknowledge state variable (Va) 55
Refresh
Clear
Cancel
Help

11.2 SNA Mode Box Manager Node Support

An ENTR or FDDI OSA-2 that is being run in the SNA mode can support a Box Manager node (page 204) through its virtual port X'FF' for communications with a network management service such as NetView. If the PTF resolution for OSA/SF APAR OW30222 (OS/390 or MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA), has *not* been applied to an ATM OSA-2, it can also support a Box Manager node when the OSA is being run in the SNA mode. A FENET OSA-2 does not support the Box Manager node.

Through the Box Manager node, an OSA alerts the network management service that is running on the system image that is in the LP associated with that OAT entry whenever the OSA is being run in the SNA mode and one of the alertable conditions listed in the next section occurs. The OSA can also be queried to provide relevant data about its hardware, software. If NetView is being used, it can monitor events related to the SNA/APPN operations of an OSA that has been defined to any partition in which VTAM is running. To monitor these events, NetView's Network Problem Determination Application (NPDA), or hardware monitor, must be used.

11.2.1 Operational Information

If you are familiar with the support provided by communications controllers, such as the IBM 3172, you can see that OSA support is very similar.

11.2.1.1 Unsolicited Generic Alerts

Upon detecting one of the following alertable conditions, an OSA sends a generic alert to the Network Problem Determination Application (NPDA) hardware monitor at the NetView operator console. Each alert provides notification of the pending or actual loss of service and relevant data.

Category 1
is sent when a permanent software error occurred on the OSA that requires manual intervention. All internal recovery procedures have already failed.

Category 2
is sent when a temporary software error occurred on the OSA that does not require external intervention. Internal recovery has been successful.

Category 3
is sent when a hardware error occurred on the OSA that requires manual intervention. All internal recovery procedures have failed.

Category 7
is sent when an error occurred that was caused by the hardware or software configuration.

Category 8
is sent when an SNA protocol error was detected that requires no external intervention. The OSA mode remains active.

Category 9
indicates that a communications equipment error was detected that caused a threshold to be exceeded.

Category 10
is sent when a permanent error condition exists that is outside the span of the OSA's control.

11.2.1.2 Solicited Adapter Statistics

An OSA can also be solicited, or queried, to provide data to the NetView operator console when it receives a Central Site Control Facility (CSCF) command. The OSA provides a list, or profile, of all the components that can be queried. From the profile, the NetView operator can select a hardware (HW) component, software (SW) component, and adapter name.

11.2.1.3 Guidelines on Querying an OSA for NetView Data: Here is a checklist to assist the NetView operations personnel. For more information, refer to the NetView books, some of which are listed in the bibliography (page xviii).

1. Make sure an SSCP-PU session has been established to access the CSCF session.
   OSA SNA management services use the following SNA request units (RUs): Network Management Vector Transport (NMVT), Activate Physical Unit (ACTPU), and Deactivate Physical Unit (DACTPU).

2. Establish a NetView CSCF session by issuing the CSCF command from the Network Communications Control Facility (NCCF) or another NetView component. DISKREM is the task name.

   CSCF PU= *puname*
   PURGE ALL | BEFORE *mm/dd/yy hh:mm*
   COPY

   Where:

   PU= is a required parameter. Specify the 8-character physical unit name by which you defined the OSA to VTAM in SWNET PU Definition statement.

   PURGE is an optional parameter to clear the CSCF VSAM data base of either all panel templates or those that have not been used since the specified date or since the specified date and time.

   COPY is an optional parameter that sends the current display to the network log and to the hardcopy terminal if one is connected. CSCF must be active and a CSCF panel must be displayed.

3. Issue one of the Query commands that are displayed on the ***OSA Commands*** panel.

   - On the top title line, of the ***OSA Commands*** panel, the panel ID, panel tile, and PU name are displayed.
   - On the message line, the messages are displayed to notify the user ID whether the command was successful or failed, whether a time-out limit was reached, and any syntax errors that were made.
   - Enter one of the following OSA Query commands on the CMD line. Begin an OSA command with a slash '/' to distinguish it from a NetView command. Note that time on the output of a Query command indicates the lapsed time since the last IPL.

     /QUERY to obtain a list of the OSA components that can be queried

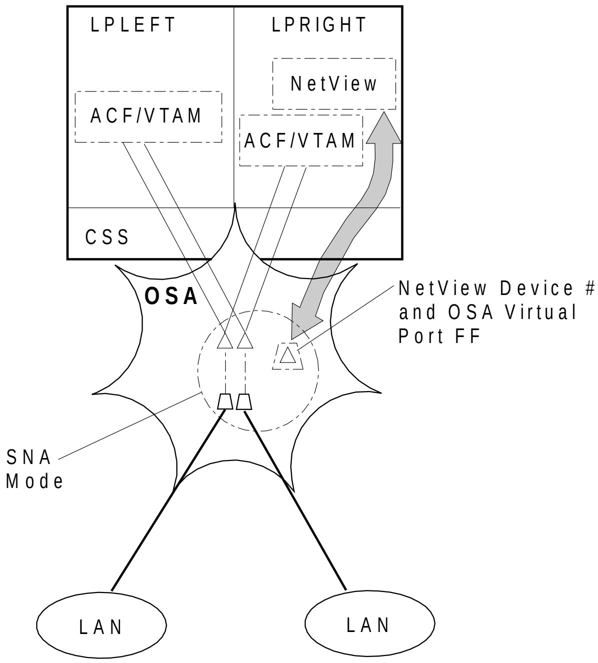
     /QUERY*component*, replacing the component variable with one of the following options: **HW**, **SW**, adapter name, or task name.

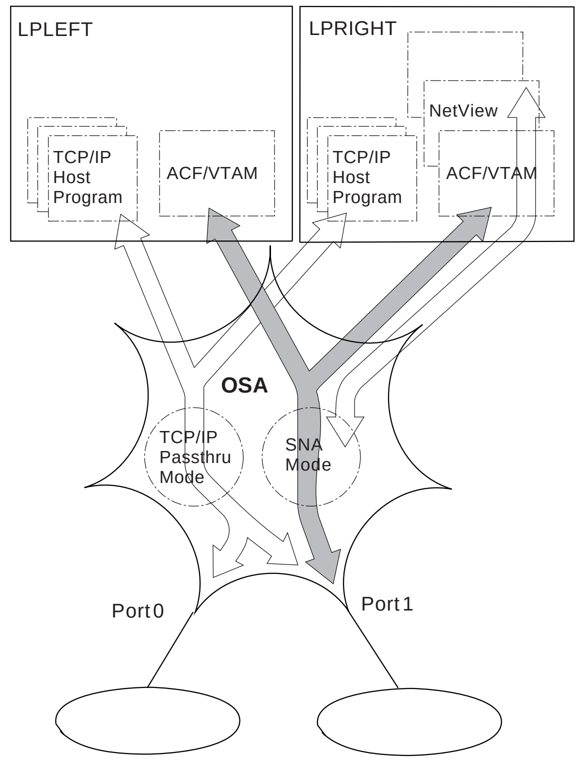
   - The PF keys have conventional meanings. Press:

     PF2 to return to the preceding NetView component or return to NCCF.
     PF3 to return to the previous panel
     PF6 to roll
     PF7 to scroll backward one panel
     PF8 to scroll forward one panel
     PF11 to display the current statistical counter values
     PF12 to retrieve the immediately preceding command

11.2.2 NetView Support via Box Manager Node

For an ATM OSA-2 to which the PTF resolution to OSA/SF APAR OW30222 has not been applied, for an ENTR OSA-2, and for a FDDI OSA-2, NetView communications require a Box Manager node and CSCF interface for viewing solicited information. In the following figures, the additional definitions are shown that you need to specify a Box Manager node for these OSAs.





11.2.2.1 Tasks

- System hardware I/O configuration definitions are provided on page 138.
- OSA definitions are described on page 138.
- VTAM definitions are listed in the next section.

11.2.2.2 VTAM Definitions: Establish an SSCP-PU session for communications between an OSA and an SNA network management service, such as NetView.

Associate one XCA major node as the box manager XCA major node. This allows an OSA to have minimal network management and to send generic alerts to the NetView program when the OSA is being run in the SNA mode.

- Specify MEDIUM=BOXMGR on the PORT definition statement.
- Do not specify a DIAL parameter in the Group Definition statement.
- Only one GROUP, LINE, and PU definition statement is allowed.
- Otherwise, follow the guidelines presented on page 156 .

Define one Switched Network (SWNET)major node. Specify an IDBLK value of 074 and a PUTYPE of 2 on the PU definition statement. The switched major node for the PU of the OSA does not need a PATH statement, and there should be no LU definitions. The PU Definition statement is shown here.

```
name PU ADDR=link_station_address, PUTYPE=pu_type,
        IDBLK=id_block_value, IDNUM=id_num_value
```

name

Specifies the minor node name of the physical unit represented by this definition statement.

link_station_address

Specifies the hexadecimal station address for the physical unit.

pu_type

Specifies the PU type for this peripheral, which must be a 2.

id_block_value

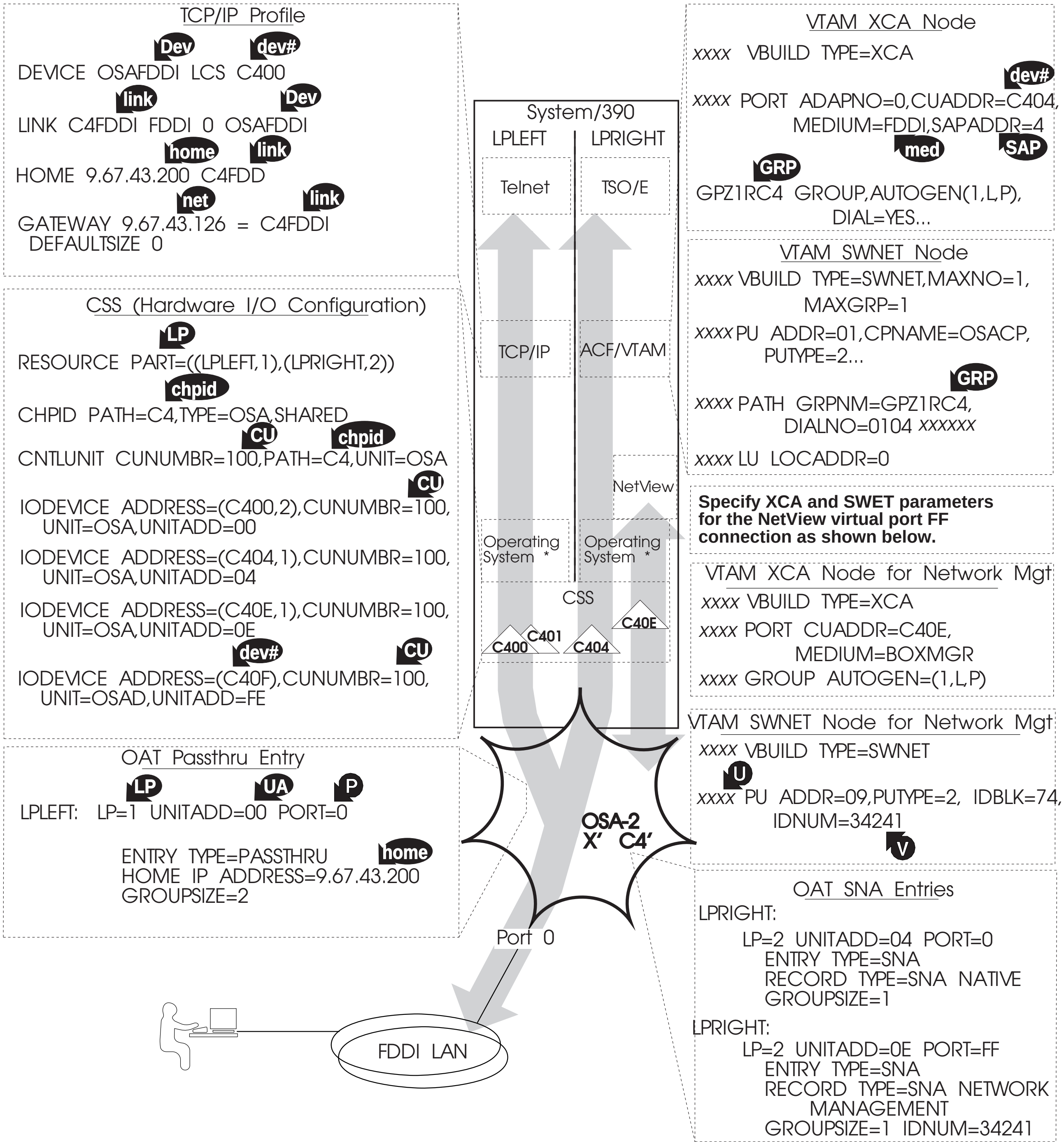
Specifies the block value, which must be 074 for OSA.

V id_num_value

Specifies a 5-digit hexadecimal number that identifies the specific device. For OSA this must match the value specified in OSA/SF when you set up a SNA OAT entry for SNA network management.

Note: Activate the SWNET major node before activating the XCA major node. Otherwise, the Boxmanager PU will stay in the connectable (CONCT) state. The line will not become active; you will get the VTAM IST690I message instead.

11.2.2.3 An Example of a FDDI OSA-2's Box Manager Node:



11.3 SNMP Management for an ATM OSA-2

If an ATM OSA-2 is running in an OS/390 environment, Simple Network Management Protocol (SNMP) management support is available via the OS/390 TCP/IP OpenEdition Distributed Programming Interface (DPI) subagent in conjunction with the OSA/SF.

DPI, which is an API that is supported by OS/390 OpenEdition, is used to develop subagents to extend the Management Information Base (MIB) available from an SNMP agent. For more information on DPI, refer to *eNetwork Communications Server: IP Configuration Guide* This SNMP management support fits ATM management into the SNMPv2 management framework.

Cautionary note: An SNMP subagent can receive information only from the instance of TCP/IP that is running in the same logical partition as the instance of OSA/SF that is managing the ATM OSA-2.

11.3.1 Step 1. Obtain the Values for the Following Parameters

The parameters used in this appendix are based on the example shown on page 174 for an ATM OSA-2 running in the HPDT ATM Native mode.

home Get the *TCP/IP instance IP address,* which is displayed on page 4 of the 4 “Physical” pages in the HPDT ATM Settings port notebook (page 214) of this ATM OSA-2. Enter this address in the TCP/IP Home statement as the IP address of the TCP/IP stack that is managing SNMP data for this ATM OSA-2.

In the example, it is ***9.67.1.2***

OSA Get the *OSA name* that is specified on the HPDT ATM Native Settings panel (page 165) and in the VTAM TRLE statement (page 176). You will now specify this value as the *device name* in the TCP/IP Device and Link statements.

In the example, it is ***OSA18***

Port Get the OSA port name that is specified on the HPDT ATM Native Settings panel (page 165), displayed on page 4 of the Physical section of that port's notebook (page 214), and specified in the VTAM Port and TRLE statements (page 176). You will now specify this value as the *port name* in the TCP/IP Device statement.

In the example, it is ***C18TOC5C***

link Establish the OSA link name and specify it as the *link name* in the TCP/IP Link and Home statements.

In the example, it is ***ATMLNK2***

E Get the *network protocol* that you will enter on the TCP/IP Device and Link statements. The value of this parameter is ***ATM*** for any ATM OSA-2.

O Get the *socket number* or *tcipip port number* for the socket connection between TCP/IP and OSA/SF from your TCP/IP administrator.

In the example, this is ***721***

Q Get the name of the OSA/SF OE transport application.

In the example, it is the IBM-shipped default name ***IOASNMP***

11.3.2 Step 2. Define the ATM Device and Link It

1. Define the ATM OSA-2 as an ATM type device in the TCP/IP Device statement so that it can be managed by SNMP.
2. Associate the port name in the TCP/IP Link statement with the device name.
3. Correlate the TCP/IP instance address of the managing TCP/IP stack with the link name.

In the example, you would enter:

```
          OSA    E                  Port
Device  OSA18  ATM  PORTNAME  C18TOC5C
          link     E   OSA
Link  ATMLNKF2  ATM  OSA18
           home     link
Home  9.67.1.2   ATMLNKF2
```

11.3.3 Step 3. Establish a TCP/IP Socket Connection

Using the new SACONFIG statement, establish a TCP/IP socket (port) connection between OSA/SF and an instance of TCP/IP for the exchange of information. If this statement is not already in the PROFILE.TCPIP, you can add it via OBEYFILE.

In the example, you would enter:

```
                                            O
SACONFIG  ATMENABLED  OSASF  721
```

11.3.4 Step 4. Provide SNMP Access to OSA/SF by Starting IOANMAIN

To start SNMP access, you must start IOANMAIN through the Autolog section of the TCP/IP profile.

If you change the name of the procedure from its default name of IOASNMP, make sure you change it in the autolog as well. IOASNMP resides in SYS1.PROCLIB.

```
AUTOLOG
    .
      Q
    IOASNMP       ;  OSA/SF  to  TCP/IP  communication  facility
    .
ENDAUTOLOG
```

Here is an example of IOASNMP that will reside in SYS1.PROCLIB:

```
//*
//*        Start OSA SUPPORT SNMP COMMUNICATION FACILITY
//*
    Q
//IOASNMP  EXEC  PGM=IOANMAIN,TIME=1440,REGION-0K,DYNAMNBR=5
//STEPLIB     DD   DSN=SYS1.SIOALMOD,DISP=SHR
//SYSPRINT   DD   SYSOUT=*
//SYSDUMP   DD   SYSOUT=*
//*          START OSA SUPPORT SNMP COMMUNICATION FACILITY
//*
```

Chapter 12. OSA Port Management

An OSA port is used to transfer data between the S/390 platform and the network attached to the port. The physical characteristics of the OSA ports are discussed in Chapter 2. In this chapter, their traffic parameters and statistics are described using the format that is displayed by the OSA/SF OS/2 interface (GUI).

12.1 General Notes

- To view the current settings of port parameters, which you would do, for example, to gather statistical data about port traffic or to investigate the cause of a port problem, the following services and programs are available.
  1. If you are using an OSA/SF OS/2 interface (GUI), you can view and refresh the appropriate panel that GUI displays. For the other OSA/SF interfaces, you can issue the OSA/SF commands, such as the Query command and Set Parameter command.
  2. You can also view OSA port parameters at the standalone support element or single object operations via the hardware management console. For more information, refer to the operator's guide of the hardware platform that is being used.
- To set a port's hardware state, consider the following points.
  1. Enabling and disabling a physical OSA port is controlled at the S/390 system console on an ES/9000 processor and on the hardware management console of a 9672 parallel server. However, the Control mode in the appropriate panels, or frames, of these consoles can be set to Yes or No.

     Yes = only users of the hardware console can change the state of the physical OSA port.
     No = applications such as OSA/SF can change the state of the physical OSA port.
  2. Enabling and disabling an ATM OSA-2 LAN emulation client (LEC), or logical, port is done with user input to the OSA/SF GUI ATM LAN emulation client (LEC) settings notebook page (page 185). The default value for a LEC port is the enabled state.
- To stop port traffic, take the following steps.
  1. Identify all the OSA devices that are associated with the LAN port or ATM LEC port number in the active OSA mode or modes. Check the OSA's OAT entries for a list of the devices.

     Only for an OSA-1 being run in one of the LANRES/MVS modes, you must determine the port number from the AUTOOSA file because there is no direct correlation between port and device number.

The AUTOOSA file LOAD statement shows the port slot, which is one digit higher than the port number. (Port 0 is in slot 1.)

```
                    P+1        P+1                E
LOAD  IOBLODI  SLOT=1  PORT=1  FRAME=TOKENRING  NAME=BOARD1
```

2. Stop the S/390 programs from using these devices.
3. ***Vary all the devices off from all the LPs before you disable the port.*** For example, in an OS/390 environment, you can use the host operating system commands or ESCON Manager.
4. Disable the port.

- To start port traffic, take the same steps that you took to stop port traffic, but in reverse order.

12.2 MAC Address and ESI

12.2.1 General Notes

1. **A media access control (MAC) address** uniquely identifies a port that is either physically attached to a LAN or, if it is an ATM LAN emulation client (LEC) port, logically attached to a LAN.Therefore, each port on an ENTR, FDDI, FENET OSA-2, and each LEC port on an ATM OSA-2, is shipped with its unique, or universal, MAC address.

   You can set a local MAC address and specify that a port receives frames for a group destination MAC address as discussed in the following sections. Use OSA/SF or, except for an ATM OSA-2, use either the support element (SE) or single object operations via the hardware management console.

2. **A 6-byte end system identifier (ESI)** uniquely identifies the physical port of an ATM OSA-2 to its attached ATM device or switch. See the 20-byte ATM physical address (page 216).

   Because an ESI serves an analogous function in an ATM network as a MAC address does in a LAN context, the two terms are sometimes equated with each other. On the OSA/SF physical port settings notebook page 1, which is shown on page 214, the ESI is equated with the MAC address for consistency of the display.However, only a LEC port uses a MAC address. Because this port is not recognized by the support element or single object operations via the hardware management console, you can not set a MAC address for an ATM OSA-2 through these facilities.

3. **To summarize:**
   - An ATM OSA-2 is shipped with 1 ESI for its physical port.
   - An ATM OSA-2 is shipped with 2 universal MAC addresses, one for each LAN emulation client (LEC), or logical, port. The LEC ports are used in the TCP/IP Passthru and SNA modes.
   - An ENTR OSA-2 is shipped with 2 universal MAC addresses, one for each port.
   - A FDDI OSA is shipped with 1 universal MAC address.
   - An FENET OSA-2 is shipped with 1 universal MAC address for its port.

12.2.2 Notes on a Local MAC Address

Under the following conditions, you can or must set a locally-administered MAC address for an OSA LAN port and should consider doing so for the following reasons:

- A local MAC address can be easier to identify by network personnel because it conforms to the network's or site's naming convention.

- A local MAC address would not need to be changed if the OSA is physically replaced. A replaced OSA, of course, brings its own universal MAC addresses with it.

Notes:

1. You must specify the same local MAC address for each port that will be specified as a member of a group of ports that collectively enhance session availability in the SNA mode (page 154).
2. A local MAC address must be unique within the network in which it is used and administered by a local authority. It is therefore a unicast MAC address.
3. For a local MAC address to take effect, the OSA channel must be configured offline from, and then back online to, all the partitions to which the OSA feature is defined.
4. Set a MAC address for an Ethernet or emulated Ethernet connection in the *canonical* format as shown in the following table.

   The difference between a canonical and nonconical address is that the bits within each byte are transposed (swapped). In the canonical format of an Ethernet MAC address, bit 6 indicates whether the address is an individual (0) or group (1) address; bit 7 indicates whether the MAC address is universal (0) or local (1).

   An exception to the canonical format is if an Ethernet PU is connected across a LAN bridge to a non-Ethernet LAN. In that case, the destination MAC address must be coded in the noncanonical format in the DIALNO parameter of the VTAM SWNET PATH statement (page 159).
5. Set a MAC address for a FDDI or token-ring connection in the *noncanonical* format as shown below.

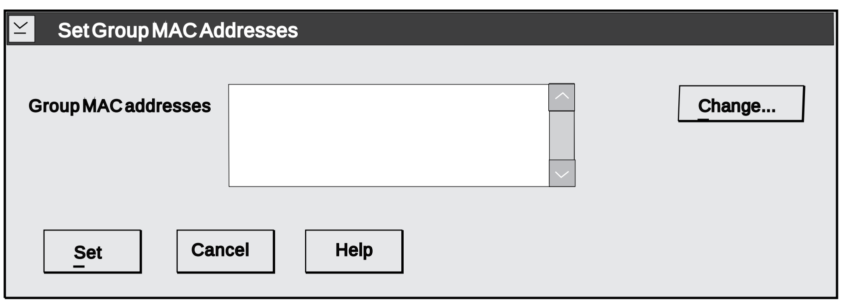
   The bits within the same byte are transposed (swapped) between a canonical and nonconical address. In the nonconical format of a FDDI or token-ring MAC address, bit 0 indicates whether the MAC address is an individual (0) or group (1) address; bit 1 indicates whether the MAC address is universal (0) or local (1).
6. You can set a local MAC address for any port using OSA/SF if the PTF resolution to the appropriate OSA/SF APAR has been applied. For considerations for a LAN emulation client (LEC) port, see page 185.
7. You can set a local MAC address for a port on an ENTR, FDDI, or FENET OSA-2 using the support element (SE) or single object operations via the hardware management console.

   For procedural information, refer to the operator's guide for the hardware platform (page xviii).

For these types of LANs and ports	Specify as shown
• For a FDDI port attached to a FDDI LAN:	• Set bit 0=0 and bit 1=1 • Set bits 2–47 to the 46-bit local MAC address
For an Ethernet Connection as follows: • For an ATM LEC port when it is defined for an emulated Ethernet LAN, or • An ENTR OSA-2 port when it is attached to an Ethernet LAN, or • A FENET OSA-2 port:	• Set bit 6=1 and bit 7=0 • Set bits 0–5 and 8– 47 to the 46-bit local MAC address If an Ethernet LAN station is connected across a bridge to a non-Ethernet LAN, the destination MAC address in the VTAM PATH Definition statement may need to be coded differently (page 159).
For a token-ring connection as follows: • For an ATM LEC port when it is defined for an emulated token-ring LAN, or • An ENTR OSA-2 port when it is attached to a token-ring LAN:	• Set bit 0=0 and bit 1=1 • Set bits 2 through 47 to the 46-bit local MAC address

12.2.3 Notes on a Group MAC Address

1. Here is an example of a Group MAC address pulldown menu.



2. A group MAC address allows the port to receive frames with that group's destination MAC address.
3. Assign a group MAC address as a 48-bit unsigned integer using OSA/SF.
4. If the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) or PQ16071 (VSE/ESA) is applied, you can assign a group MAC address of all zeros, but not an address of all `X'FF'`.

   For a nonzero group MAC address:

   - Set bit 7 to 1 for an Ethernet LAN or emulated Ethernet LAN connection.
   - Set bit 0 to 1 for a FDDI LAN, token-ring LAN, or emulated token-ring LAN connection.
5. If the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) or PQ16071 (VSE/ESA) is *not* applied, the following rules apply:
   - Set bits 6 and 7 to 1 for an Ethernet LAN or emulated Ethernet LAN connection.
   - Set bits 0 and 1 to 1 for a FDDI LAN connection.
   - Set bits 0,1, and 16 to 1 and set bits 2 through 15 to 0 for a token-ring LAN or emulated token-ring LAN connection.

12.3 ATM OSA-2 Physical Port

For an ATM OSA-2, OSA/SF GUI displays 4 notebook pages that are tabbed ***Physical*** to designate that these notebook pages are in a format common to all the OSA modes in which the ATM OSA-2 is being run because they described the settings of the physical port. The other tabs and pages of the port notebook for an ATM OSA-2 depend on the OSA mode in which the OSA is being run as follows:

Notes:

1. If the ATM OSA-2 is being run in the HPDT ATM Native mode, it additionally displays one PVC notebook page for the PVCs that are defined in this mode.
2. If the ATM OSA-2 is being run in the ATM IP Forwarding mode, OSA/SF GUI additionally displays one PVC notebook page for the single PVC that is defined for this mode.
3. If the ATM OSA-2 is being run in the TCP/IP Passthru or SNA mode, OSA/SF GUI displays notebook pages for each LAN emulation client (LEC) port that is being used (page 220).
4. To view or set an ATM port parameter, use OSA/SF Release 2 GUI, or later.
5. Depending on the processor, the standalone support elementor single object operations via the hardware management console can also be used to display many of these port parameters.
6. More information can be found in the following documents:
   - Pages xxi (bibliography), 33, and 185.
   - *The ATM Forum Technical Committee Specification: LAN Emulation Over ATM Version 1.0*
   - And these documents, which are referenced specifically in the following cross-references to ATM OSA-2 notebook pages:

     (1) ATM Forum Technical Committee User-Network Interface (UNI) Specification Version 3.1 - Interim Local Management Interface

       (1A) Physical Port Group
       (1B) ATM Layer Group
       (1C) ATM Statistics Group
       (1D) Network Prefix Table

     (2) RFC 1695 - Definitions of Managed Objects for ATM Management Version 8.0 using SMIv2 (ATM Interface Configuration Parameters Group)

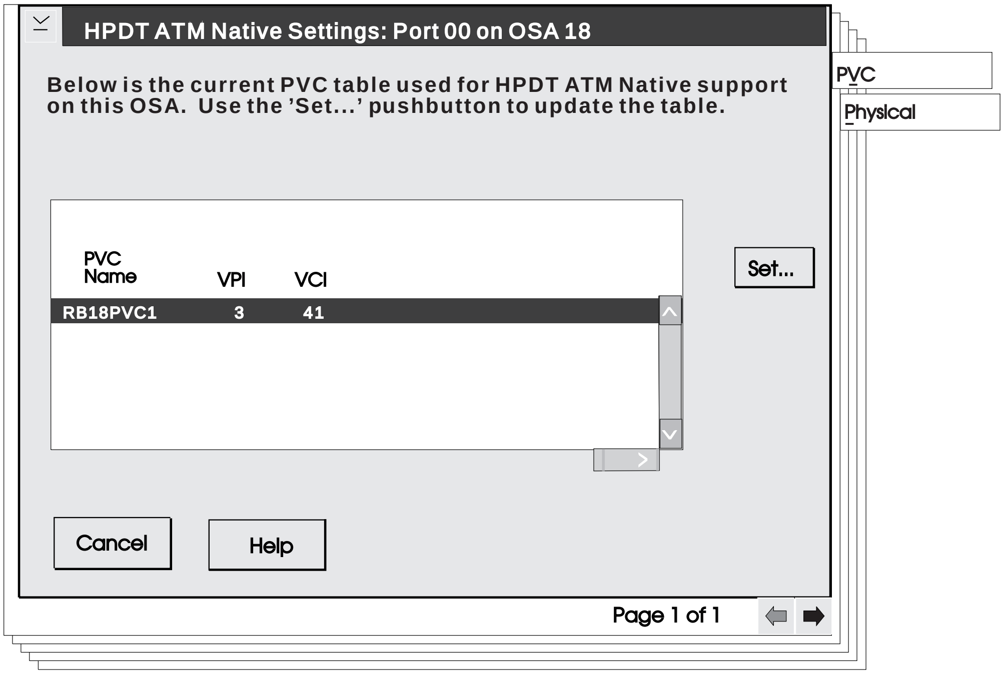
     (3) RFC 1573 - Evolution of the Interfaces Group of MIB-II

       (3A) Interfaces Group - ATM Layer, further defined in RFC 1695, section 6.2.1
       (3B) Interfaces Group - AAL5 Layer, further defined in RFC 1695, section 8.3
       (3C) Interfaces Group - LAN Emulation Layer, further defined in Section 4.2 of the document listed under (4) below.

     (4) ATM Forum Technical Committee's document, # 94–0737R3 entitled: *LAN Emulation Client Management: DRAFT Version 1.0 Specification,* (April 26, 1995).
     Actual MIB definitions are in the LAN Emulation Client MIB text

       (4A) Configuration Group
       (4B) Status Group
       (4C) Statistics Group
       (4D) Server Connections Group

12.3.1 PVC Table Page



Notes:

1. The example shown in the preceding figure is for ATM OSA-2 when it is running in the HPDT ATM Native mode.
2. An example for an ATM OSA-2 running in the ATM IP Forwarding mode would be very similar except that there is only one PVC defined, the PVC name is always WANPVC00, and of course the name of the mode is ATM IP Forwarding.

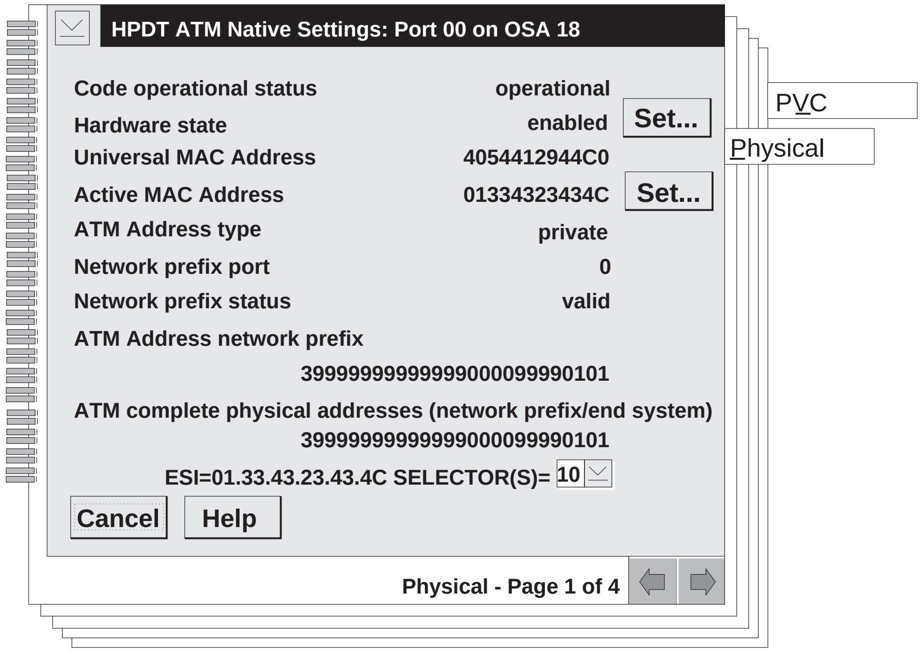
12.3.2 Four Physical Pages

Indicated by the tab ***Physical***, the OSA/SF GUI displays 4 notebook pages of physical data for the ATM physical port (port 0) in a format that is common to all the OSA modes in which the ATM OSA-2 is being run.

An example of these notebook pages is provided for ATM OSA-2 CHPID X'18' that is being run in the HPDT ATM Native mode.

Supplementary charts are provided to help you cross-reference the data item name as the OSA/SF OS/2 interface (GUI) displays it with the ATM Forum standard name. In the cross-reference chart, the source is listed as (1A), (1B). Refer to page 213 to correlate these sources with the ATM Forum specifications.

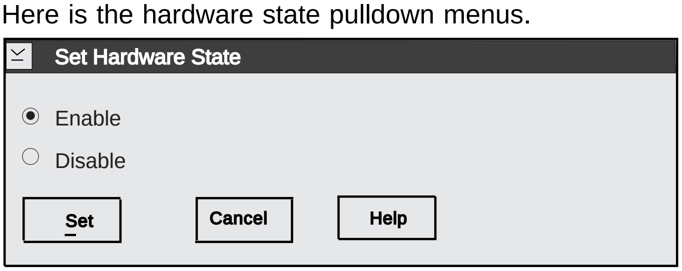
12.3.2.1 Page 1 of 4:



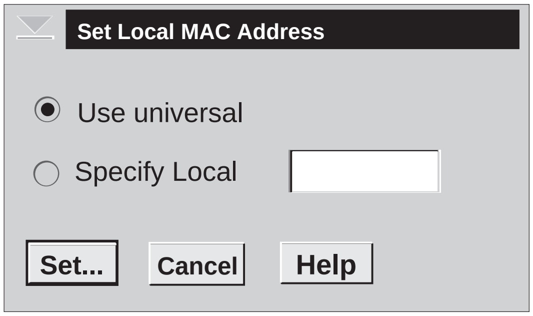
ID	Name in OSA/SF Notebook	Name in ATM Standard (No.)
	Code operational status	N/A
	Hardware state	(Note 1)
	Universal MAC address	(Note 2)
 	Active MAC address or ESI	(Note 2)
	ATM address type	(2) atmInterfaceAddressType
	Network prefix port (0 for OSA)	(1D) atmfNetPrefixPort
	Network prefix status	(1D) atmfNetPrefixStatus
	ATM Address Network Prefix	(1D) atmfNetPrefixPrefix
	ATM complete physical addresses	(3A) ifPhysAddress (Note 3)

Notes:

1. Here is the hardware state pulldown menus.



2. Here is the local MAC address pulldown menu.



Note that this is the ESI if the ATM OSA-2 is being run in the HPDT ATM Native or IP Forwarding modes. For more information on MAC addresses and ESIs, see page 210.

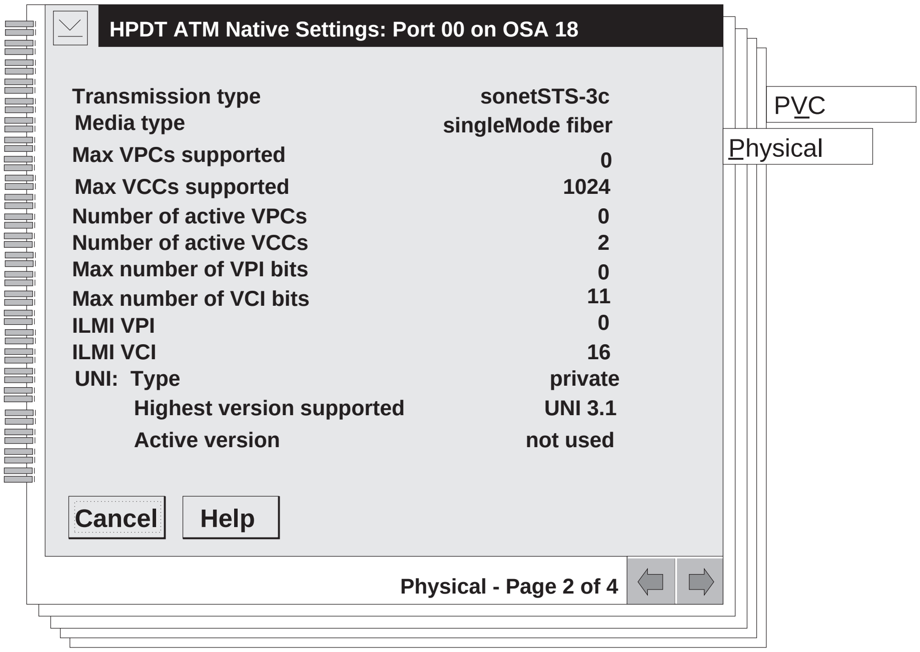
3. This is the complete physical address of the OSA CHPID. If the subfield of the DLCADDR parameter is `X'21'` in the Path Definition statement of the SWNET macro (page 176) and this is the destination (remote) ATM address, specify this 20-byte address.

   The ATM complete physical address contains:

   - A 13-byte ATM address network prefix, which must be the same as the network prefix recorded at the ATM switch to which the ATM OSA-2 is connected.
   - A 6-byte end system identifier (ESI), which is used in the HPDT ATM Native mode (page 176) and equates with the active MAC address used in the LAN-attached and emulated LAN modes (page 210).
   - A 1-byte selector byte of *xy*, which is significant only in the HPDT ATM Native mode and which is under the control of the application with which the ATM OSA-2 is communicating.
     - If the value of *x* is 0, the ATM OSA-2 is either defined as shared, in which case it is communicating with an application in LP 1, or it is defined as not shared.
     - If the value of *x* is nonzero, the ATM OSA-2 is defined as shared and it is communicating with VTAM or a CS for OS/390 SNA application in a logical partition whose LP number is one digit higher than the value of *x.*
     - The value of *y* denotes the application. For VTAM or a CS for OS/390 SNA application, the value is 0.

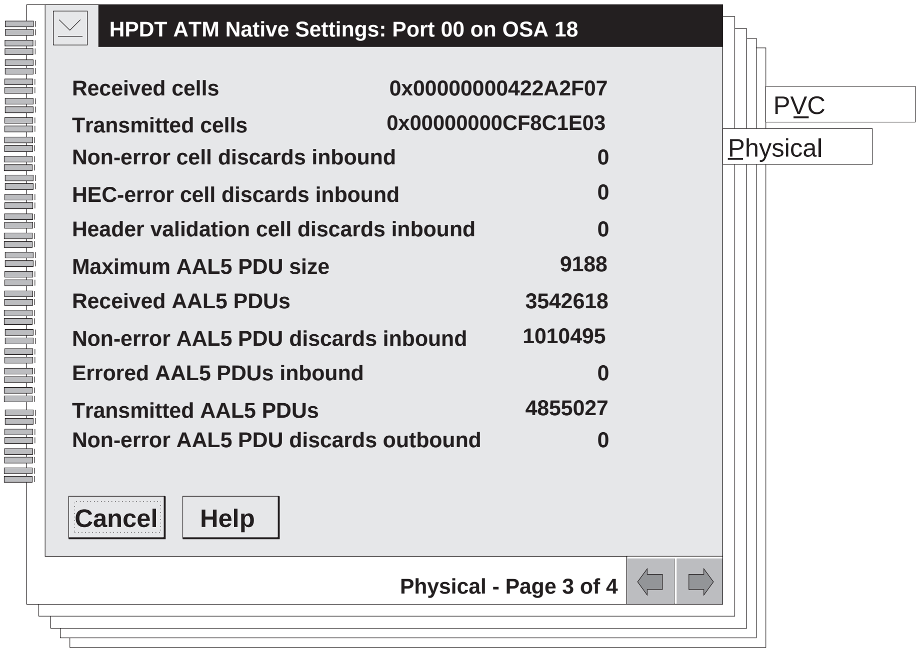
     For example, a selector byte value of 30 means that the ATM OSA-2 is defined as shared and is communicating with VTAM or a CS for OS/390 SNA application in LP 4. Note that, if the ATM OSA-2 is defined as shared, the OSA/SF OS/2 interface (GUI) displays all the values possible for the selector byte so that you can deduce all the logical partitions to which the OSA is defined.

12.3.2.2 Page 2 of 4:



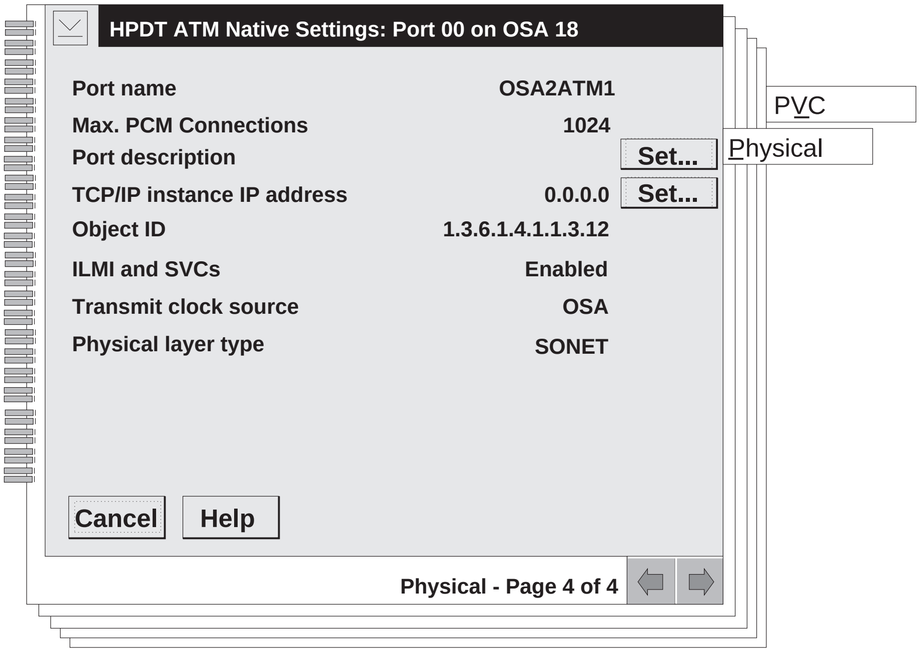
ID	Name in OSA/SF Notebook	Name in ATM Standard (No.)
	Transmission Type	(1A) atmfPortTransmissionType
	Media Type	(1A) atmfPortMediaType
	UNI Type	(1B) atmfAtmLayerUniType
	UNI Version	(1B) atmfATMLayerUniVersion
	Max VPCs Supported	(2) atmInterfaceMaxVpcs
	Max VCCs Supported	(2) atmInterfaceMaxVccs
	Number of Active VPCs	(2) atmInterfaceConfVpcs
	Number of Active VCCs	(2) atmInterfaceConfVccs
	Max number of VPI bits	(2) atmInterfaceMaxActiveVpiBits
	Max number of VCI bits	(2) atmInterfaceMaxActiveVciBits
	ILMI VPI	(2) atmInterfaceIlmiVpi
	ILMI VCI	(2) atmInterfaceIlmiVci

12.3.2.3 Page 3 of 4:



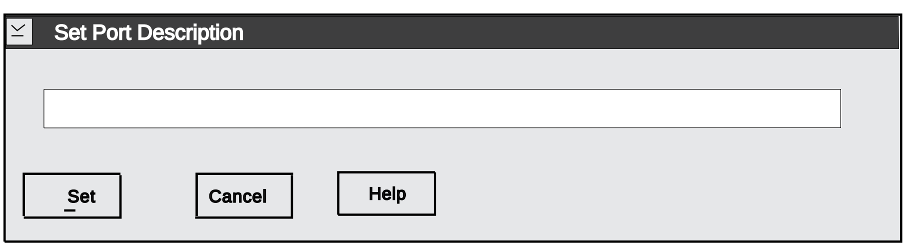
ID	Name in OSA/SF Notebook	Name in ATM Standard (No.)
	Received Cells	(1C) atmfAtmStatsReceivedCells
	Transmitted Cells	(1C) atmfAtmStatsTransmittedCells
	Non-error cell discards inbound	(3A) ifInDiscards
	HEC-error cell discards inbound	(3A) ifInErrors
	Header Validation cell discards inbound	(3A) ifInUnknownProtos
bpdu fpdu	Maximum AAL5 PDU size	(3B) ifMtu
	Received AAL5 PDUs (not octets)	(3B) ifInOctets
	Non-error AAL5 PDU discards inbound	(3B) ifInDiscards
	Errored AAL5 PDUs inbound	(3B) ifInErrors
	Transmitted AAL5 PDUs (not octets)	(3B) ifOutOctets
	Non-error AAL5 PDU discards outbound	(3B) ifOutDiscards

12.3.2.4 Page 4 of 4:

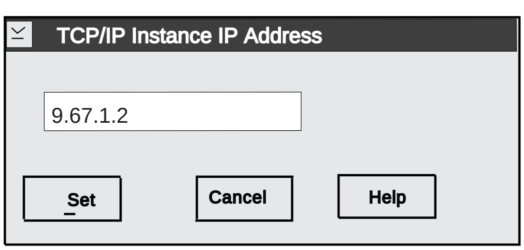


ID	Name in OSA/SF Notebook	Name in ATM Standard (No.)
Port	Port name (Note)	N/A
	Max. PCM Connections	
	Port Description	N/A
A	TCP/IP Instance IP address (Managing IP address)	N/A
	Object ID	
PL	Physical layer type (SONET or SDH)	International standards

Note: Set the port name in the HPDT ATM Native settings panel (page 165), in the TRLE statement in the TRL VTAM macro (page 176), and–if you want SNMP management–as the link name in the TCP/IP Link statement (page 207).



Optionally, enter a string of not more than 16 ASCII characters.



You can set this TCP/IP instance IP address only in the HPDT ATM Native mode to specify the TCP/IP instance address that is providing SNMP management for the OSA in this mode. This IP address must match the one you enter on the TCP/IP profile's Home statement (page 207).

12.4 ATM OSA-2 LAN Emulation Client (LEC) Port

- Four notebook pages tabbed ***Physical***, whose format is common to all OSA modes (page 214).
- One SNA page, whose format is shown on page 140 for the expanded SNA mode port parameters and on page 151 for the basic SNA mode port parameters.
- One logical page
- Nine pages of ATM LEC port statistics (page 221). In older releases of OSA/SF, the GUI tab read Logical port instead of LEC port.

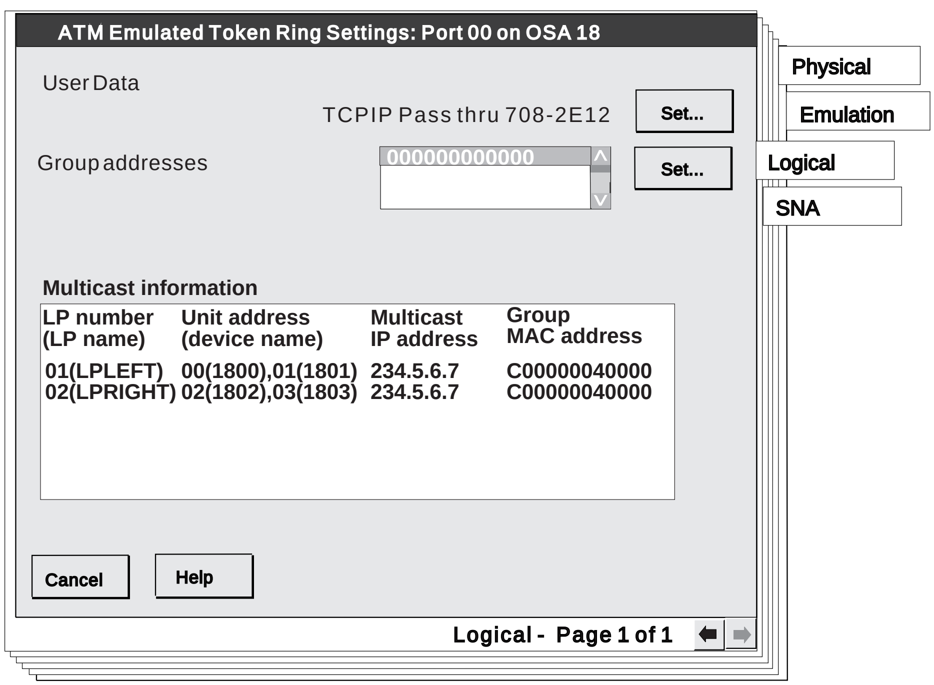
12.4.1 Four Physical Pages

Examples of these notebook pages start on page 214.

12.4.2 One SNA Page

See page 140 for the panel with the expanded SNA mode port parameters and page 151 for the panel with the basic SNA mode port parameters.

12.4.3 One Logical Page



Notes:

1. The optional User Data field can contain a string of up to 32 characters.
2. For information on group MAC addresses, see page 212. For a LEC port, the restrictions depend on whether the port is configured for an Ethernet or token-ring LAN.
3. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

12.4.4 Nine Emulation Pages

OS/SF GUI displays 9 pages of port values for each ATM LAN emulation client (LEC) port being queried. These panels are not shown in this book. Instead, the following tables cross-reference these fields with the corresponding nomenclature in the ATM Forum standard. The reference numbers, such as (1A) and (1B), correspond to the numbers listed on page 213.

- If the ID column shows a C #, this is parameter is listed by that C # in the *ATM Forum Technical Committee Specification: LAN Emulation Over ATM Version 1.0.*
- If the ID column shows a C # encircled by an arrow, the parameter is settably by user input on an OSA/SF ATM LE notebook page (page 185).

12.4.4.1 General Data (Page 1 of 9)

ID	Name in OSA/SF Notebook	See
M	Active MAC Address	Page 210
N/A	Client enabled state (Settable field)	Page 209
	Best effort peak rate (Mb/sec)	Page 185
N/A	Maximum LEC connections	(Up to 1,000)

12.4.4.2 Configured Group (Pages 2–4 of 9)

ID	Name in OSA/SF Notebook	(No.) and Name of Standard
N/A	Configuration mode	(4A) lecConfigMode
C2	Configured LAN Type	(4A) lecConfigLanType
N/A	Actual LAN type	(4B) lecActualLanType
C 3	Configured max data frame size (Note 1)	(4A) lecConfigMaxDataFrameSize
N/A	Actual max data frame size	(4B) lecActualMaxDataFrameSize
C5	Configured LAN name	(4A) lecConfigLanName
N/A	Actual LAN name	(4B) lecActualLanName
C9	Configured LES ATM address (network prefix/end system)	(4A) lecConfigLesAtmAddress
N/A	Actual LES ATM address (network prefix/end system)	(4B) lecActualLesAtmAddress

ID	Name in OSA/SF Notebook	(No.) and Name of Standard
C7	Control timeout	(4A) lecControlTimeout
C10	Max unknown frame count	(4A) lecMaxUnknownFrameCount
	Max unknown frame time (seconds)	(4A) lecMaxUnknownFrameTime
C12	VCC timeout period (seconds)	(4A) lecVCCTimeoutPeriod
C13	Max retry count	(4A) lecMaxRetryCount
C17	Aging time (seconds)	(4A) lecAgingTime
C18	Forward delay time (seconds)	(4A) lecForwardDelayTime
C20	Expected ARP response time (seconds)	(4A) lecExpectedArpResponseTime

ID	Name in OSA/SF Notebook	(No.) and Name of Standard
C21	Flush timeout (seconds)	(4A) lecFlushTimeout
C22	Path switching delay (seconds)	(4A) lecPathSwitchingDelay
C 23	Local segment ID	(4A) lecLocalSegmentID
C 24	Multicast send VCC type	(4A) lecMulticastSendType
C 25	Multicast send VCC avg rate	(4A) lecMulticastSendAvgRate
C 26	Multicast send VCC peak rate	(4A) lecMulticastSendPeakRate
C28	Connection complete timer	(4A) lecConnectionCompleteTimer

12.4.4.3 Status Group (Page 5 of 9)

ID	Name in OSA/SF Notebook	(No.) and Name of Standard
C 1	Client ATM address (ntework prefix/end system)	(4B) lecPrimaryAtmAddress
C 14	Client identifier	(4B) lecID
N/A	Client's current state	(4B) lecInterfaceState
N/A	Last failure response code	(4B) lecLastFailureRespCode
N/A	Last failure state	(4B) lecLastFailureState
N/A	Protocol	(4B) lecProtocol
N/A	LE Protocol version	(4B) lecVersion
C 19	Topology change	(4B) lecTopologyChange
N/A	Configuration server ATM address (network prefix/end system) This is the LECS address.	(4B) lecConfigServerAtmAddress
N/A	Configuration source	(4B) lecConfigSource
C 4	Proxy client	(4B) lecProxyClient

12.4.4.4 Statistics (Pages 6–7 of 9)

Name in OSA/SF Notebook	(No.) and Name of Standard
Octets inbound	(3C) ifInOctets
Non-error discards inbound	(3C) ifInDiscards
Errored LE PDUs inbound	(3C) ifInErrors
Unknown protocol LE PDUs inbound	(3C) ifInUnknownProtos
Octets outbound	(3C) ifOutOctets
Non-error discards outbound	(3C) ifOutDiscards
Errored LE PDUs outbound	(3C) ifOutErrors

Name in OSA/SF Notebook	(No.) and Name of Standard
LE ARP Requests outbound	(4C) lecArpRequestsOut
LE ARP Requests inbound	(4C) lecArpRequestsIn
LE ARP Replies outbound	(4C) lecArpRepliesOut
LE ARP Replies inbound	(4C) lecArpRepliesIn
Control frames outbound	(4C) lecControlFramesOut
Control frames inbound	(4C) lecControlFramesIn
SVC failures	(4C) lecSvcFailures

12.4.4.5 Server Connections Group (Pages 8–9 of 9)

Name in OSA/SF Notebook	(No.) and Name of Standard
Configuration direct interface (Note 1)	(4D) lecConfigDirectInterface
Configuration direct VPI	(4D) lecConfigDirectVpi
Configuration direct VCI	(4D) lecConfigDirectVci
Control direct interface (Note 1)	(4D) lecControlDirectInterface
Control direct VPI	(4D) lecControlDirectVpi
Control Direct VCI (Note 1)	(4D) lecControlDirectVci
Control distribute interface (Note 1)	(4D) lecControlDistributeInterface
Control distribute VPI	(4D) lecControlDistributeVpi
Control distribute VCI	(4D) lecControlDistributeVci

Note 1: If this value is 0 (zero) and either of the next two parameters is a nonzero value within a valid range, the interface exists and the 0 is the ATM *physical* port number. This is an exception to the ATM standard, which says that a 0 means the interface does not exist regardless of the values of the next two parameters.

Name in OSA/SF Notebook	(No.) and Name of Standard
Multicast send interface	(4D) lecMulticastSendInterface
Multicast send VPI (Note 1)	(4D) lecMulticastSendVpi
Multicast send VCI	(4D) lecMulticastSendVci
Multicast forward interface (Note 1)	(4D) lecMulticastForwardInterface
Multicast forward VPI	(4D) lecMulticastForwardVpi
Multicast forward VCI	(4D) lecMulticastForwardVci

Note 1: If this value is 0 (zero) and either of the next two parameters is a nonzero value within a valid range, the interface exists and the 0 is the ATM *physical* port number. This is an exception to the ATM standard, which says that a 0 means the interface does not exist regardless of the values of the next two parameters.

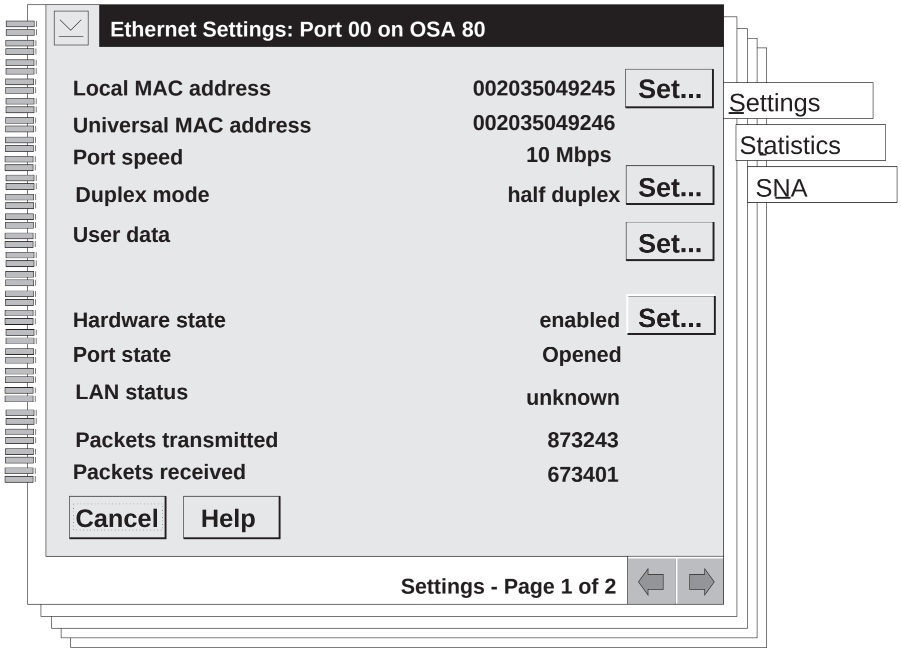
12.5 Ethernet LAN Connections

OSA/SF GUI displays a multi-page port notebook for an Ethernet LAN connection: 2 pages of Ethernet settings; 1 page of statistics; and 1 page of SNA mode port parameters if the port is being used in the SNA mode.

- The ENTR OSA-2 Ethernet settings and Fast Ethernet (FENET) OSA-2 settings are shown in separate sections.
- For explanations of port parameters, refer to RFC 1398 (TCP/IP protocol standard for the Definitions of Managed Objects for the Ethernet-like Interface Types).
- Besides using OSA/SF GUI, you can view many of these port parameters at the standalone support element or single object operations via the hardware management console.
- For more information, refer to the OSA/SF User's Guide or operator's guide of the hardware management console of the appropriate hardware platform.

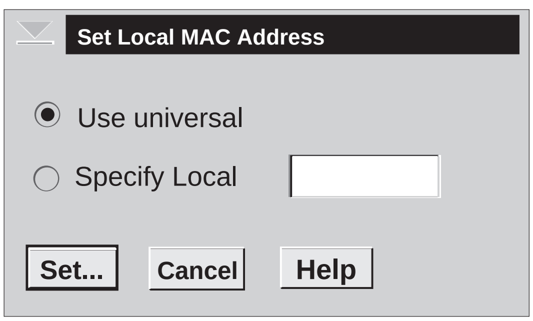
12.5.1 On an ENTR OSA-2

12.5.1.1 Ethernet Settings (Page 1 of 2):

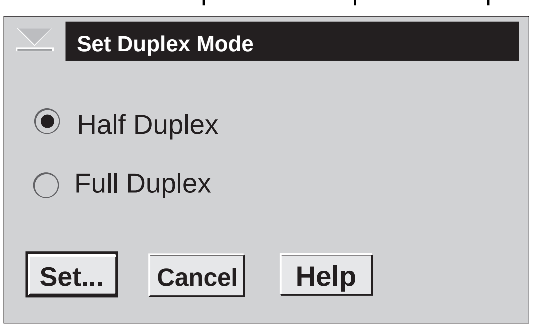


Notes:

1. Here is an example of the local MAC address pulldown menu. For more information, see page. 210



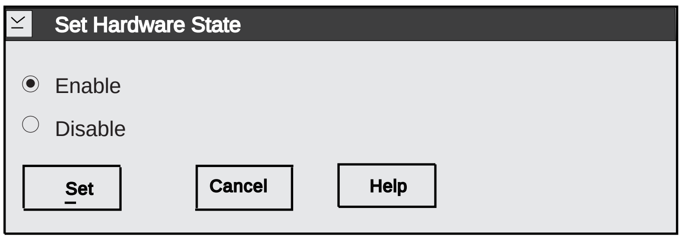
2. Here is an example of the duplex mode pulldown menu. For more information, see page 26.



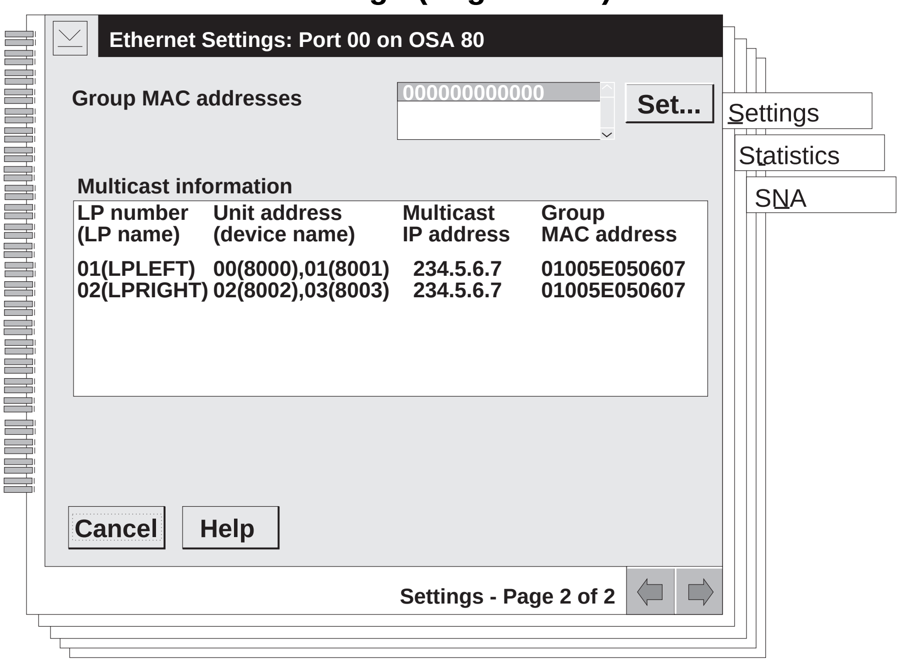
Notes:

1. In the optional User Data field, enter any 32–character string using OSA/SF.

2. Here is an example of the Hardware State pulldown menu.



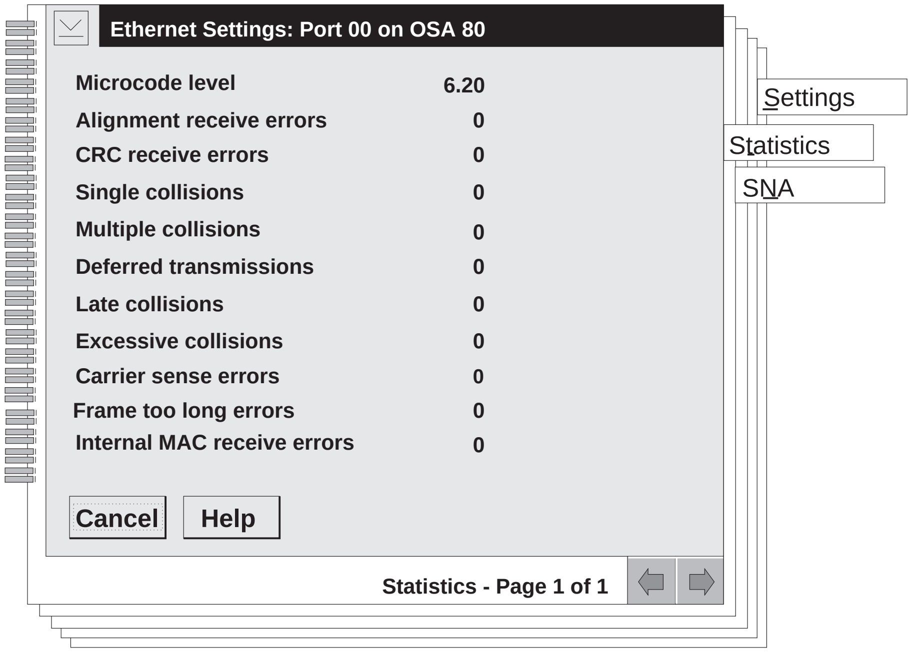
12.5.1.2 Ethernet Settings (Page 2 of 2):



Notes:

1. For information on a group MAC address, see page 212.
2. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

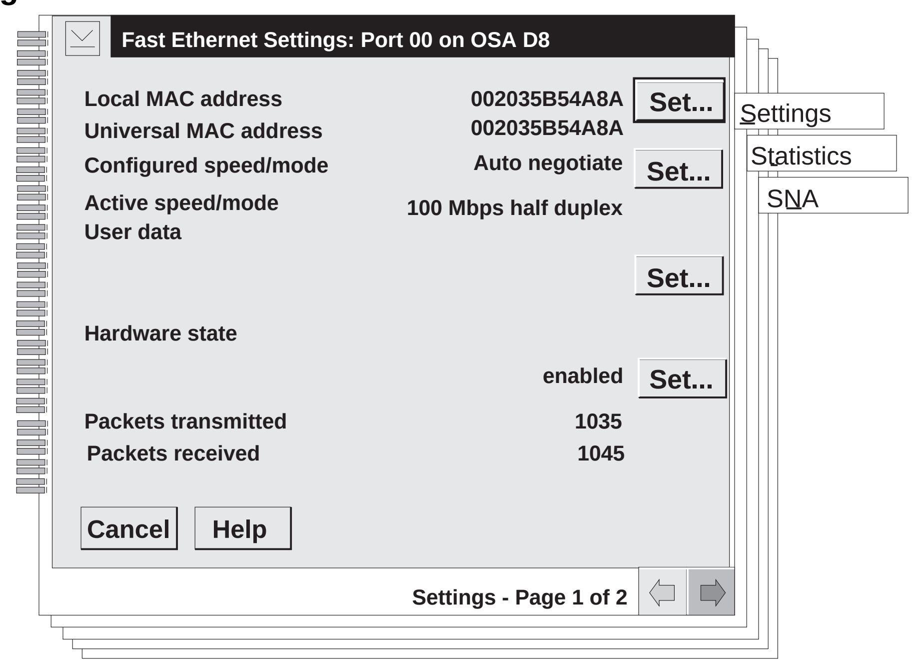
12.5.1.3 One Statistics Page



12.5.1.4 One SNA Page: See page 140 for the panel with the expanded SNA mode port parameters and page 151 for the panel with the basic SNA mode port parameters.

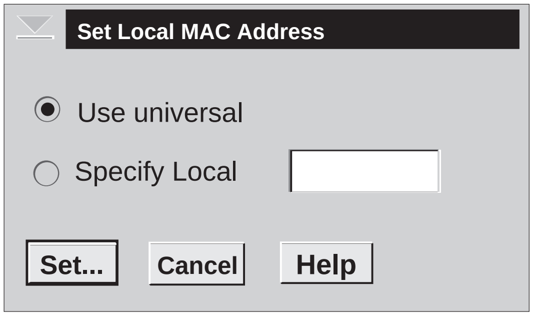
12.5.2 On a Fast Ethernet (FENET) OSA-2

12.5.2.1 Page 1 of 2:

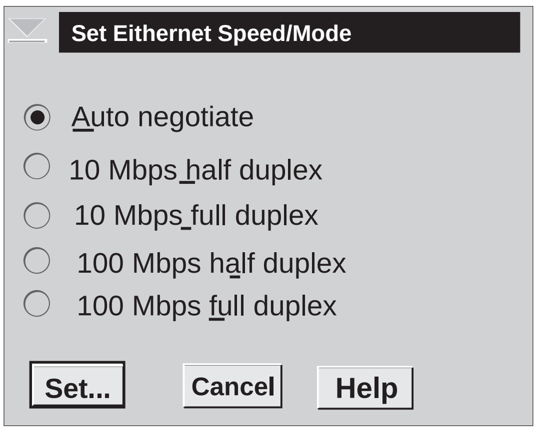


Notes:

1. Here is an example of the local MAC address pulldown menu. For more information, see page 210.



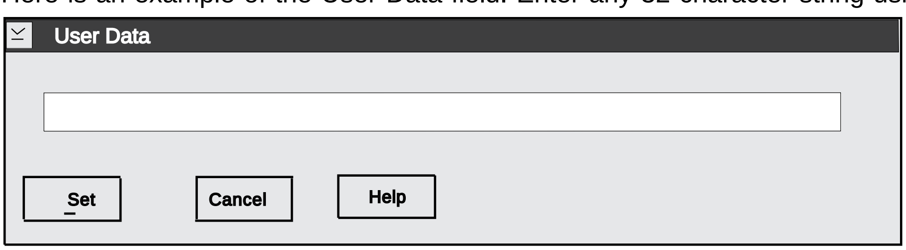
2. Here is an example of the speed and duplex mode settings pulldown menu.



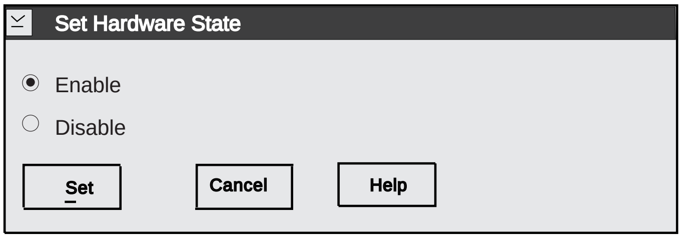
   - Auto-negotiate is the IBM-supplied default.

     If auto-negotiate is in effect, the FENET OSA-2 auto-negotiates the LAN speed and duplex mode. If the Ethernet hub, router, or switch to which the FENET OSA-2 port is attached does not support auto-negotiation, the FENET OSA-2 attempts to autosense the LAN speed and enters the LAN at that speed and defaults to half-duplex mode.
   - If you set the LAN speed or duplex mode, those settings override the auto-negotiate default.
   - For more information on a Fast Ethernet (FENET) OSA-2, see page 39.
   - For information on how to define a locally-administered MAC address, see page 210.

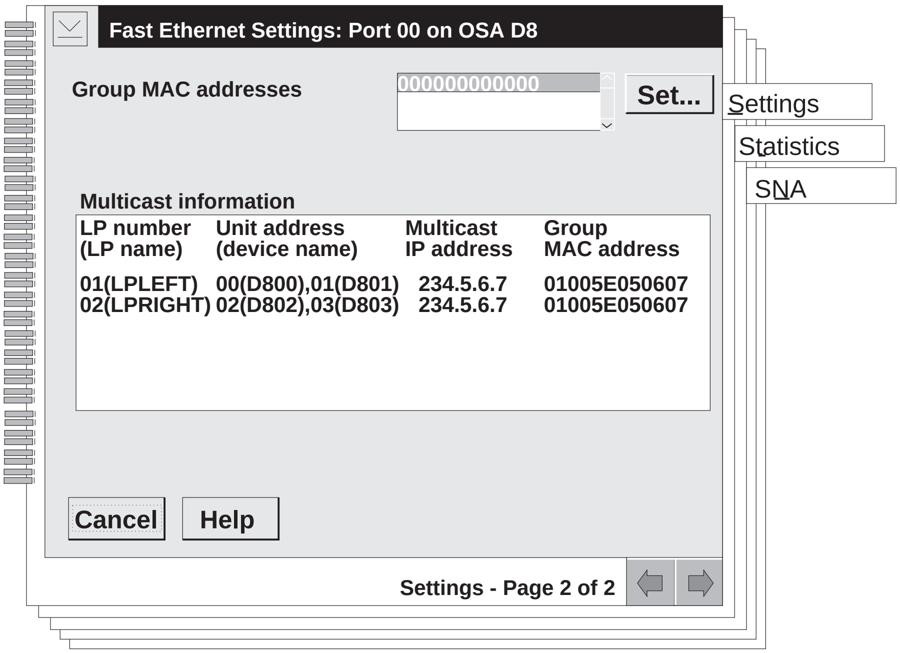
3. Here is an example of the User Data field. Enter any 32-character string using OSA/SF.



4. Here is an example of the hardware status pulldown menu.



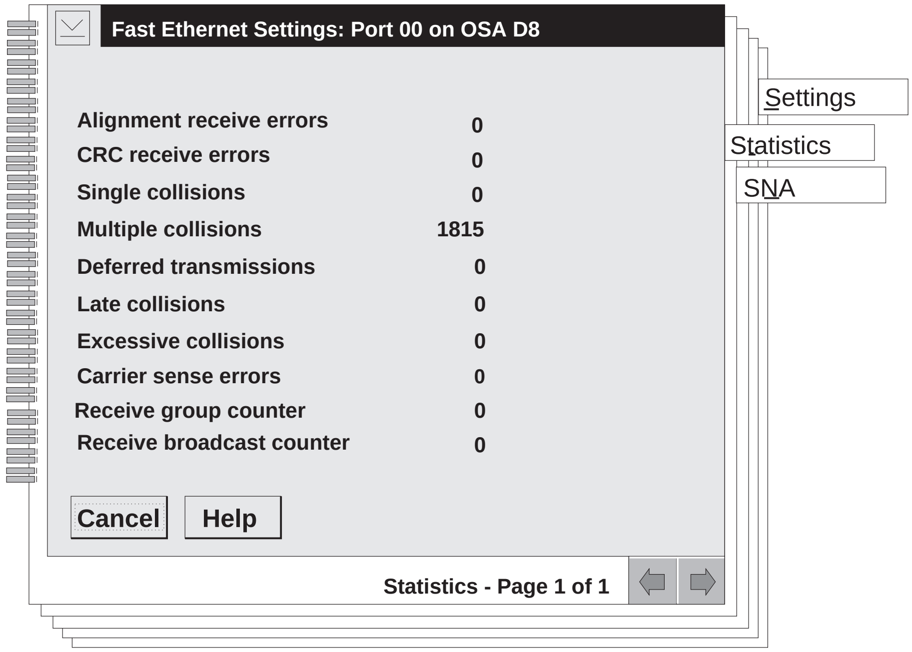
12.5.2.2 Page 2 of 2:



Notes:

1. For information on a group MAC address, see page 212.
2. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

12.5.2.3 One Statistics Page



12.5.2.4 One SNA Page: See page 140 for the panel with the expanded SNA mode port parameters and page 151 for the panel with the basic SNA mode port parameters.

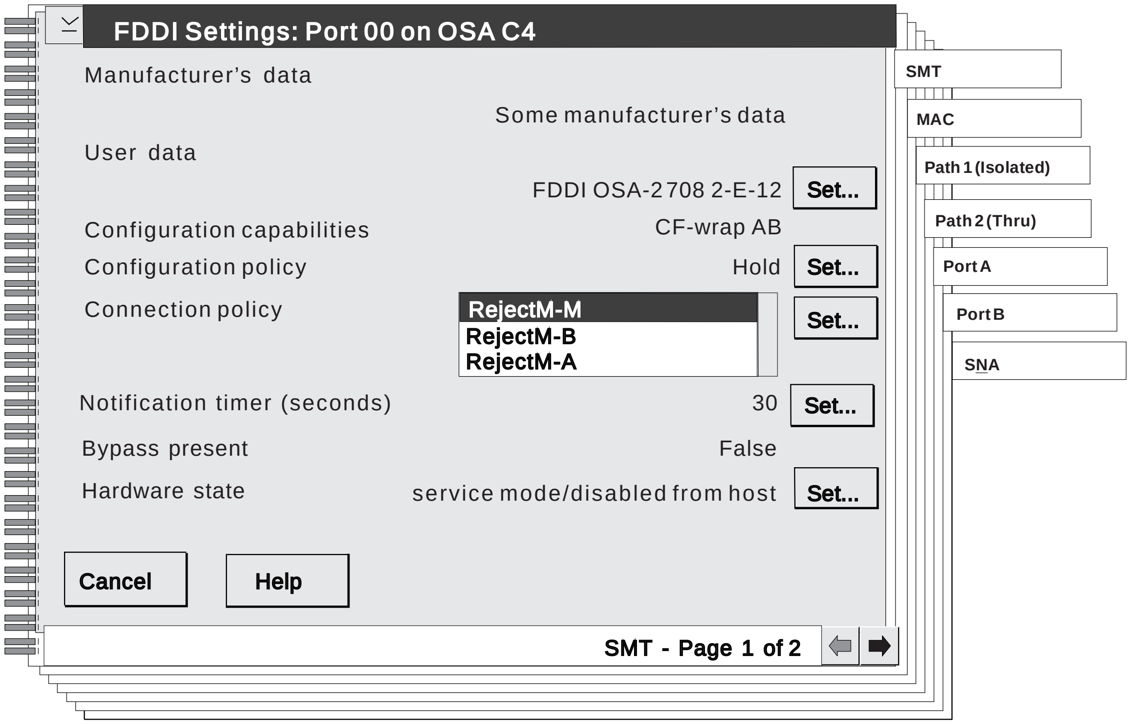
12.6 FDDI Port

12.6.1 General Notes

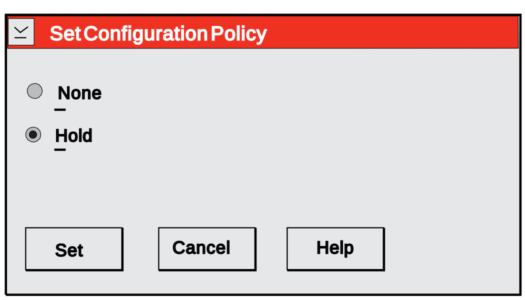
- A FDDI OSA-1 or a FDDI OSA-2 has only one port. This port can be connected to either one single- or dual-ring FDDI LAN. The term connection unfortunately has a second connotation because each fiber connection to a FDDI port is also called a port. These are port *a* and port *b*, one of which is designated as the primary path and one as the secondary path.
- For explanations of the FDDI port parameters, refer to *X3T9.5 ANSI FDDI Statement Management, Revision 7.2.*
- To reset the port parameters listed in this section, use either the appropriate port notebook panels displayed by the OSA/SF OS/2 interface (GUI) or the OSA/SF Set Parameters command. For more information, refer to the appropriate OSA/SF user's guide listed in the bibliography.
- In addition to displaying the settable FDDI port parameters, OSA/SF and the hardware management console display a large number of non-settable parameter values for a FDDI port. For information on displaying those parameters, also see the OSA/SF user's guide or operator's guide of the hardware management console of the appropriate hardware platform.

12.6.2 Two Pages of FDDI Station Management (SMT) Group

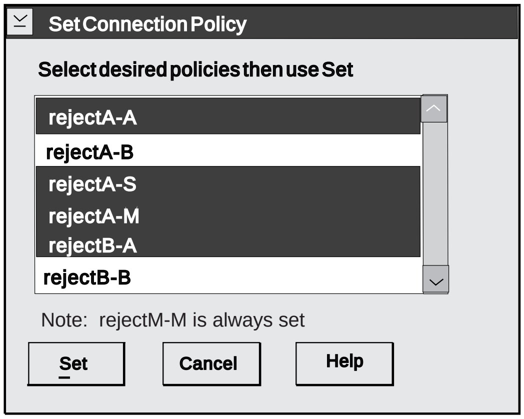
12.6.2.1 FDDI SMT Group (Page 1 of 2)



OSA/SF displays a user data field for each port except an ATM OSA-2's physical port. You can enter any 32-character string using OSA/SF.



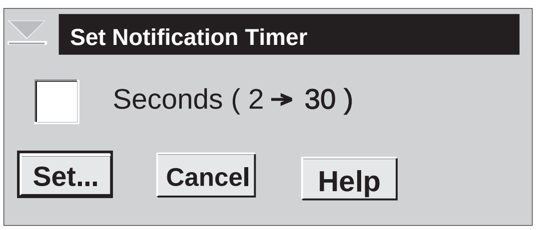
Accept or override the Hold default station configuration policy. Hold means that a connection will be held in abeyance, or delayed, until it is needed.



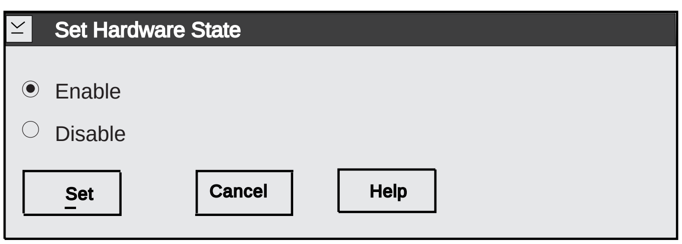
A = the primary connector (pages 253 and 30).

B = the secondary connector.
M = master, which OSA does not support.
S = slave.

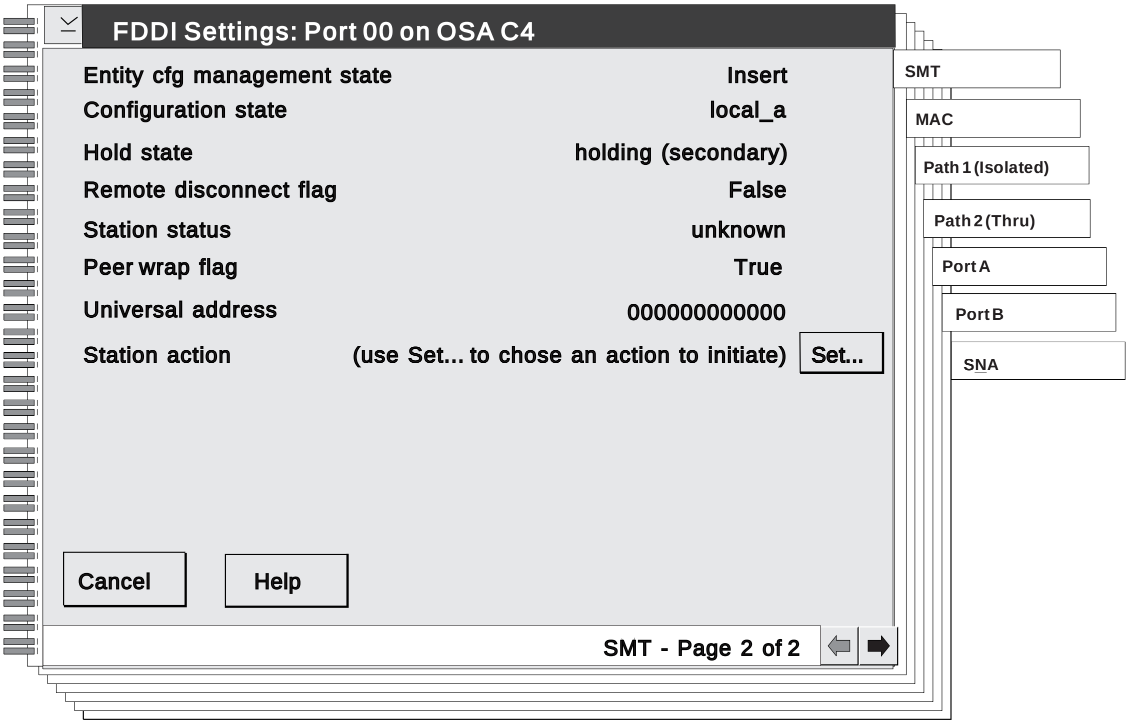
The connections that are rejected are displayed for selection. For example, **reject A–B** means the primary connector (A) of this station rejects a connection to the secondary connector (B) of the adjacent, or PC neighbor, station. M-M is always rejected. (See ANSI 9.6.3.)

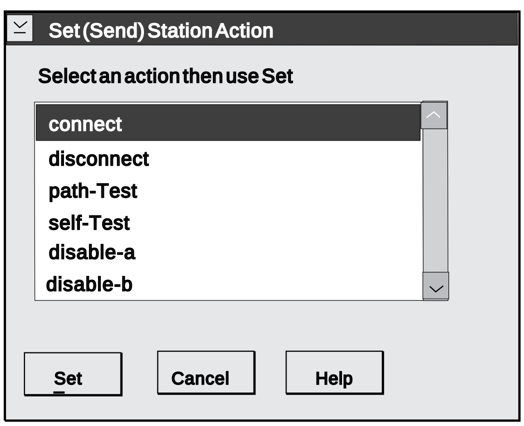


Accept the 30-second default to be used in neighbor notification protocol or override with the values shown on the panel. (See ANSI SMT 8.2.)



12.6.2.2 FDDI SMT Group (Page 2 of 2)

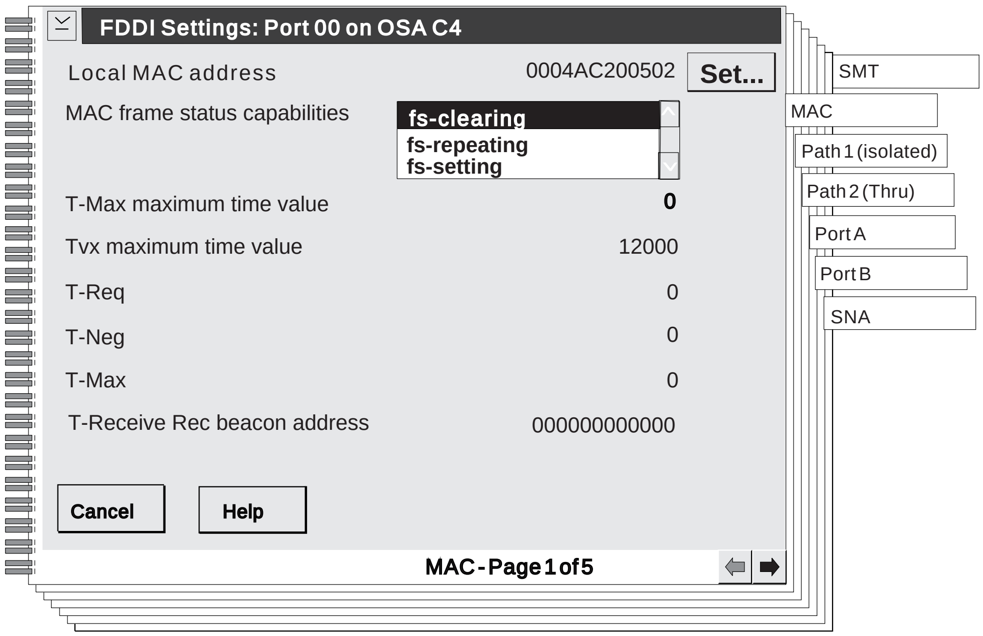




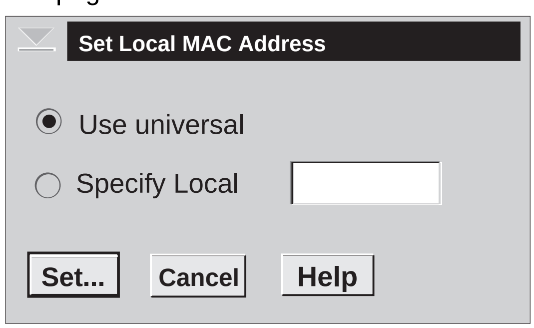
connect starts a connect sequence, and **disconnect** stops it. (ANSI Ref 9.4.2.)
path-Test sets testing of the path, and **self-Test** initiates a station self-test. (ANSI Ref 9.4.1, but the results of this action are not specified in this standard.)
disable-a causes a PC-disable on the primary connector if port a is peer.
disable-b causes a PC-disable on the secondary connector if port b is peer.

12.6.3 Five Pages of FDDI MAC Group

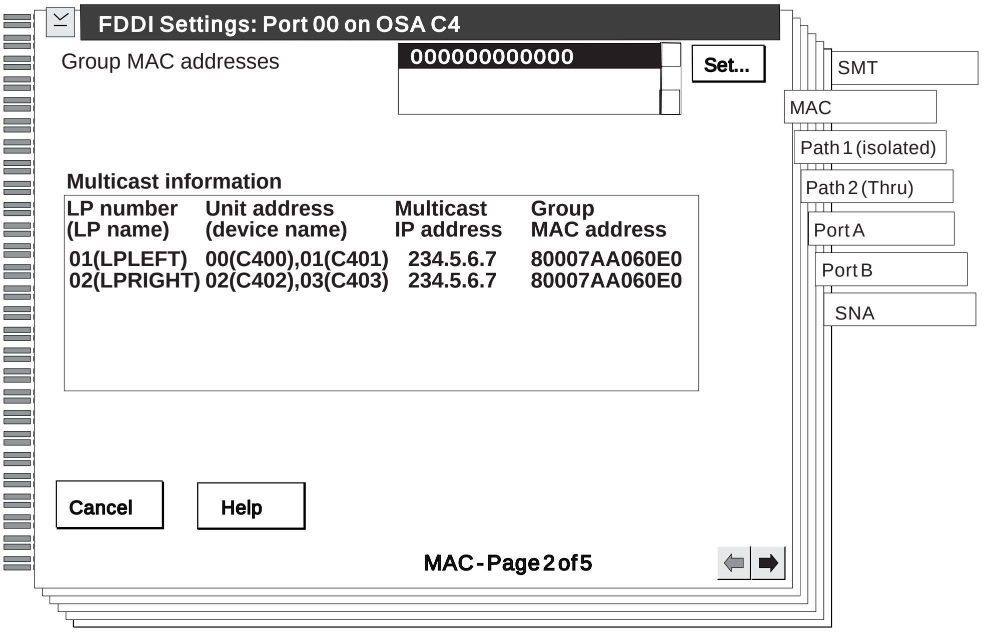
12.6.3.1 FDDI MAC Group (Page 1 of 5)



Here is an example of the local MAC address pulldown menu. For information on a local MAC address, see page 210.



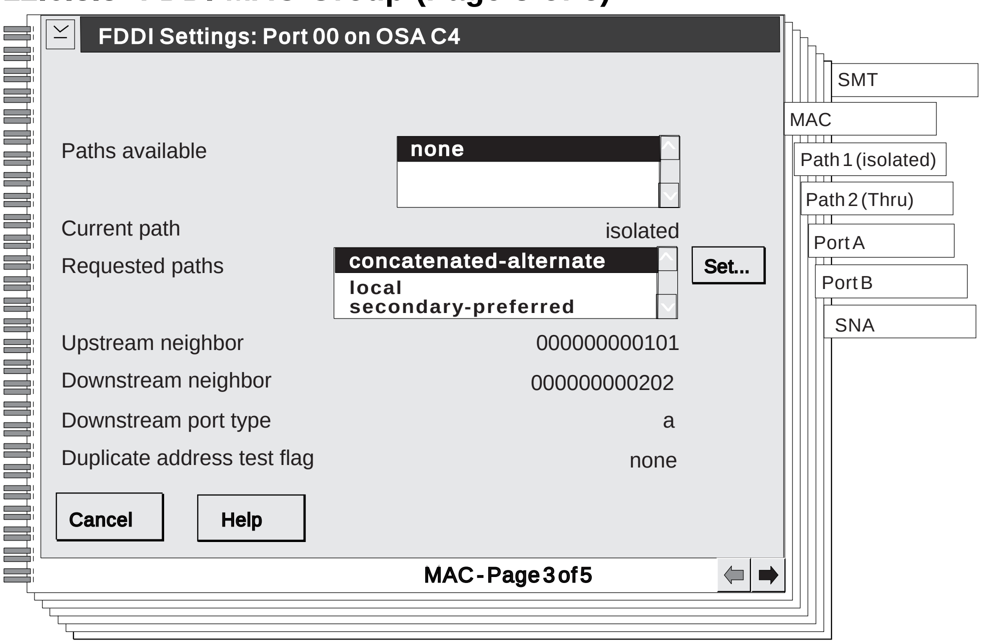
12.6.3.2 FDDI MAC Group (Page 2 of 5):

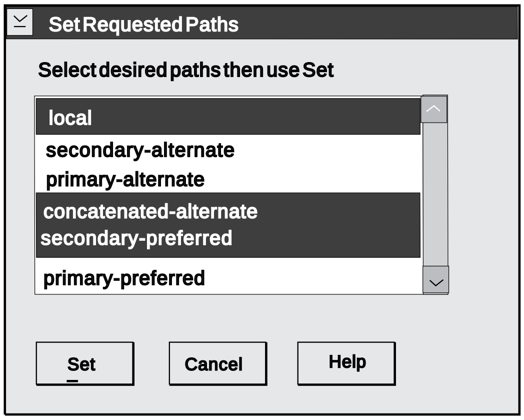


Notes:

1. For information on a group MAC address, see page 212.
2. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

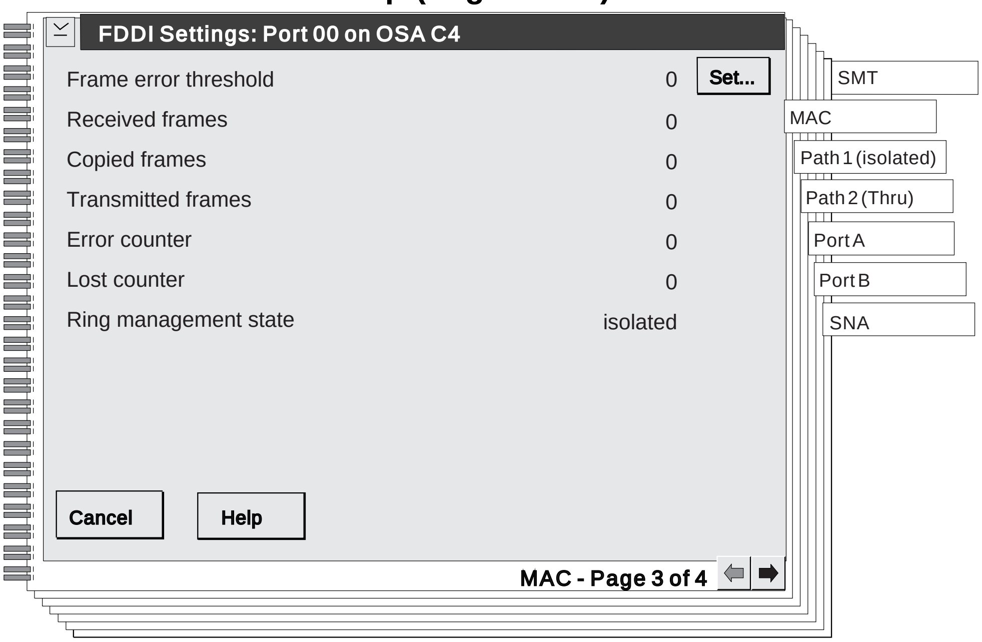
12.6.3.3 FDDI MAC Group (Page 3 of 5)

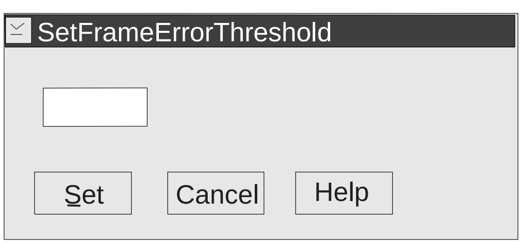




Select the paths into which the MAC may be inserted (ANSI SMT 9.7.)

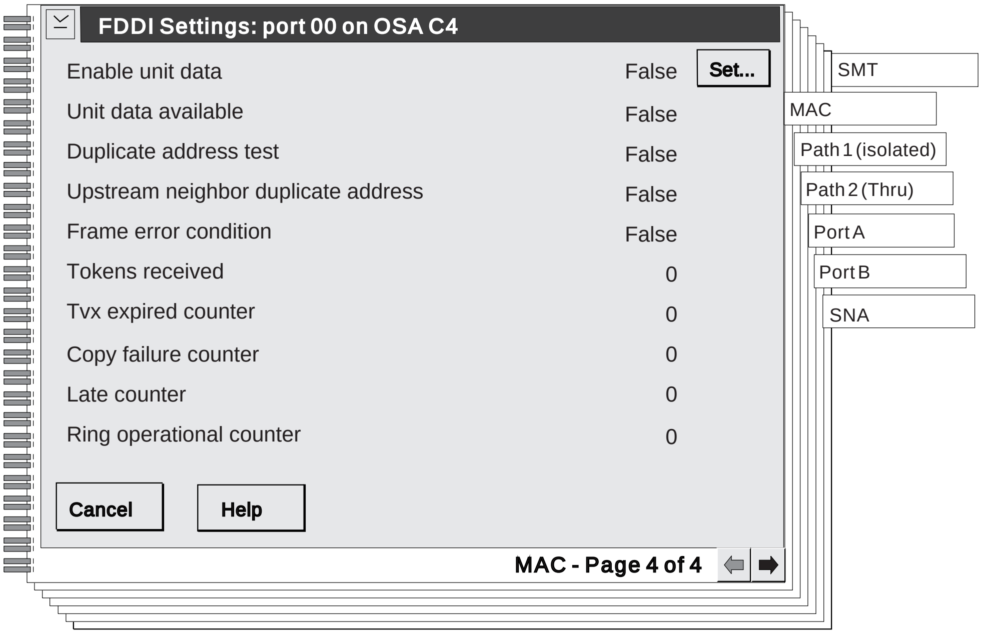
12.6.3.4 FDDI MAC Group (Page 4 of 5)

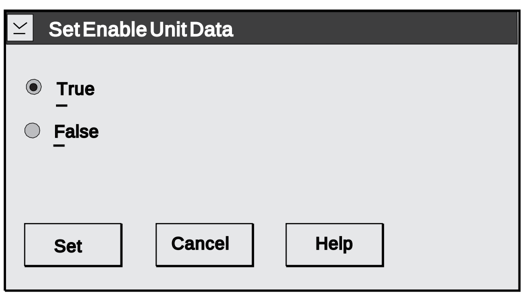




Set the threshold for determining when a MAC condition report will be generated (ANSI 8.3.1.1). The default is 0 (zero).

12.6.3.5 FDDI MAC Group (Page 5 of 5)

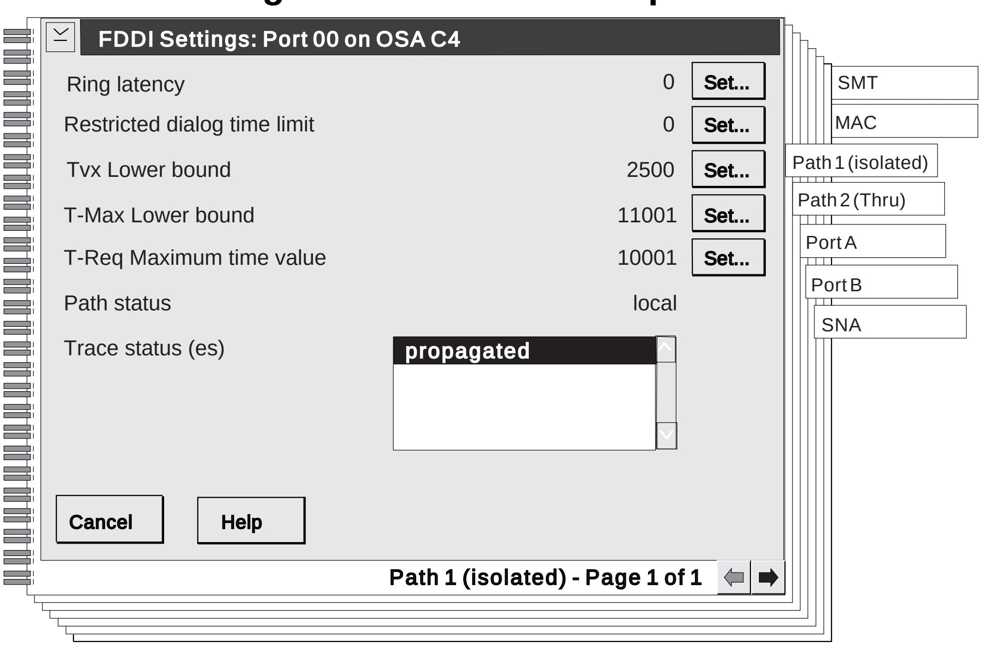


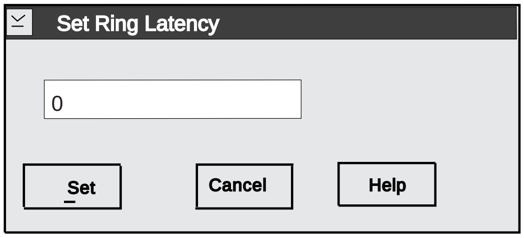


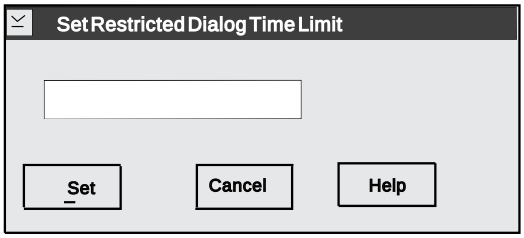
Determine the value of the MA_UNITDATA_Enable flag in RMT.

- True (1) is the default and initial value.
- False (0) overrides the default.

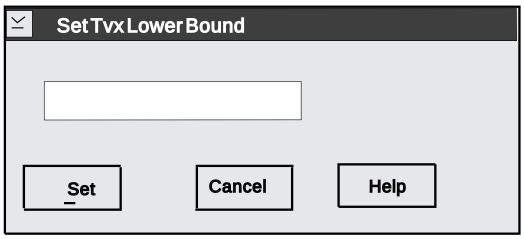
12.6.4 One Page of FDDI Path Group



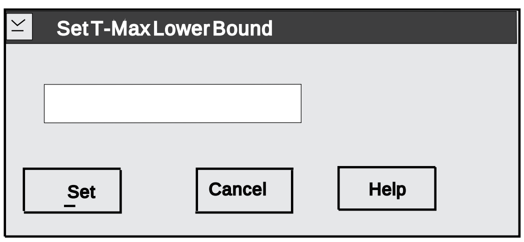




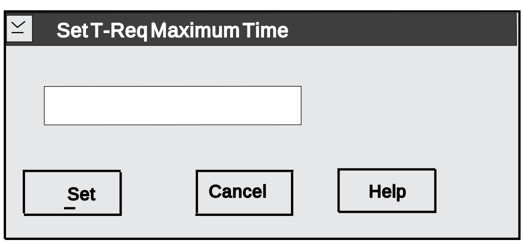
Set a vaue in the range from 0 through 343,597 seconds (ANSI X3T9).



Specifies the minimum time value of Tvx used by any MAC that is configured in this path. The default and initial value is 2500 nanosec (2.5msec). Specify a value of 0 or greater, but less than the TReq Maximum time shown in that panel.



Specifies the minimum time value of Tmax that shall be used by any MAC that is configured in this path.



Specifies the maximum time value of Treq that shall be used by any MAC that is configured in this path.

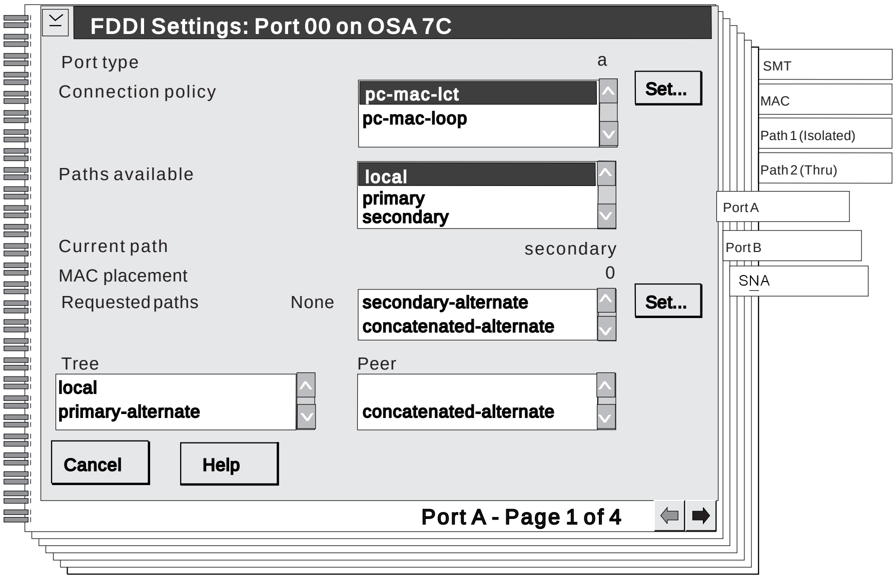
12.6.5 Four Pages of FDDI Port A|B Group

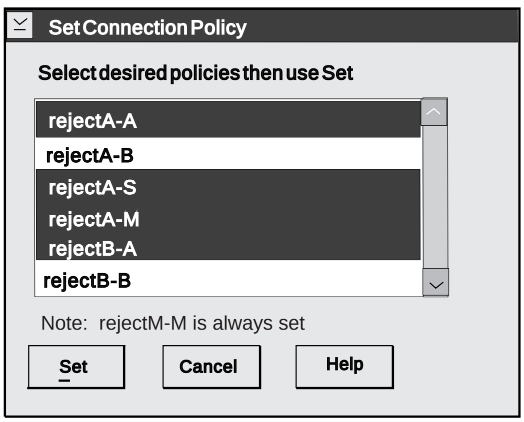
Notice!

In this book, a *station* is generally equated with a *port.* A FDDI station is a FDDI port, or vice versa. As described on page 253, however, a FDDI station has two port connectors, which are rather confusingly called *port a* and *port b*.

The port pages for port a and port b are identical, so only one set is listed in the following sections.

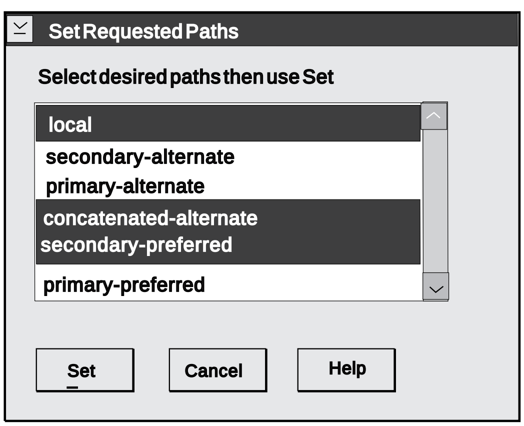
12.6.5.1 One Port (Port a) Group (Page 1 of 4)





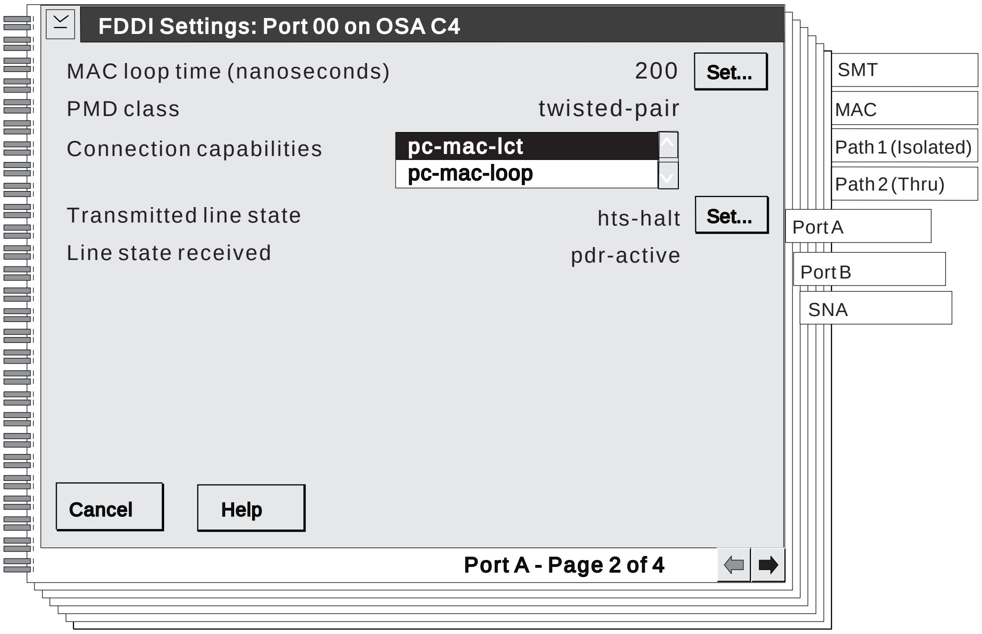
A = the primary connector (pages 253 and 30). B = the secondary connector. M = master, which OSA does not support. S = slave.

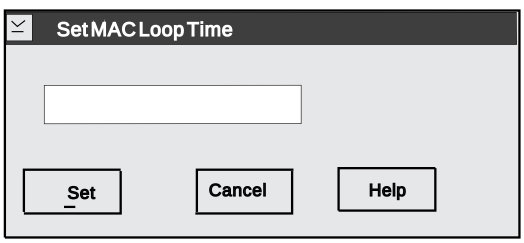
The connections that are rejected are displayed for selection. For example, **reject A–B** means the primary connector (A) of this station rejects a connection to the secondary connector (B) of the adjacent, or PC neighbor, station. M-M is always rejected. (See ANSI 9.6.3.)



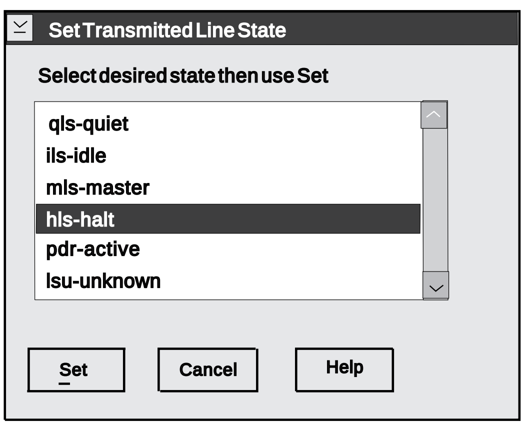
Select the paths into which the MAC may be inserted (ANSI SMT 9.7.)

12.6.5.2 FDDI Port a Group (Page 2 of 4)



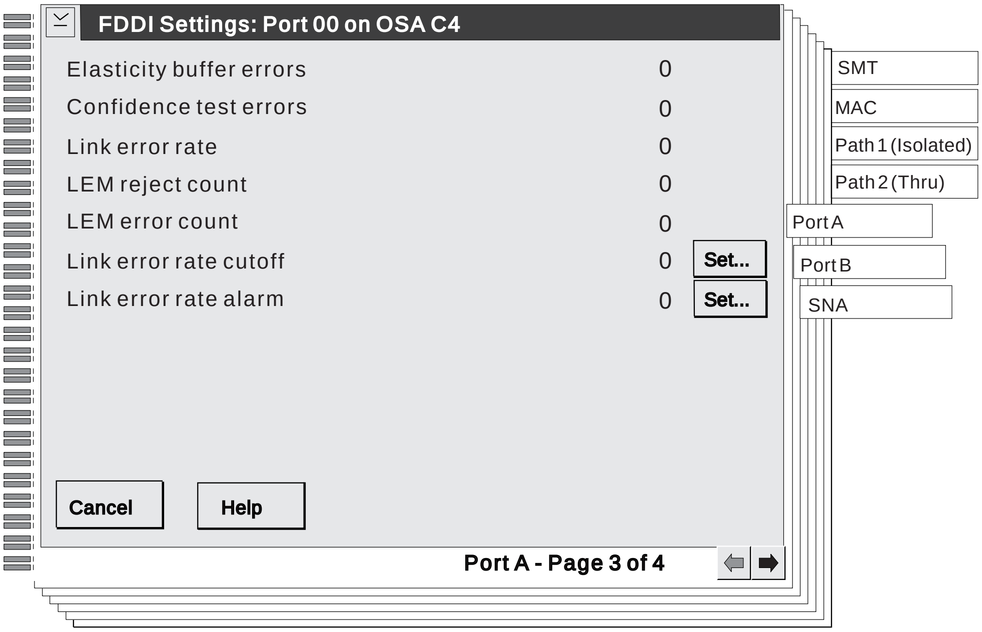


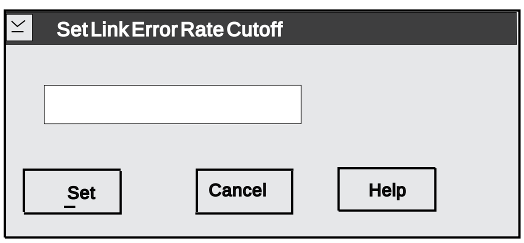
The default is 200 milliseconds (200 msec), which can be overridden. This object controls the value used by the FDDI attribute Tnext to prevent deadlock. This allows sufficient time for the MAC recovery process to complete and the exchange of neighbor information frames.



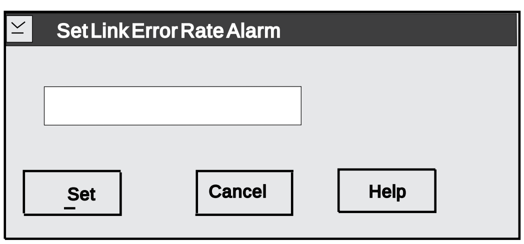
Refer to *X3T9.5 ANSI FDDI Statement Management, Revision 7.2.*

12.6.5.3 FDDI Port a Group (Page 3 of 4)



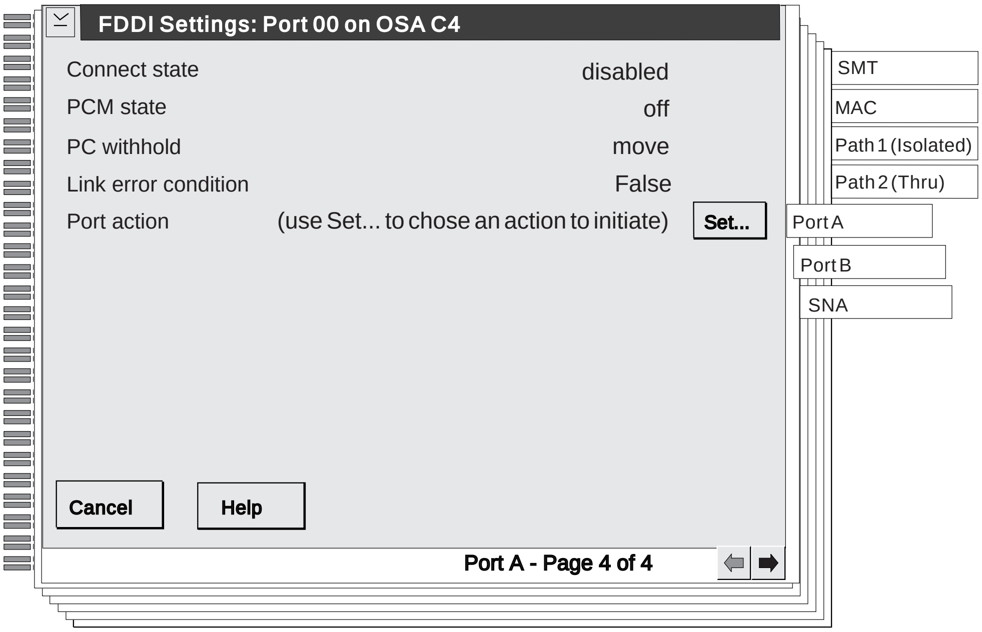


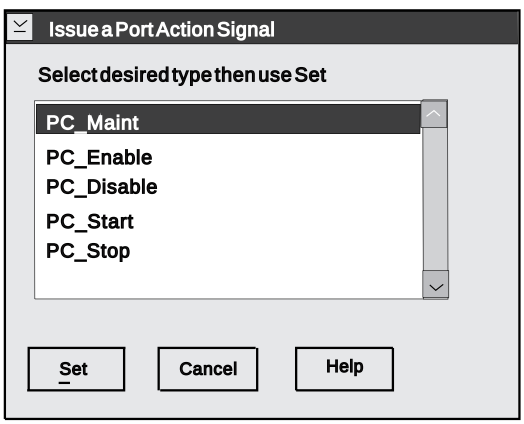
Accept the default of 7 or specify a value in the range from 0–15. This determines the link error rate estimate at which a link connection will be broken.



Accept the default of 8 or specify a value in the range from 0–15. This determines the link error estimate at which a link connection will generate an alarm.

12.6.5.4 FDDI Port a Group (Page 4 of 4)





Causes a control signal to be generated with a control action of 'Signal' and the 'variable' parameter set with the appropriate value, such as PC_Maint, PC_Enable, PC_Disable, PC_Start, or PC_Stop. (ANSI 9.4.2).

12.6.6 One SNA Page

See page 140 for the panel with the expanded SNA mode port parameters and page 151 for the panel with the basic SNA mode port parameters.

12.7 Port Notebook for a Token-Ring LAN Connection

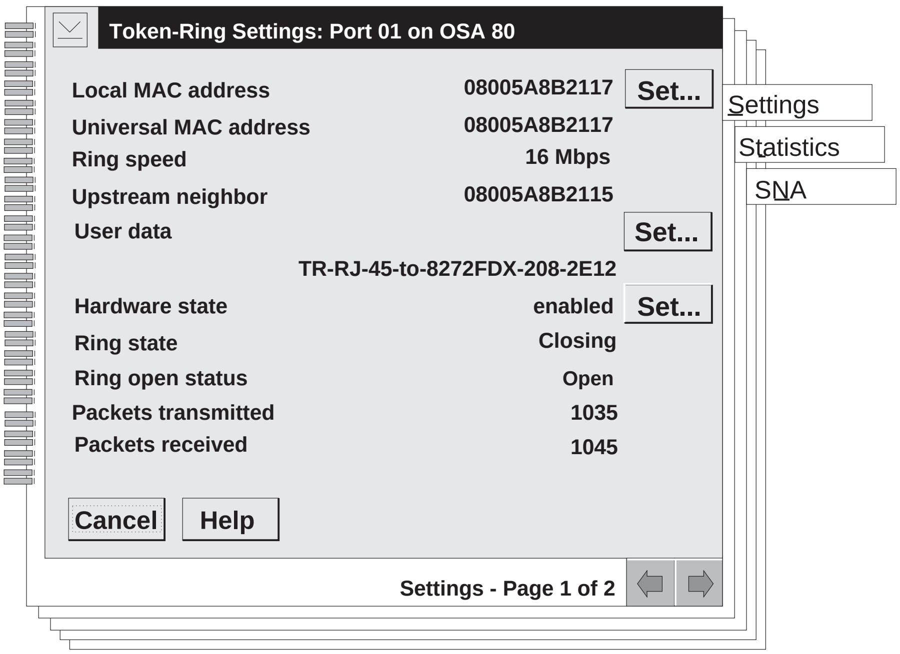
OSA/SF GUI displays a multi-page port notebook for a token-ring LAN connection: 2 pages of token-ring settings; 2 pages of statistics; and 1 page of SNA port parameters if the port is being used in the SNA mode.

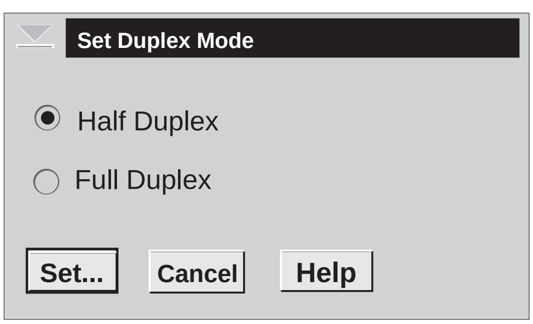
- For more information on the token-ring port values, refer to RFC 1231, which is the TCP/IP protocol standard for the IEEE 802.5 token-ring MIB.
- OSA/SF GUI can display all the token-ring port parameters. Refer to the appropriate OSA/SF user's guide.

- Depending on the processor, the standalone support element or single object operations via the hardware management console can also be used to display a large number of these port parameters. Refer to the books on the hardware management console of the appropriate hardware platform.
- For the ATM LAN emulation client (LEC) port parameters that are required for an emulated token-ring LAN, see page 185.

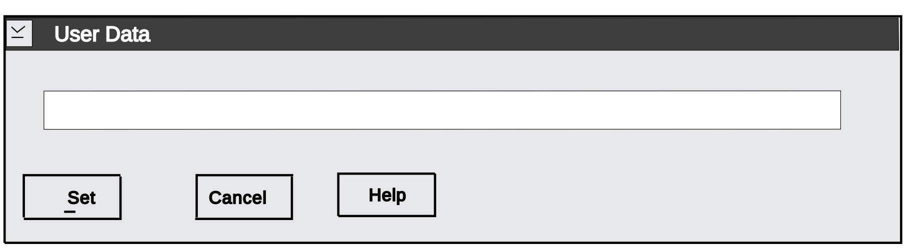
12.7.1 Two Pages of Token-Ring Settings

12.7.1.1 Token-Ring Settings (Page 1 of 2)

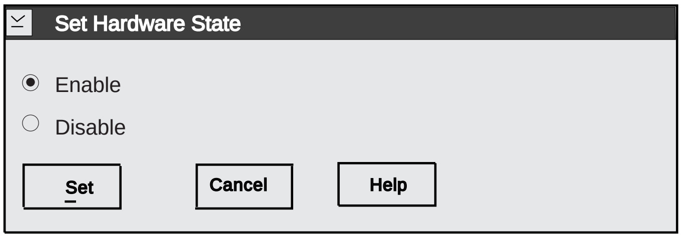




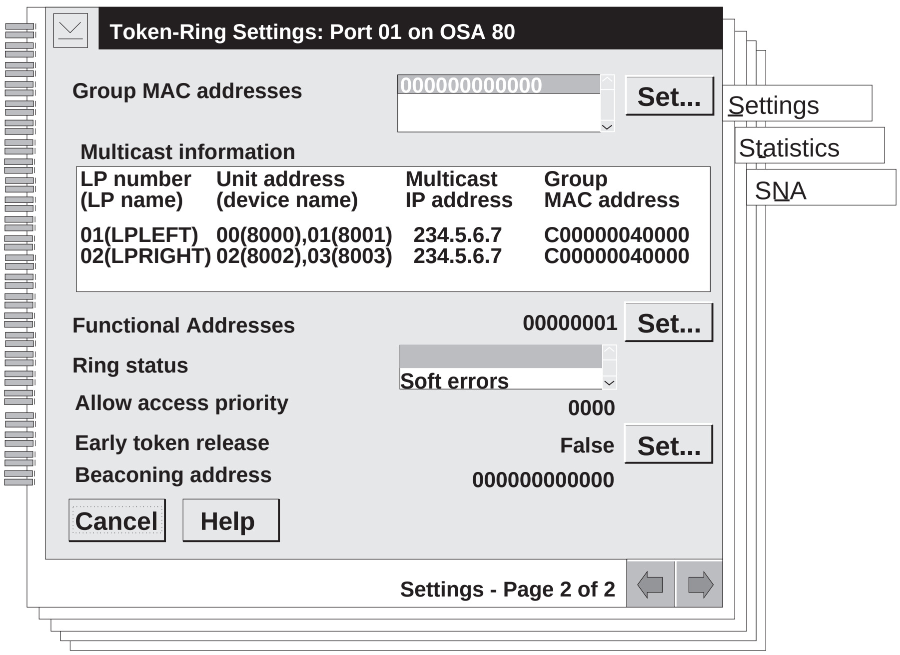
Note: For information on how to define a locally-administered MAC address, see page 210.



Note: OSA/SF displays a user data field for any port except an ATM OSA-2's physical port. You can enter any 32-character string using OSA/SF.



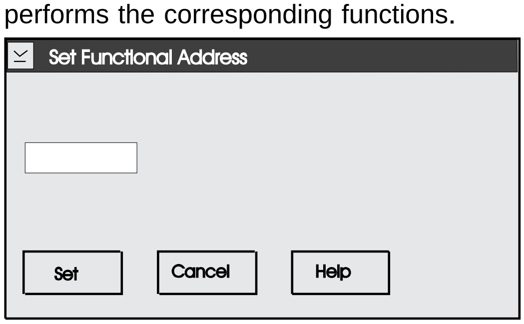
12.7.1.2 Token-Ring Settings (Page 2 of 2):



Notes:

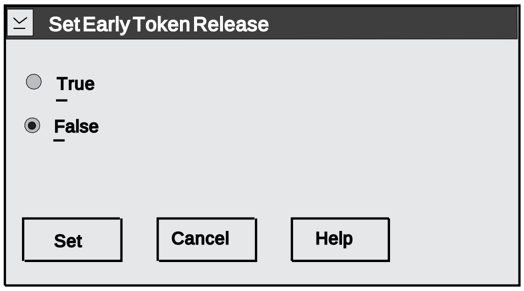
1. For information on a group MAC address, see page 212.
2. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.
3. Here is an example of the Functional Address pulldown menu. You can set a functional address consisting of 8 non-blank hexadecimal digits for any port except an ATM OSA-2 LEC port.

   The port uses bits 1–31 of this address as a bit mask to compare with bits 0–30 of the functional address of an incoming frame. If at least one pair of matched bits is 1, the port receives the frame and performs the corresponding functions.

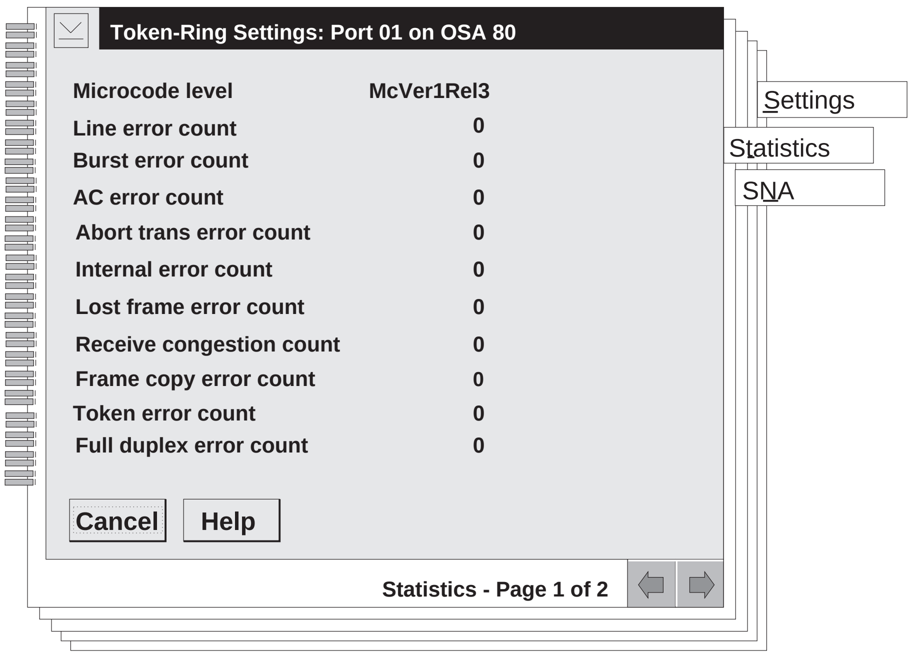
   

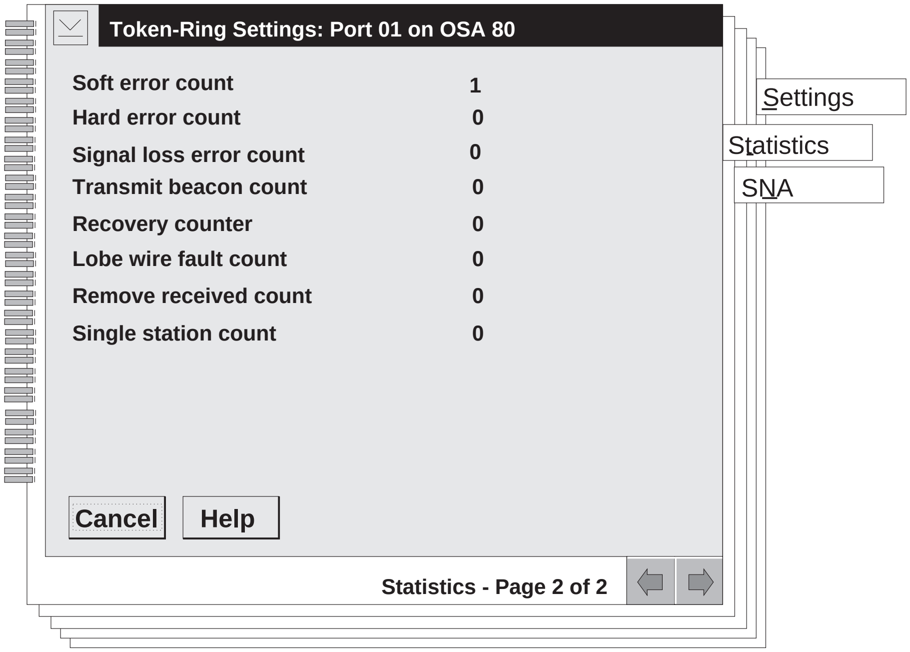
4. Here is an example of the Early Token Release pulldown menu.

- True = On = token is released at the end of the transmit. (This default allows greater use of the ring.)
- False = Off = token is released after the token has been stripped from the ring.



12.7.2 Two Pages of Statistics





12.7.3 One SNA Page

See page 140 for the panel with the expanded SNA mode port parameters and page 151 for the panel with the basic SNA mode port parameters.

Appendix A. OSA-1 and Its Modes

Information that applies only to an OSA-1 is provided in this appendix. An OSA-1 can only be run in the TCP/IP Passthru, SNA, and LANRES/MVS modes.

- For information on OSA protocols, ports, TCP/IP Passthru mode, and SNA mode, refer to the information in the relevant chapters of the book.
- For information on the LANRES mode, refer to page 248 and to the following books:
  - *LAN Resource and Extension Services/MVS Guide and Reference,* SC24-5623
  - *LAN Resource and Extension Services/MVS Configuration Files and Commands,* SC28-1578
  - *Novell NetWare for SAA Administration Guide 1.3 Revision B*
  - *Novell NetWare 3.12 System Administration Guide*

A.1 Checklists

A.1.1 General OSA-1 Checklist

1. For each OSA-1, determine in which OSA modes (TCP/IP Passthru, SNA, and/or LANRES/MVS) it will be run. This decision determines which OSA-specific identifiers you will need to plan for.
2. Determine whether the number of OSA-1s will be used on each hardware platform.
3. Ensure that the hardware requirements are met that are listed in this appendix. Also refer to the hardware books that are listed in the bibliography (page xviii) and your marketing representative.
4. Ensure the site physical installation planning has been completed. See the hardware installation books listed in the bibliography (page xviii).
5. Check the EC level of the hardware platform to ensure it meets OSA requirements. To check the EC level, follow the instructions for the standalone support element (SE), the SE function of the system hardware management console (HMC) or the processor control element (PCE).
6. For each OSA-1, ensure its channel path identifier (CHPID) is provided to the personnel who define the CHPID in the hardware system I/O configuration, to the host operating system, and to OSA/SF.
   - OSA CHPIDs for your CPC should be available in the *System Assurance Product Review* (SAPR) guide or the IBM Configurator (CFSYSTEM) *Placement Report* and *CHPID Report,* which should be available from your service representative.
   - OSA-1 CHPID slot assignment guidelines are provided on page 256 (9021), page 259 (9121), and page 261 (OSA-1 on a 9672).
7. For each OSA-1, review its port data transfer speeds and frame protocols. Refer to the protocol information in the relevant chapters. Also, ensure the customer-supplied OSA cables will be available for installation and that space will be allotted for their installation.

   For more information, especially about redundant LAN paths, refer to *IBM Multisegment LAN Design Guidelines,* which is listed in the bibliography (page xx).
8. Check the active media access control (MAC) address for each OSA-1 port. Refer to MAC information in the relevant chapters.

   If you plan to set a local MAC address, it is advisable to do so when the OSA is being installed. The reason for this is that the OSA channel path must be configured off from all the partitions to which it is defined, and then back on to all of them, before the change takes Decide whether to alter any settable port parameters (Chapter 12).

9. For each OSA port that will be used to transfer data in the SNA mode, review the SNA mode port parameters (page 151).
10. For a FDDI OSA, decide whether to use an optional, optical bypass switch. If so, plan to have the switch operational before the FDDI OSA is online (page 254).

A.1.2 General LANRES/MVS Modes Checklists

1. Ensure that only OSA-1s will be used in this mode
2. Ensure the programming requisites listed in this chapter are met as well as those listed in the OSA/SF for MVS/ESA and OS/390 program directory.
3. Define the pairs of device numbers required for this mode (page 271).
4. Define the OSA to the host server programs that will interface with it in these modes. See the LANRES/MVS books for the LANRES/MVS mode and the VTAM books for the LANRES/MVS for SAA mode. Examples are also provided in “LANRES/MVS Modes” on page 265.
5. For either the LANRES/MVS or LANRES/MVS SAA mode, but not for both:
   - Define S/390 disk space for the OSA-1 disk server files (data sets) (page 45).
   - Protect user access to the OSA-1 disk server (page 60).
   - Define one pair of device numbers in the hardware I/O configuration with unit addresses X'FC' and X'FD' (page 271) for each OSA-1 that will communicate with the OSA-1 disk server.

A.1.2.1 LANRES/MVS Mode Checklist

1. Ensure that the NetWare 3.12 license diskettes are available.
2. Set up a NetWare client to run the RCONSOLE utility.
3. Define a pair of device numbers for each subchannel function, or session, in the hardware I/O configuration for each OSA-1 to be used in this mode (pages 266 and 271).
4. Plan to use OSA/SF to customize each OSA in which this mode will be active (page 270).
5. Ensure that the installation factors relevant to this mode are taken into account.
6. Ensure that the OSA-related files will be installed from the LANRES/MVS tape. (See the appropriate program directory.)
7. Determine whether this mode will be active concurrently with the TCP/IP Passthru mode or the LANRES/MVS SAA mode, or both modes, on any OSA.
8. Plan to update the LANRES/MVS host program statements for the host program in the partition to which each OSA will be defined in this mode. See the LANRES/MVS books listed in the bibliography (page xviii). An example is listed in the book starting on page 265.
9. Plan for the use of the LANRES/MVS mode, including how to handle problems that can occur. When using OSA/SF, refer to the OSA/SF user's guide that is listed in the bibliography (page xv).

A.1.2.2 LANRES/MVS for SAA Checklist

1. Ensure that the NetWare for SAA license and the NetWare 3.12 license diskettes are available.
2. Set up a NetWare client to run the RCONSOLE utility.
3. Define the user device numbers in the hardware I/O configuration needed for each OSA-1 used in this OSA mode (pages 266 and 271).
4. Plan to use OSA/SF to customize each OSA in which this mode will be active (page 270).

5. Determine whether this mode will be active concurrently with either the TCP/IP Passthru mode or the LANRES/MVS mode, or both, on any OSA. If so, remember to take the concurrency factors into account.
6. Ensure that the installation factors relevant to this mode are taken into account.
7. Ensure that the OSA-related files will be installed from the LANRES/MVS tape. (See the appropriate program directory.)
8. Determine whether this mode will be active concurrently with the TCP/IP Passthru mode on each OSA. If so, remember to take the concurrency factors into account. These are discussed on page 267.
9. Plan to update the VTAM macros in the partition or partitions to which each OSA is defined. See the host program books listed in the bibliography (page xviii). An example is listed in the book starting on page 265 .
10. Plan for the use of the LANRES/MVS SAA mode, including how to handle problems that can occur. When using OSA/SF, refer to the OSA/SF user's guide that is listed in the bibliography (page xv).

A.2 Requirements

In these lists of requirements, only the minimum Engineering Change is listed: system engineering change (SEC) for the 9021 and 9121 processors; machine engineering change (MEC) for the 9672 parallel servers. Other ECs or System Element Licensed Internal Code (SE LIC) levels, which are also called micro change levels (MCLs), may be required.

For information on EC levels and how to check the EC level on a machine, refer to the hardware manuals listed in the bibliography and the applicable IBM preventive service planning (PSP) buckets, such as 9021DEVICE, 9121DEVICE, 9672DEVICE, OSA110, and OSA120.

A.2.1 Hardware Platforms

A.2.1.1 S/390 CMOS Platforms

Hardware Platform	MEC	SE LIC
S/390 9672 Parallel Transaction Server E01, E02, E03, E04, E05, E06, E07, E08, P01, P02, P03	E45592	D79756
S/390 9672 Parallel Enterprise Server R1 R11, R21, R31, R41, R51, R61	E45592	D79756
S/390 9672 Parallel Enterprise Server R2 & R3 R12, R22, R32, R42, R52, R72, RA2, R53, R63, R73, R83, RX3	E45548	E45568

A.2.1.2 ES/9000 Processors

9021 711-based: 711, 821, 822, 831, 832, 941, 942, 952, 962, 972, 982, 9X2	**SEC** 236422 (Note)
9121 511-based: 311, 411, 511, 521, 522, 621, 622, 732, 742	**SEC** C35956 (Note)

Note: On a 9021 or 9121, an OSA-1 requires additional storage space in the hardware system area (HSA). For more information, refer to the hardware books listed in the bibliography (page xviii).

A.2.2 Port Connections

To Connect	Comments	OSA-1
As a standard AUI to a half duplex 10Mb/second Ethernet LAN that conforms to ANSI IEEE 802.3 or ISO/IEC 8802.3 or Ethernet V2.0	The AUI connection supports half duplex, but not full duplex, communications.	Ethernet OSA-1 (5 ports)
As an RJ-45 STP or UTP interface to *only* a half duplex 4Mb/sec or 16Mb/sec token-ring LAN that conforms to ANSI/IEEE 802.5 or ISO/IEC 8802.5.		Token-ring OSA-1 (5 ports)
To a 100Mb/second single- or dual-ring FDDI LAN that conforms to either ANSI X3T9.5 or ISO 9314.	Do not use a FDDI OSA port for both the source and destination of communications between two logical partitions.	FDDI OSA-1 (1 port)

A.2.3 User-Supplied Cabling

Cabling requirements for the OSA ports depend on several factors.

A.2.4 Maximum Number of Users Per OSA Mode

OSA Mode	Maximum Users on the directly-attached LAN or ATM network
TCP/IP Passthru	The number of users is limited by the number supported by the TCP/IP host program.
SNA	The limit is 255 PUs. Ensure that the total number of PUs that is associated with all the instances, or copies, of VTAM, remains within the limit of PUs supported by the OSA. Once a given PU is activated within one XCA for a given OSA port, it cannot become available for another instance of VTAM.
Either LANRES/MVS Mode	The number of clients is limited by the number of users for the given license.

A.2.5 Frame Types and Sizes Supported by OSA Modes

In this book, frame parameters are identified by

A.2.5.1 Frame Protocols Supported in the TCP/IP Passthru Mode

LAN Type	Frame Protocol
FDDI	FDDI ANSI X3T9.5 using 802.2 SNAP envelope
Ethernet	Ethernet II using DEC Ethernet V 2.0 envelope Ethernet 802.3 using an 802.2 envelope with SNAP
Token ring	Token Ring 802.5 using an 802.2 envelope with SNAP

A.2.5.2 Frame Protocols Supported in the SNA Mode

LAN Type	Frame Protocol
FDDI	IEEE 802.2 LAN MAC (ANSI X3T9.5 using an 802.2 envelope)
Ethernet	Ethernet 802.2 LAN MAC (802.3 using 802.2 envelope)
Token ring	IEEE 802.2 LAN MAC (802.5 using 802.2 envelope)

A.2.5.3 MTU Sizes for Full Duplex Support

LAN Type	OSA/SF Parameter	Frame Protocol
Ethernet	ETHERNET_802.2 ETHERNET_802.3 ETHERNET_II ETHERNET SNAP	IEEE 802.3 LAN MAC (802.3 using 802.2 envelope) IEEE 802.3 CSMA/D (IPX 802.3 raw encapsulation) Ethernet II using DEC Ethernet V 2.0 envelope–but not supported if TCP/IP Passthru is running concurrently Ethernet 802.3 using an 802.2 envelope with SNAP–but not supported if TCP/IP Passthru is running concurrently
Token ring	TOKEN-RING TOKEN-RING SNAP	IEEE 802.2 LAN MAC (802.5 using 802.2 envelope) Token Ring 802.5 using an 802.2 envelope with SNAP–but not supported if TCP/IP Passthru is running concurrently
FDDI	FDDI_802.2 FDDI_SNAP	IEEE 802.2 LAN MAC (ANSI X3T9.5 using 802.2 envelope) FDDI 802.3 ANSI X3T9.5 using 802.2 SNAP envelope–but not supported if TCP/IP Passthru is running concurrently

A.2.6 LANRES/MVS Mode Requirements

A.2.6.1 For OSA/SF

- OSA-1 disk server space is required. Furthermore, LANRES/MVS requires:
  - A DOS-capable workstation for running RCONSOLE.
  - NetWare 3.12, Multiuser Version, from Novell for the LANRES/MVS mode (not a later level).
  - NetWare for SAA Version 1.3B from Novell for the LANRES/MVS SAA mode (not a later level). Only one copy of this license can run on a given OSA.
- To configure one of the LANRES/MVS modes, an additional 10MB of free disk space is required if you use OSA/SF GUI.

A.2.6.2 The LANRES/MVS mode requires

- LAN Resource Extension and Services/MVS (LANRES/MVS) 1.3 (5695-123) on MVS/ESA 4.3–5.1
- LAN Resource Extension and Services/MVS (LANRES/MVS) feature on MVS 5.2

Furthermore, LANRES/MVS requires:

- A DOS-capable workstation for running RCONSOLE
- NetWare 3.12, Multiuser Version, from Novell (not a later level)

A.2.6.3 The LANRES/MVS SAA mode requires one of the following

- LAN Resource Extension and Services/MVS (LANRES/MVS) 1.3 (5695-123) on MVS/ESA 4.3–5.1
- LAN Resource Extension and Services/MVS (LANRES/MVS) feature on MVS 5.2

Furthermore, LANRES/MVS requires:

- A DOS-capable workstation for running RCONSOLE.
- NetWare for SAA Version 1.3B from Novell (not a later level). Only one copy of this license can be run on a given OSA.

A.3 OSA-1 Features

- All OSAs support the ESCON Multiple Image Facility (EMIF), so more than one host program, each running in its own logical partition (LP) in a system that is in logically partitioned (LPAR) mode, can share access to either an OSA-1 or an OSA-2 feature. With user input through OSA/SF, the OSA allows access to each port to be shared as well.

- An OSA-1 supports all the OSA modes and can be managed by OSA/SF running in either an OS/390 or MVS/ESA environment. All the OSA-1 ports allow direct attachment to one of the following types of LANs:

- A FDDI OSA-1, which has one OSA-1 card, has one OSA port for attachment to either a single- and dual-ring FDDI LAN. This OSA-1 does not allow the source and destination MAC addresses to be identical. Data can not be transferred between logical partitions through a FDDI OSA.

- An Ethernet OSA-1, which has two OSA-1 cards (Base and Port), has five ports on its Port card that support half-duplex communications. This OSA-1 allows data through each of its ports to be transferred (wrapped) between two host programs, each running in a different partition.

- A token ring OSA-1, which also has a Base and a Port card, also has five ports on its Port card to support half-duplex communications. It also supports data transfer (wrapping) through the same port for partition-to-partition communications.

- OSA-1s are installed in the slots of an OSA-1 cage. An OSA-1 cage is installed in a frame on the hardware platform. The channel path identifier (CHPID) of an OSA-1 is location-dependent, and the location depends on the platform as discussed in this chapter.

- The maximum number of OSA-1s that can be installed on a hardware platform depends on the number of slots used by the features, the number of OSA-1 cards that can be installed in an OSA-1 cage, and the number of OSA-1 cages on the platform.

Maximum Number	9021 (Non-MP) (MP) (Note 1)	9121 (Non-MP) (MP) (Note 1)	9672 Parallel Server
OSA-1 Cards/OSA-1 Cage	8 8	8 8	9
OSA-1 Cages/Frame	2 2	1 1	1
OSA-1 Cages/Platform	2 4	1 2	(Note 2)

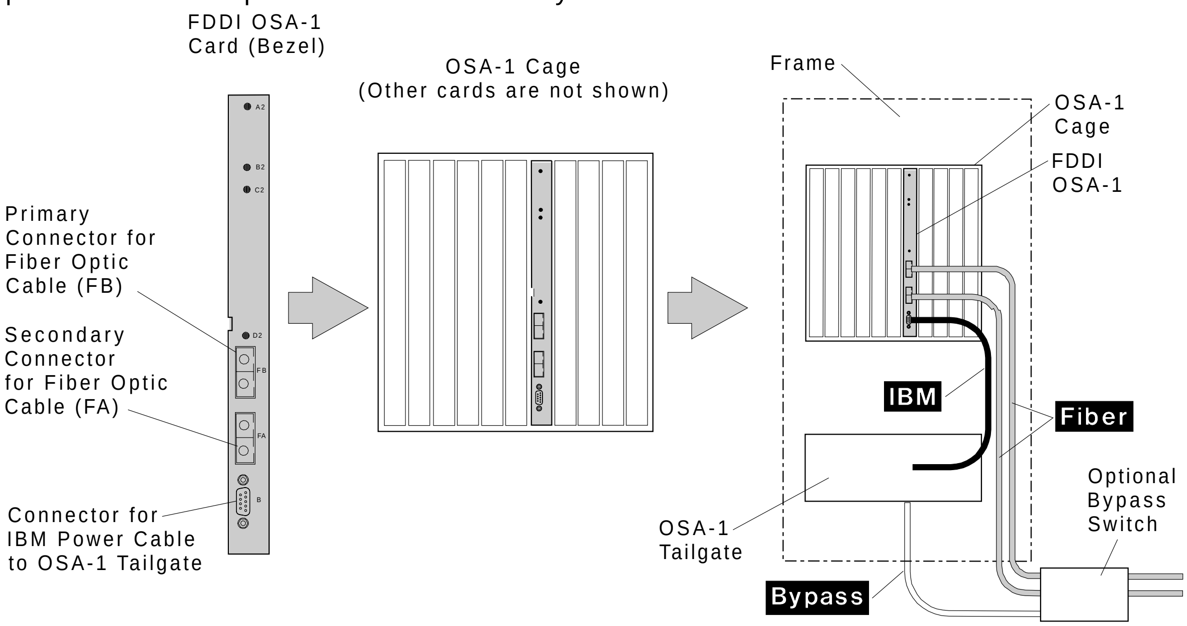
Notes:

1. Non-MP designates a nonmultiprocessor. MP designates a multiprocessor.
2. Because the E02–E08, P02, and P03 models contain more than one central processor complex (CPC), up to two OSA-1 cages can be installed on each of these models of a 9672 parallel server. An E01 or a P01 model has only one CPC, so only one OSA-1 cage can be installed. Regardless of the number of CPCs, each OSA-1 cage has affinity to only one CPC.

A.3.1 FDDI OSA-1 Feature

A FDDI OSA-1 feature consists of one card, which has one LAN port that can be attached to a 100 Mb/second FDDI LAN. The LAN must conform to either the American National Standard Institute (ANSI) X3T9.5 specification or the International Standards Organization (ISO) 9314 specification.

To help you visualize the cabling needed for a FDDI OSA-1, the following figure shows the connectors that are located on the bezel of the FDDI OSA-1 card on the left, the housing of a feature in an OSA-1 cage in the middle, and the cage and tailgate installed in a frame on the right. This figure does not represent any particular hardware platform. It is intended only to focus on the connectors and the cables that are used.



A.3.1.1 Customer-Supplied Fiber-Optic Cabling to a LAN: Identified with **Fiber** in the preceding figure, customer-supplied fiber optic cables attach the port on a FDDI OSA-1 to a FDDI LAN.

- These cables are attached directly to the transmitter and receiver of the FDDI OSA-1 to maximize the optical power budget that is available.
- Two FDDI jumper cables are required for a dual-ring configuration; one FDDI jumper cable is required for a single-ring attachment.
- The recommended fiber cross-section for a FDDI fiber optic cable is 62.5/125 micron fiber. A standard Media Interface Connector (MIC) is used.
- The term port has two connotations in a FDDI OSA. Data is transferred through the single FDDI OSA-1 port. However, this port has two fiber connectors (FA and FB), both of which are only used for a dual-ring attachment. In the FDDI port parameters, these connectors (or FDDI paths) are called *port a* and *port b.*

A.3.1.2 Customer-Supplied Optical Bypass Switch: A customer-supplied, external, optional, optical bypass switch provides optical isolation from a FDDI LAN when such isolation is needed.

- When ordering an optical bypass switch, take into account the requirements for the fiber-optic cables, which are listed in the preceding section, and the requirements imposed by the connector on the OSA-1 tailgate, which are described in the next section.
- When cabling the switch to the FDDI connector, plan to make the switch operational before the OSA channel. Otherwise, you must configure the OSA channel and all its devices offline from all the partitions to which it is defined; make the switch operational, and then configure the OSA back online (or do a power on reset, or POR).

OSA-1 Tailgate Connector

A connector on an OSA-1 tailgate for each FDDI feature allows the attachment of the power lead of a customer-supplied optical bypass switch. This connector is a 9-pin subminiature “D” shell receptacle that uses 4–40 screw locks and has the following pin assignments:

D01 +5V to the secondary switch

D02 +5V to the primary switch

D03–D05 Ground

D06 Sense switch presence

D07–D09 No connection

Customer-Supplied Power Lead

A power lead, which is labeled **Bypass** in the preceding figure, is typically part of the optical bypass switch. Because this cable is attached to the OSA-1 tailgate, the detrimental effects of electromagnetic interference (EMI) are minimized. (The internal cable between the tailgate and the card is labeled **IBM** in the figure.)

For the customer-supplied power lead:

- There must be a one-to-one (1:1) wiring, that is, pin 1 on the plug end is wired to pin 1 on the receptacle end.
- The length should not exceed 12.2 meters (12.2 m), or 40 feet (40 ft.) to assure proper voltage at the optical bypass switch.
- An extension cable can be used if the power lead is not long enough. The extension cable should be a 9-pin “D” shell plug-to-receptacle extension cable.
- An adapter cable can be made to match the power lead connector on a given switch to the OSA-1 tailgate connector if required.

A.3.2 Token Ring and Ethernet OSA-1 Features

Each token ring OSA-1 or Ethernet OSA-1 feature consists of two cards: a Base card and a Port card. A flexible cable assembly allows communications to take place between the two cards. The Port card has a connector for each of the five LAN ports on these OSA-1 features.

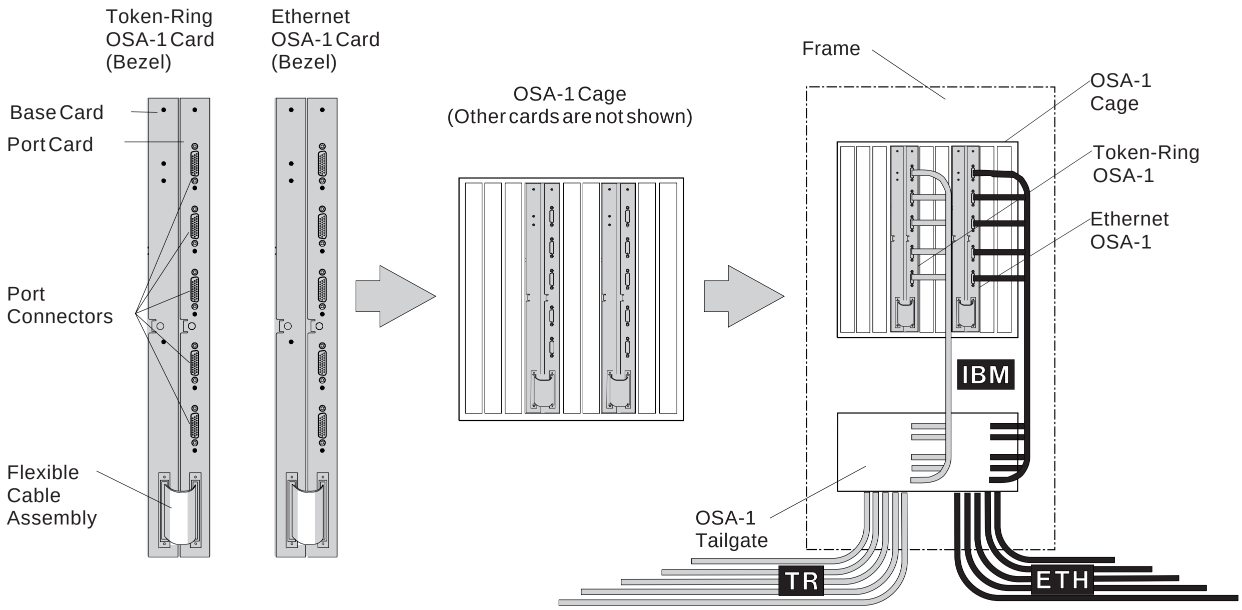
Cabling between a port connector and a LAN for these features requires two cables:

- An IBM-supplied cable, which is labeled **IBM** in the following figure, attaches one connector on the Port card with an corresponding connector on the tailgate assembly of the frame in which the OSA-1 feature is installed.

- A customer-supplied cable, which is labeled **TR** for a token ring OSA-1 and **ETH** for an Ethernet OSA-1, attaches the appropriate connector on the OSA-1 tailgate to a LAN.

To help you visualize the connectors and their cabling, the following figure shows the connectors on the Port card at the left, the housing of the two features in an OSA-1 cage in the middle, and the OSA-1 cage and tailgate in a frame on the right.

This figure does not represent any particular hardware platform. It is intended only to show you the connectors for the cables that can be used. In the discussions on OSA-1 CHPID assignments, specific representations are shown, platform by platform. As the figure indicates, the token ring and Ethernet OSA-1 cards are identical in appearance. Their connectors at the OSA-1 tailgate, however, differ from each other.



A.3.2.1 IBM Cabling for Each Token Ring and Ethernet OSA-1 Feature: Identified with **IBM** in the figure on the preceding page, an IBM-supplied shielded twisted pair (STP) cable assembly connects each port on the Port card of a token ring OSA-1 or an Ethernet OSA-1 feature with the appropriate connector on the OSA-1 tailgate panel. Depending on the hardware platform on which the OSA-1 is installed, this cable can be up to 1.5 m (about 59 in.) in length.

A.3.2.2 Customer-Supplied Cabling for a Token Ring OSA-1: The customer-supplied cable attaches a token-ring connector located on an OSA-1 tailgate to a token-ring LAN. When this connection is completed and the corresponding token-ring OSA-1 port is initialized, the port senses and conforms to the speed of the token ring. If no carrier is sensed on the ring, the adapter enters the ring at the speed of its last successful entry.

Each token ring connector on an OSA-1 tailgate is a 9-pin subminiature “D” shell receptacle that supports screw locks for cable retention. This design supports a shielded twisted pair (STP) interface to either a 4Mbit/second or a 16Mbit/second token ring network that conforms to the ANSI/IEEE 802.5 (ISO/IEC 8802.5) standard.

The customer-supplied cable is identified with **TR** in the figure on page 255. This cable, which must be industry-standard, attaches the connector to a Multistation Access Unit (a token ring MAU or MSAU). The length of cable needed depends on the requirements of the installation, the type of cable, and the gauge of the wire.

- The maximum length of a type-1 cable can be about 97.5 m (320 ft.).

- A type-2 cable can be the same length as a type-1 cable for a 22-gauge wire, and about 64 m (210 ft.) for a 26-gauge wire.

A.3.2.3 Customer-Supplied Cabling for an Ethernet OSA-1: The customer-supplied Attachment Unit Interface (AUI) cable attaches an Ethernet connector located on an OSA-1 tailgate with a transceiver, which must be an Ethernet Medium Attachment Unit (MAU).

Depending on the type of MAU being used, the AUI supports the following connections:

- 10BASE5 ("thick" Ethernet)
- 10BASE2 ("thin" Ethernet)
- 10BASET (unshielded "twisted-pair" Ethernet)
- Fiber optic ST or SMA connection

Each Ethernet AUI connector on an OSA-1 tailgate is a 15-pin subminiature "D" shell receptacle with a slide latch for cable retention. This connector provides a standard attachment unit interface (AUI) to a 10Mbit/second LAN that conforms to either the ANSI IEEE 802.3 (ISO/IEC 8802.3) standard or the Ethernet V2.0 specification.

The customer-supplied AUI cable is identified with **ETH** in the figure on page 255 . The length of the cable depends on customer requirements, but should not exceed 48.5 m (about 126 ft. 4 in.).

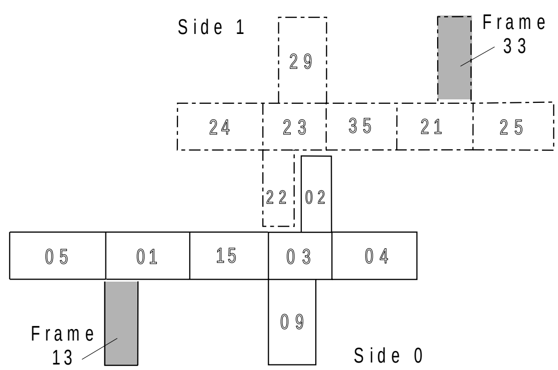
A.4 CHPID Assignments for OSA-1s in a 9021 Processor

Because the CHPID assignment of an OSA-1 depends on the location of the feature in the processor, the following figures are provided to help you visualize the relationships among the OSA-1 features, cages, and frames on this hardware platform. For more information, refer to the hardware installation books listed in the bibliography (page xviii).

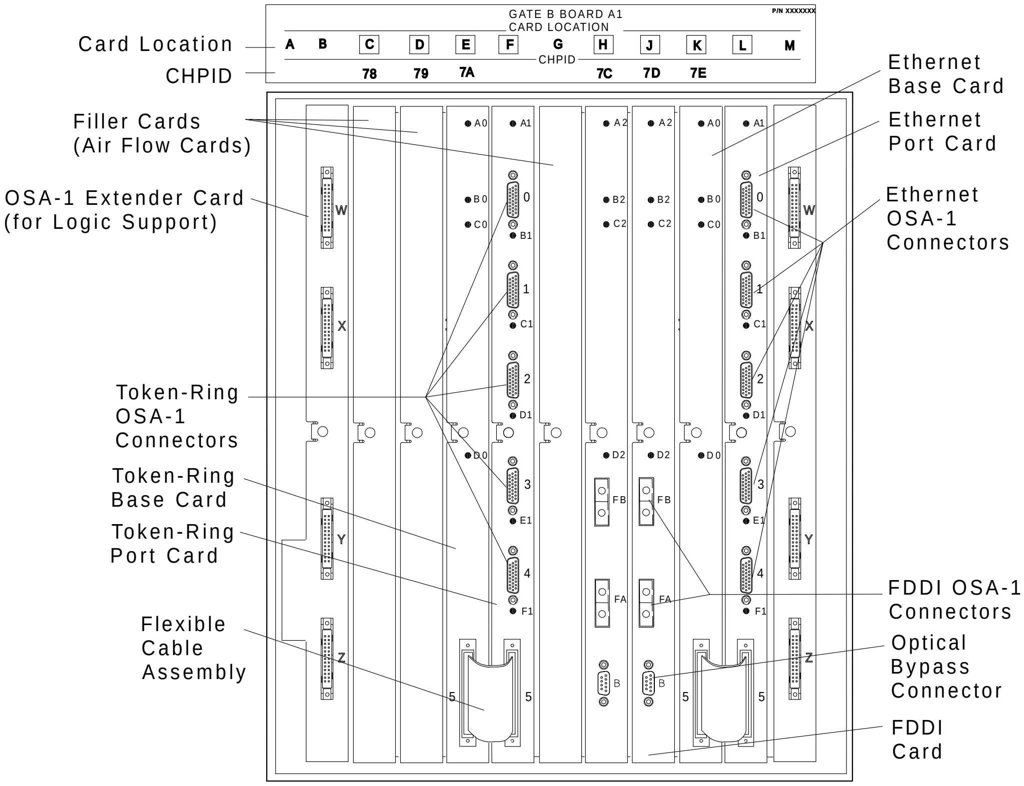
A.4.1 OSA-1 Locations in a 9021 Processor

In the adjacent figure, the floor plan, or footprint, of a multiprocessor (MP) model 962 is shown. The solid outline in the figure indicates a non-MP processor. The two OSA frames (13 and 33) are shaded. Each OSA-1 frame can contain up to two OSA-1 cages. Each OSA-1 cage can contain up to eight OSA-1 cards.

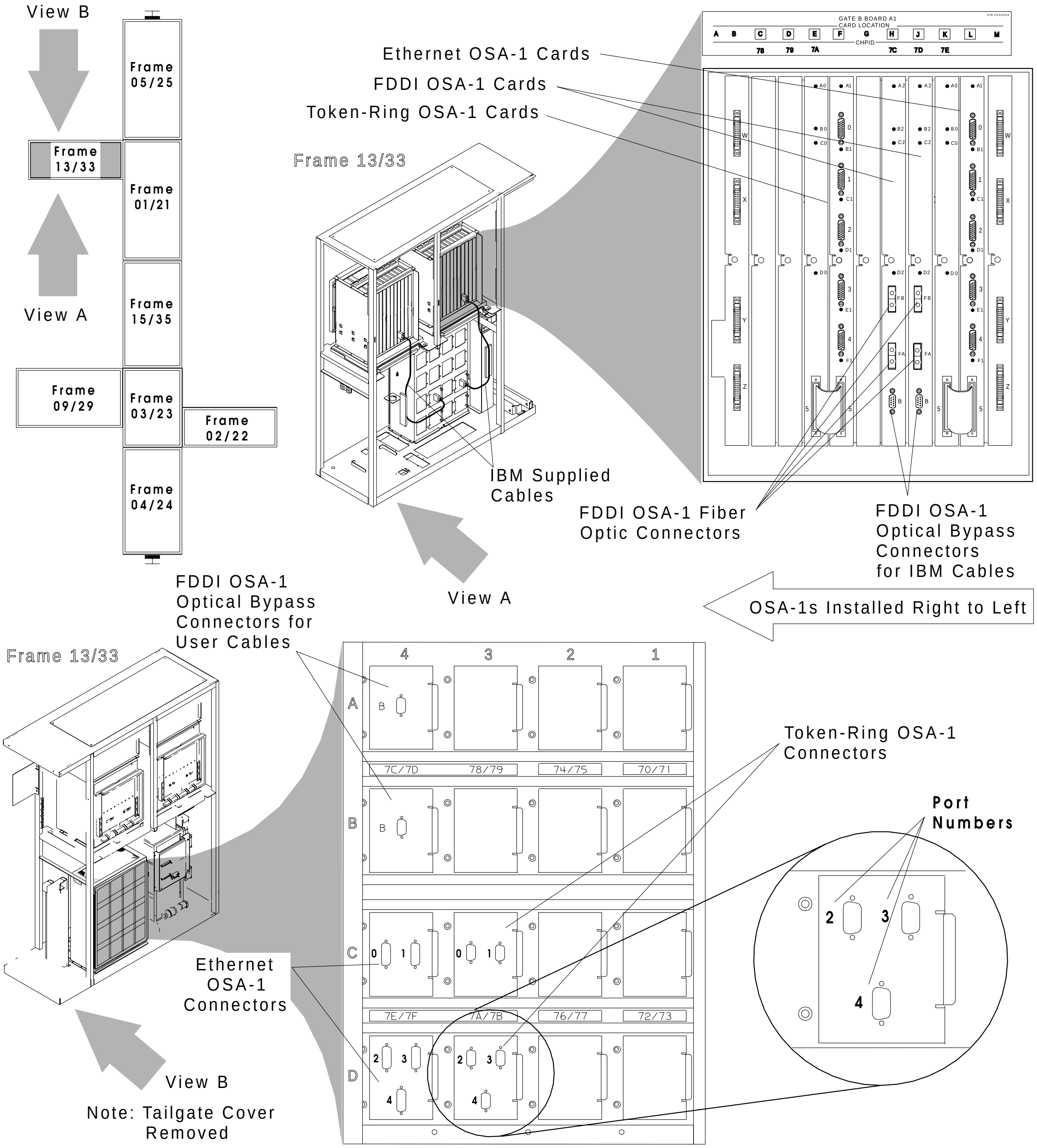
The OSA-1 frame on either side of the 9021 processor can be populated first. The OSA-1 cages are installed in the upper half of one frame: one cage in gate A, the other in gate B. In the lower half of the frame, the tailgate and the power supplies are located that support both OSA-1 cages.



In the figure below, the bezels of several OSA-1 features are shown together in the front view of an OSA-1 cage. They are shown separately on pages 253 (FDDI) and 254 (token ring and Ethernet).



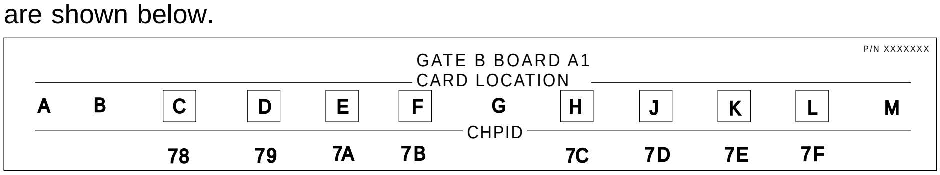
The next figure shows that the OSA-1 features fit in an OSA-1 cage, and an OSA-1 cage fits in an OSA-1 frame of a 9021 processor. One OSA-1 tailgate serves both OSA-1 cages in the OSA-1 frame. Assume that the covers of frame 13 have already been removed by service personnel.

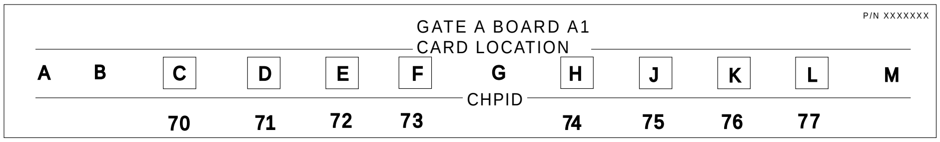


A.4.1.1 Rules for OSA-1 CHPID Assignments in a 9021

1. Up to 32 CHPIDs can be used by the OSA-1 features in a 9021 processor.

   The CHPIDs range from X'70'–X'7F' in frame 13, and from X'F0'–X'FF' in frame 33. The CHPIDs are displayed on the card location label of the OSA-1 cage. The labels for the two cages in frame 13 are shown below.



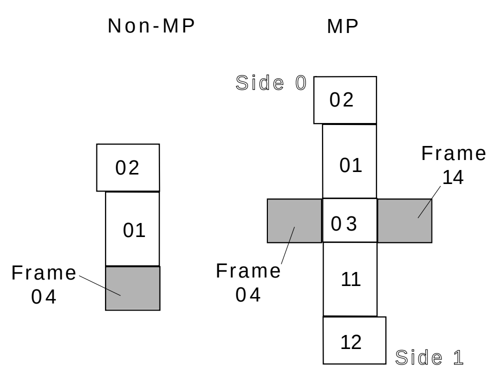


2. Within an OSA-1 frame, OSA-1s are populated in the OSA-1 cage in gate B first. If more OSA-1 features are to be installed than fit in the first cage, a second OSA-1 cage, which is ordered as a feature, must be installed in gate A.
3. The lowest group of four CHPIDs in gate A on either side of the processor is mutually exclusive for use by either OSA-1 cards or coupling links (coupling facility channels). These CHPIDs range from X'70' through X'73' on side 0 and from X'F0' through X'F3' on side 1.
4. Within an OSA-1 cage, OSA-1 cards are installed from right to left, or in descending CHPID order, when you view the card location label. This progression ensures that the CHPID ranges that overlap between OSA-1s and coupling links (coupling facility channels) are the last to be used.
5. The Base card of either a token ring OSA-1 or an Ethernet OSA-1 feature must be installed on an even CHPID boundary. (The Port card is installed in the next-higher slot, whose CHPID is therefore not used. In fact, it is covered with a blank label.) If a FDDI OSA-1 feature is installed on an even CHPID, the next higher odd CHPID can be used only for a one-card FDDI OSA-1. User's Guide and Reference, which is listed in the bibliography (page xviii).
6. If the number of channels on one side of a 9021 is increased to more than 64, some of the installed ESCON channels will be moved and their CHPIDs will be renumbered. If 64 or fewer channels are installed on a side, installing the first OSA-1 feature on that side will have a similar effect. The factors governing which ESCON channels will be moved are complex and discussed in Appendix F of the IOCP User's Guide and Reference, which is listed in the bibliography (page xviii).
7. If one side of a 9021 is fully loaded with 124 ESCON channels plus four coupling links, installing an OSA-1 cage in gate B causes the corresponding eight CHPIDs *and* the four next-lower CHPIDs to be assigned to OSA-1. These 12 CHPIDs can no longer be used for any other type of channel.
8. If one side of a 9021 is fully loaded with 128 ESCON channels:
   - Installing an OSA-1 cage in gate B causes the corresponding eight CHPIDs to be assigned to OSA. These CHPIDs can no longer be used for ESCON channels. In frame 13, for example, the OSA-1 cage in gate B causes CHPIDs X'78' through X'7F' to be assigned to OSA.
   - Installing an OSA-1 cage in gate A causes the remaining eight CHPIDs to be assigned to OSA-1. These CHPIDs can no longer be used for ESCON channels.

A.4.1.2 CHPID Assignments for OSA-1s in a 9121 Processor

As shown by the shading in the adjacent figure, an OSA-1 cage is installed in frame 04 in an ES/9000 9121 511-based non-MP model. In an ES/9000 511-based MP model, an OSA-1 cage can be installed in frame 04, in frame 14, or in both frames, depending on customer requirements.

The figure on page 260 shows that an OSA-1 cage is located in the middle section of a frame 04 or 14 in this processor. The OSA-1 tailgate assembly is installed below the OSA-1 cage, and the power and cooling fan are installed above it.



Although the OSA-1 cage assembly is very similar to the OSA-1 cage shown on page 256 for the ES/9000 9021 models, the CHPID ranges differ. Although there are no OSA-1 extender cards in an OSA-1 cage in this processor, other logic support cards are used in those slots.

Rules for OSA-1 CHPIDs in a 9121

1. A maximum of eight OSA-1 cards can be installed in an OSA-1 cage. The CHPIDs available in frame 04 on side 0 range from X'28' through X'2F'. Those in frame 14 on side 1 range from X'68' through X'6F'. The card locations labels for both frames are shown below.

GATE A BOARD A1 — P/N XXXXXXX

	A	B	C	D	E	F	G	H	J	K	L	M
CARD LOCATION	A	B	C	D	E	F	G	H	J	K	L	M
CHPID			28	29	2A	2B		2C	2D	2E	2F	

GATE A BOARD A1 — P/N XXXXXXX

	A	B	C	D	E	F	G	H	J	K	L	M
CARD LOCATION	A	B	C	D	E	F	G	H	J	K	L	M
CHPID			68	69	6A	6B		6C	6D	6E	6F	

2. Installing an OSA-1 cage causes the four lowest CHPIDs in that cage to be assigned to the OSA-1. These CHPIDs can no longer be used for any other type of channel.

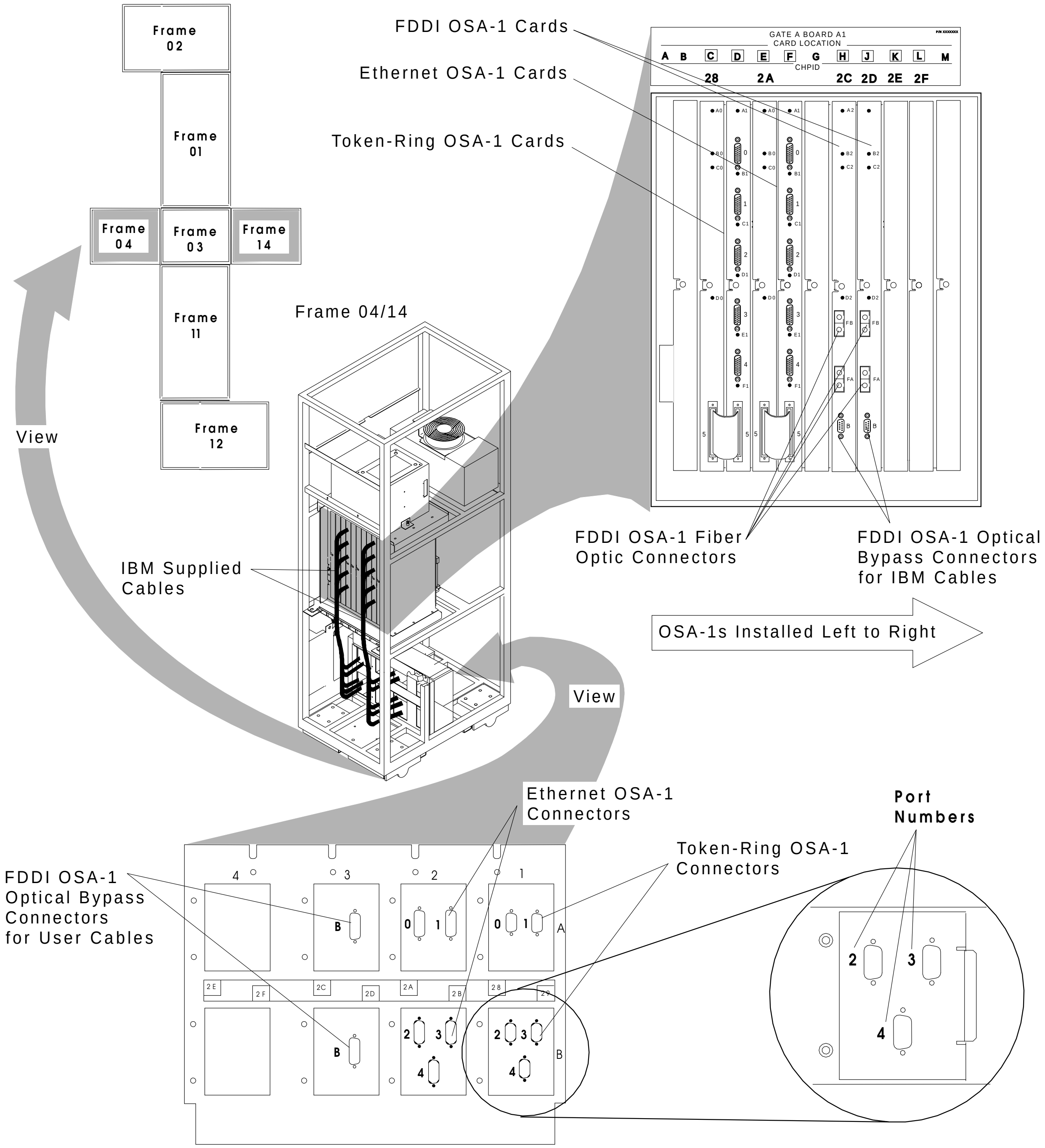
3. If an OSA-1 card is installed in the fifth available slot in an OSA-1 cage, the four highest CHPIDs in that cage are now assigned to OSA-1 and cannot be used for any other type of channel.

4. Within an OSA cage, OSA-1 cards are installed from left to right, or in ascending order, when you view the card location label. Population in this order can be done because there is no contention for CHPID assignments between OSA-1 features and coupling links (coupling facility channels) in an ES/9000 9121 processor.

5. The Base card of a token ring OSA-1 or an Ethernet OSA-1 is installed in a slot with an even CHPID. (The Port card is installed in the next-higher slot, whose CHPID is not used. In fact, the CHPID is covered with a blank label.) If a FDDI OSA-1 feature is installed on an even CHPID, the next higher, odd CHPID can only be used for another FDDI OSA-1.

An OSA-1 Frame in a 9121

The OSA-1 elements in an ES/9000 processor 9121 are shown in the following figure. Assume that the covers of frame 04 have already been removed by service personnel. The OSA-1 cage and its tailgate assembly are shown in two perspectives in this OSA-1 frame.

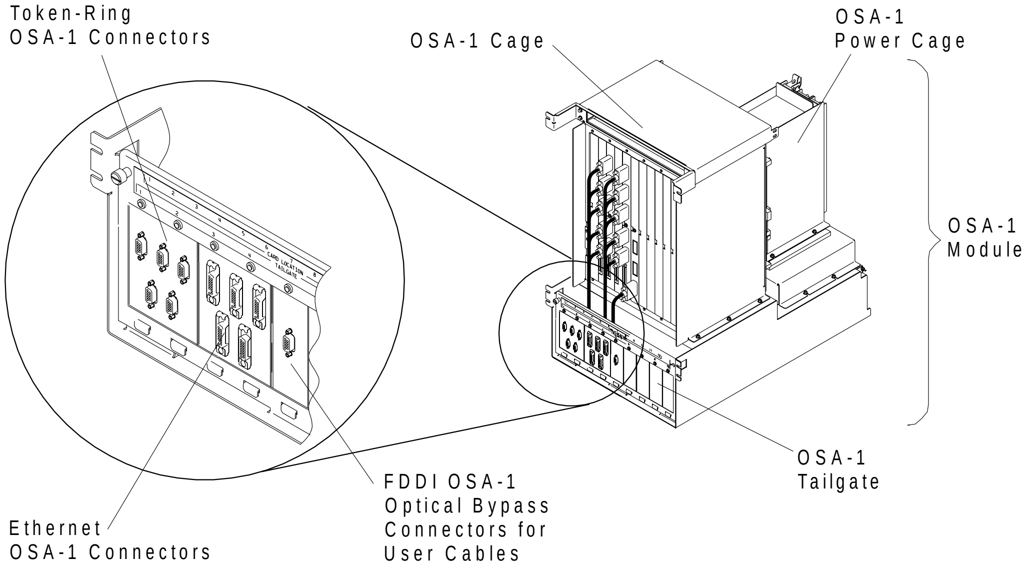


CHPID Assignments for OSA-1s in a 9672 Parallel Server: An OSA-1 feature can be installed in the E,P, and R models of a 9672 parallel server. The information in the following sections should help you to visualize the locations of OSA-1 features in a 9672 parallel server.

OSA-1 Locations in a 9672 Frame: Analogous to other hardware platforms, an OSA-1 feature is installed in an OSA-1 cage. However, an OSA-1 cage is only one of the components in an OSA-1 module, which is the OSA-1 unit installed in a 9672 parallel server.

An OSA-1 Module

An OSA-1 module has three components, which are shown in the following figure. The OSA-1 cage is shown with some OSA-1 cards installed. The power cage is located behind the OSA-1 cage, and the OSA-1 tailgate is located below the cage.



In those 9672 models (E01, P01, and R) that contain one CEC, only one OSA-1 module can be installed.

In those 9672 models (E02-E08, P02, P03) that can contain more than one CEC, up to two OSA-1 modules can be installed. Each OSA-1 module, however, has affinity for only one CEC.

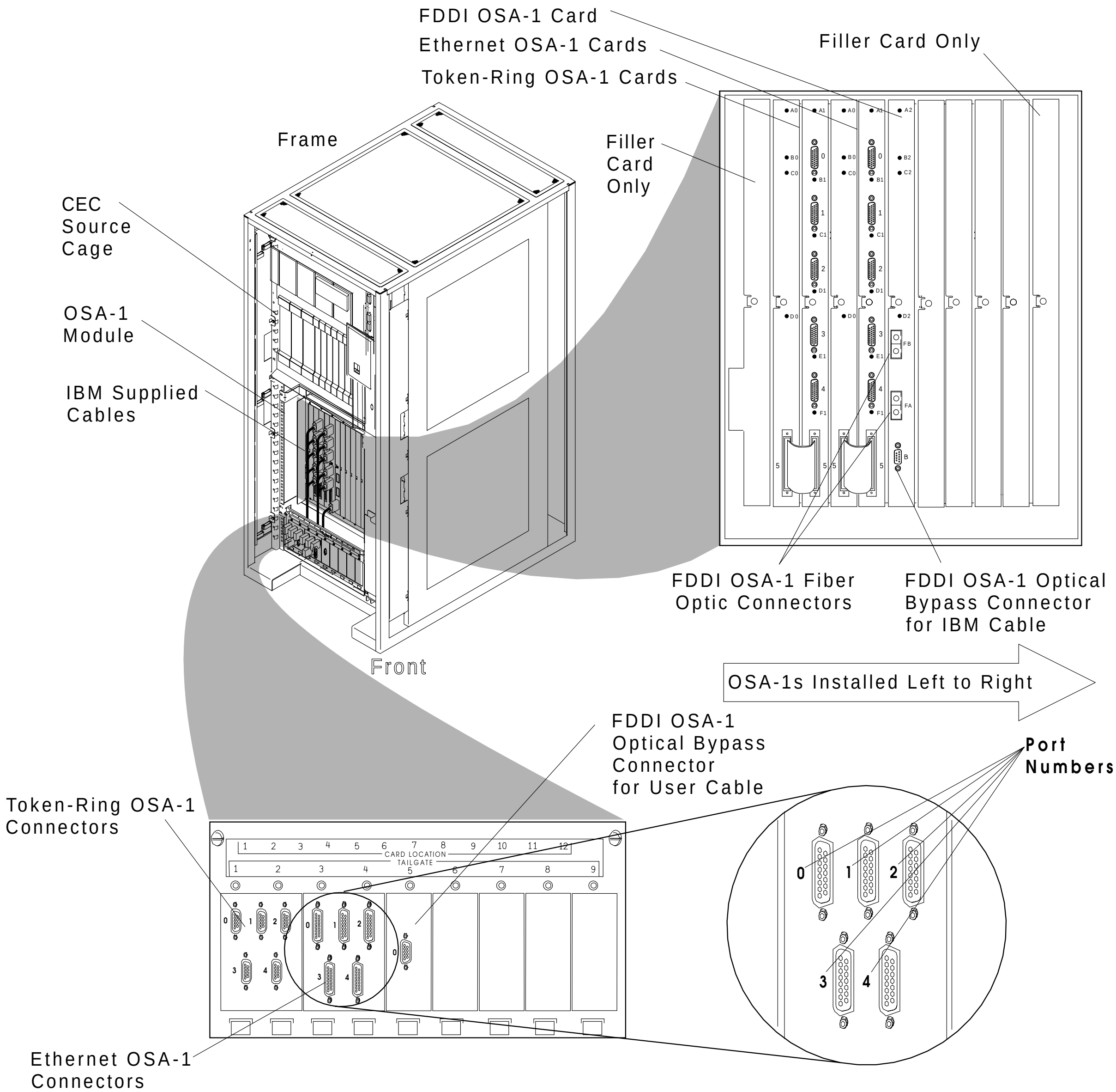
Source Cages for OSA-1 Modules: Each OSA-1 frame is driven by a *source cage,* which can be either a central electronics complex (CEC) cage or an I/O expansion (EXP) cage. For more information, refer to the 9672 Parallel Transaction Server and S/390 Parallel Enterprise Server books listed in the bibliography (page xviii).

Front View of a Frame with an OSA-1 Module

In the view shown below, the CEC cage, which is the source for the OSA-1 module shown, has been installed in the upper position of the frame of a 9672 E model. The OSA-1 module has been installed in the lower position of the frame. Assume that the covers of the frame have been removed by service personnel.

In the right upper quadrant of the figure: The front of the OSA-1 cage is brought forward so you can see the bezels of the OSA-1 cards that it contains.

In the lower part of the figure: You can see the front of the tailgate assembly of an OSA-1 module and the connectors for the user cables. The user cables are described for each OSA-1 feature on pages 253 (FDDI OSA-1) and 254 (token ring OSA-1 and Ethernet OSA-1).

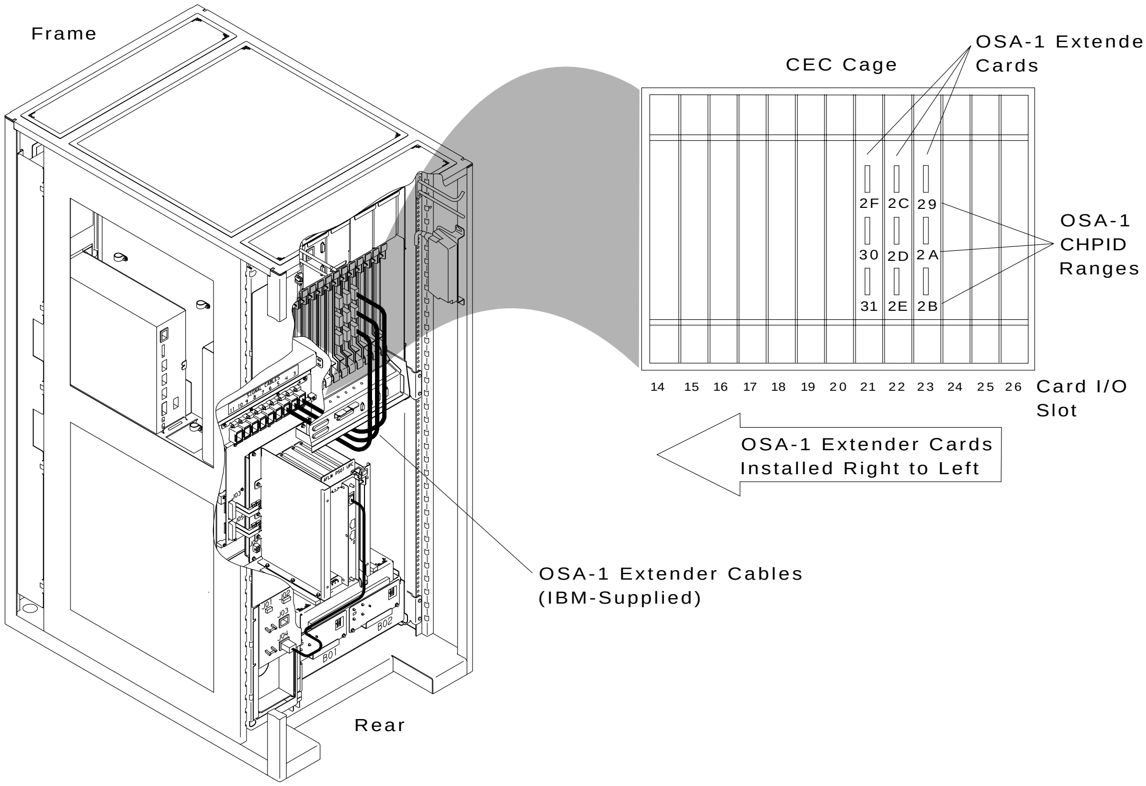


Rear View of a Frame with an OSA-1 Module

In this rear view of a 9672 frame in which an OSA-1 module has been installed, assume that the covers have been removed by service personnel.

Three I/O channel card slots in the CEC source cage in the upper: position contain the OSA-1 extender cards. In this example, the source is a CEC cage in a E01 model, so the OSA-1 extender cards are installed in card slots 21, 22, and 23. Each OSA-1 feature for this platform is shipped with an extender cable. These IBM-supplied OSA-1 extender cables connect the OSA-1 feature in the OSA-1 module with the OSA-1 extender card.

An OSA-1 module is installed in the lower position in the frame: Through an OSA-1 extender cable, each OSA-1 extender card provides the source for the three CHPIDs shown in the diagram.



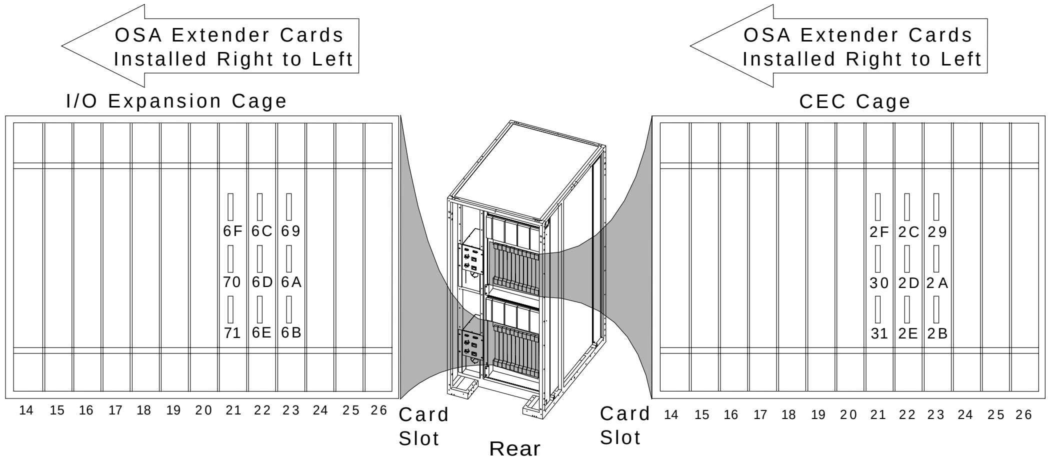
Rules for OSA-1 CHPID Assignments:

1. Up to nine OSA-1 cards can be installed in an OSA cage in contiguous positions. Sample configuration worksheets are provided in 2.4.
2. OSA-1 cards are populated in ascending CHPID order, thus from left to right when viewing the front of the OSA-1 cage.
3. A FDDI OSA-1 feature has only one card.
4. A token ring OSA-1 feature or an Ethernet OSA-1 feature each has two cards.
   - These two cards can be installed in any two adjacent slots in an OSA-1 cage.
   - Although the Base card is inserted in the lower-numbered CHPID slot and determines the CHPID of the OSA-1 feature, this CHPID does not need to be on an even-numbered boundary.
   - The Port card is inserted in the adjacent, higher-numbered slot to the right of the Base card. An installed Port card does not use a CHPID number, nor does it affect the CHPID of the next Base card or FDDI card that is installed.

Notes on a 9672 E, P, and R1 (Rx1) Model:

1. When an OSA-1 extender card is installed in the card slot of a CEC-source or EXP-source cage, three CHPIDs are available to the OSA-1 cage. Three OSA-1 extender cards are therefore needed to load all nine slots in the OSA-1 cage.
2. An OSA-1 extender card can be installed in slots 21, 22, and 23. The OSA-1 CHPID range for each of these slots is listed on the sample configuration worksheet in 2.4.
3. In the following figure, a CEC cage and an I/O expansion cage are shown in the upper and lower positions in a 9672 E, P, or R1 model. To avoid cluttering the figure, no OSA-1 modules are shown. An OSA-1 module can be located either above or below its source cage in the same 9672 frame. Or, an OSA-1 module can be located in an adjacent frame, in which case it must be positioned in a lateral

position relative to its source cage in the other frame. An OSA-1 module cannot be positioned in a diagonal position relative to its source cage.



9672 E, P, or R1 Model

Notes on a 9672 R2 (Rx2) Model:

1. Either the CEC or I/O expansion cage serves as the source cage for the OSA-1 cage. The CHPID ranges do not depend on the type of cage that serves as the source cage.
2. Up to three consecutive CHPIDs can be controlled by one OSA-1 extender card.
3. An OSA-1 extender card can be installed in slots 26, 27, and 28. The OSA-1 CHPID range for each of these slots is listed in the configuration worksheets that start on page 21.
4. To find the CHPID location of a particular OSA-1 feature, refer to the CHPID report that is provided by your account team.

Notes on a 9672 R3 (Rx3) Model:

1. Only an I/O expansion cage serves as a source cage for an OSA-1 cage.
2. Up to three consecutive CHPIDs can be controlled by one OSA-1 extender card.
3. An OSA-1 extender card can be installed in slots 26, 27, and 28. The OSA-1 CHPID ranges for each of these slots are listed in 2.4.
4. To find the CHPID location of a particular OSA-1 feature, refer to the CHPID report that is provided by your account team.

LANRES/MVS Modes: Because only an OSA-1 can be run in the LANRES/MVS modes, that information is provided here. These modes are available in an OS/390 or MVS/ESA environment. For complete information on LANRES/MVS, see the books listed in the bibliography (page xviii).

A List of the OSA LANRES/MVS Mode Identifiers:

OSA-Related Identifiers (Below)	LANRES/MVS Statements	OSA/SF GUI (Page 270)	Subchannel OAT Entry (Page 276)	Hardware I/O Configuration (Page 271)
1 Logical partition LP name LP number	 N/A N/A	 N/A N/A	 OSA/SF User	 User User
2 Channel path	N/A	N/A	OSA/SF	User
3 Control unit number	N/A	N/A	OSA/SF	User
4 Device number (same as device address)	User	N/A	User	User
5 6 7 Unit addresses	N/A	User	User	User
E Frame type	N/A	User	N/A	N/A
N Network Number	N/A	User	N/A	N/A
P Port number	User	User	User	N/A
R RCONSOLE password	N/A	User	N/A	N/A

Ports, Devices, and the LANRES/MVS Modes: For LANRES/MVS Clients, the OSA-1 LANRES/MVS Mode Is Available In this mode, the IPX LAN clients using NetWare for Systems Application Architecture (NetWare for SAA) have VTAM services available in either an OS/390 or MVS/ESA environment. (This mode requires that LANRES/MVS be installed on the system, but not necessarily active.) For the LANRES/MVS mode, you need to define the OSA-1 in the system hardware I/O configuration, to LANRES/MVS, and to OSA/SF. This mode gives NetWare clients the services provided by the LAN Resource and Extension Services/MVS in an OS/390 or an MVS/ESA environment.

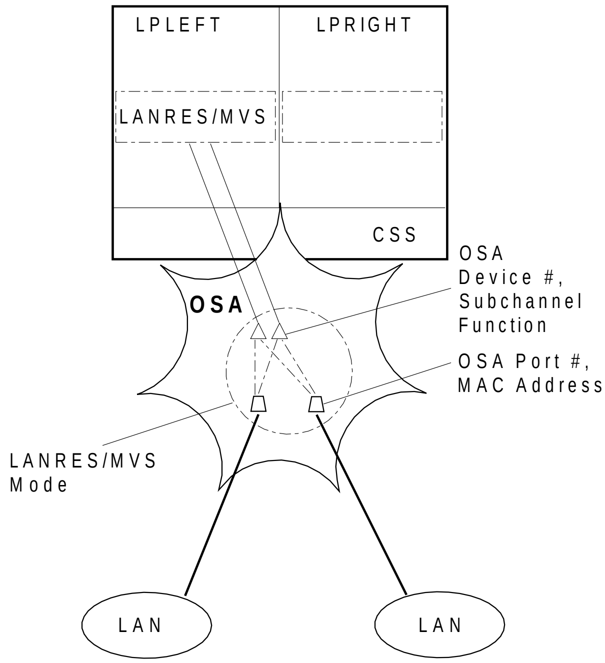
For LAN-based clients using the Internet Packet Exchange (IPX) protocol, an OSA-1 offers both an IPX gateway to the functions of the Advanced Communications Function for Virtual Telecommunications Access Method (ACF/VTAM) and the direct services of the LAN Resource and Services/MVS (LANRES/MVS).

An OSA correlates these device numbers indirectly. Therefore, you do not define the port number as well. You must, however, define an additional pair of read/write device numbers for communication between the OSA and its OSA-1 disk server, which is the system VSAM linear dataset that holds the NetWare SYS: volume. (An OSA keeps the SYS: volume there since it cannot read diskettes.)

LAN clients using the IPX network protocol can use the functions, or sessions, of LANRES/MVS through an OSA-1 in an OS/390 or MVS/ESA environment. This allows LAN clients using the IPX network protocol to take advantage of the different sessions that LANRES/MVS offers (page 267).

To support these sessions, or subchannel functions, an OSA needs one pair of devices for each session. OSA correlates these device numbers with the ports through which data will be transferred in these modes of operation.

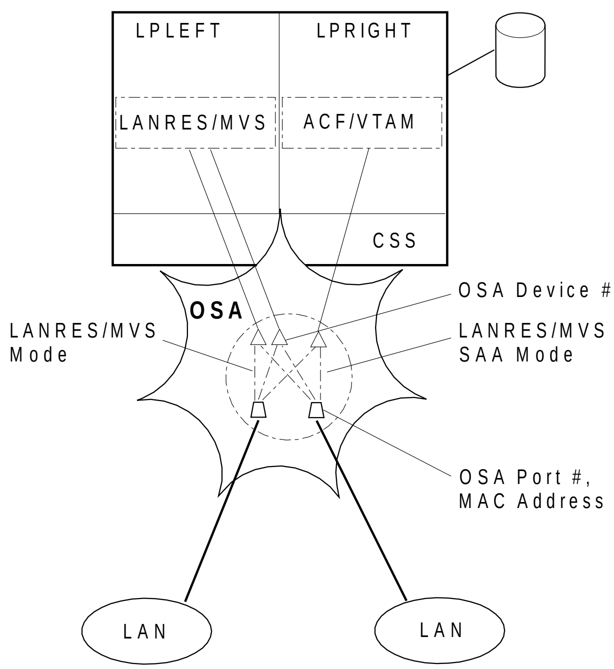
In the adjacent figure, LANRES/MVS is shown in only one partition to simplify the figure. Actually, an OSA can transfer data to and from LANRES/MVS in any number of the partitions to which the OSA has been defined.



LAN clients using the NetWare for Systems Application Architecture (NetWare for SAA) have the services of ACF/VTAM available to them.

In the adjacent figure, NetWare for SAA clients are using VTAM applications and functions in the LPRIGHT partition, while LANRES/MVS is available in LPLEFT. (LANRES/MVS must be installed, but not necessarily in the same partition as the VTAM with which the OSA is communicating in the LANRES/MVS SAA mode.)

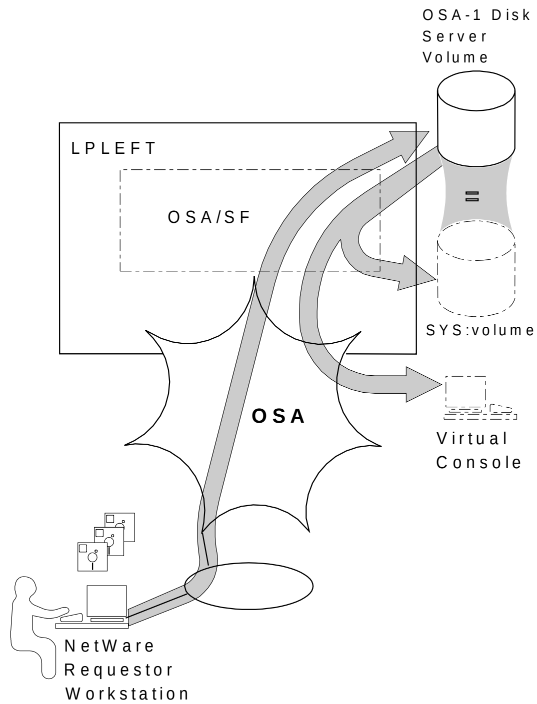
An OSA can transfer data between NetWare for SAA clients on a LAN and VTAM in the host in only one of the partitions to which the OSA has been defined. To do so, the OSA needs one device number for each NetWare for SAA subchannel function.



General Flow of the LANRES/MVS Modes:

Only an OSA-1 can operate in the two OSA modes that support NetWare LAN-based clients that use the IPX network protocol. Both the LANRES/MVS and LANRES/MVS SAA modes are available in either an OS/390 or MVS/ESA environment.

As the adjacent figure shows, OSA/SF's customization of these modes causes an OSA-1 to become the NetWare server. The OSA-1 disk server data set is equated with the NetWare SYS volume. A standard NetWare requestor workstation can login to the OSA-1 NetWare server and continue to install the license copy of SERVER.EXE, system files, and public files, using the RCONSOLE facility.

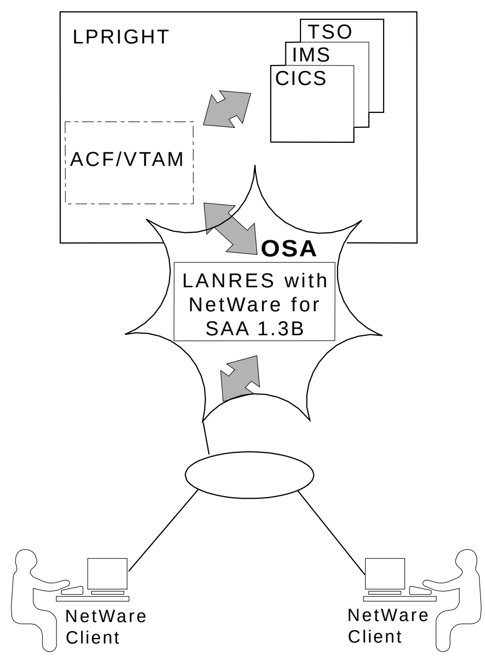


The LANRES/MVS SAA Mode:

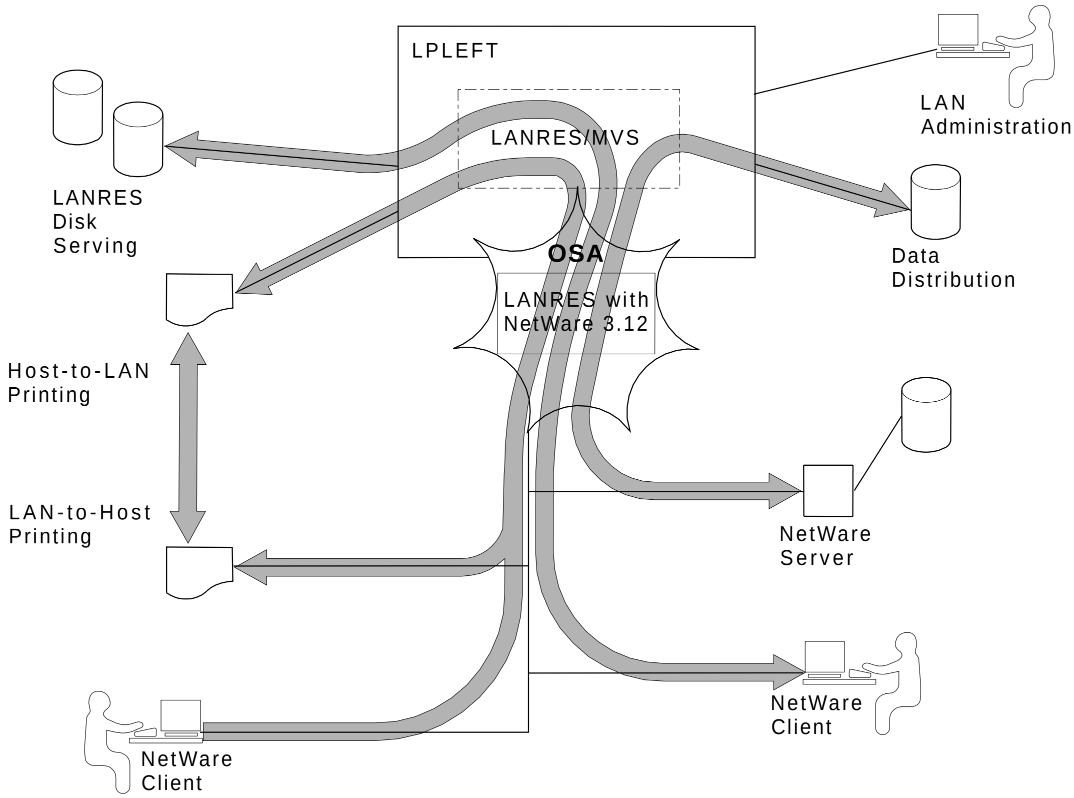
The LANRES/MVS SAA mode supports the NetWare for Systems Application Architecture (NetWare for SAA) program, giving NetWare clients access to S/390 host applications that use ACF/VTAM in an OS/390 or MVS/ESA environment.

A set of NetWare loadable modules (NLMs), which are downloaded on the OSA-1 when the LANRES/MVS SAA mode is active, allow the OSA to provide this direct access to LAN clients. In this mode, an OSA-1 can communicate with VTAM in only one of the partitions to which it has been defined.

LANRES/MVS must be installed on the system, but does not need to be active when this mode is active. The LANRES/MVS SAA mode can be active on an OSA-1 concurrently with the TCP/IP Passthru mode, the LANRES/MVS mode, or both modes.



The LANRES/MVS Mode:

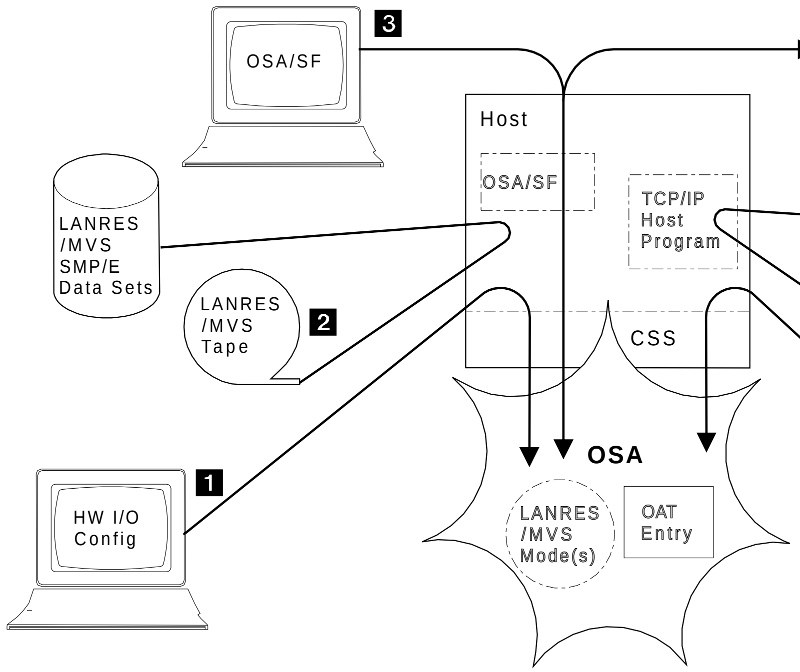


The LANRES/MVS mode gives NetWare clients the services provided by the LAN Resource and Extension Services/MVS. As shown in the figure, an OSA-1 gives these clients direct access to S/390 disk storage, system printers, and other centralized services. The LANRES/MVS mode can be active on an OSA-1 concurrently with the LANRES/MVS SAA mode, with the TCP/IP Passthru mode, or with both of these modes.

An OSA-1 can communicate with LANRES/MVS in any of the partitions in which OS/390 or MVS/ESA is running and to which the OSA-1 has been defined under OSA/SF management. To simplify the figure, only one partition is shown. The LANRES/MVS sessions are represented:

- On the left, you see that the LANRES/MVS disk serving functions makes S/390 disks available to NetWare LAN clients
- Below the disk serving, the flexibility of printers is shown schematically. Printing can be done at either a S/390 printer or a printer on the LAN.
- On the right, you see that the LAN can be administered from a central focal point through the LAN administration session.
- Below on the right, you see that data can be distributed from a central system data set to a disk on the LAN. Data can, of course, also be distributed to the S/390 disk on the right to which LAN clients have access.

Customizing an OSA-1 for the LANRES/MVS Modes: Only an OSA-1 can operate in the LANRES/MVS modes, which are supported by the OS/390 and MVS/ESA host operating system.



1 Using a suitable program hardware I/O configuration program, such as HCD, IOCP, etc., define one read/write pair of device numbers for each OSA port in each partition in which the OSA will be running in this mode (page 271).

2 Install these modes from the LAN Resource Extension and Services/MVS installation tape using SMP/E.

3 Using OSA/SF GUI, customize the OSA-1 feature by entering values in the panels shown on the following pages.

4 Identify the OSA in the LANRES/MVS macros. Although this task falls outside the scope of this book, some examples and an introductory discussion are provided in "LANRES/MVS Modes" on page 265.

5 To activate an OSA mode, the OSA channel and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA feature must be reset.)

Devices for the Two LANRES/MVS Modes (IODEVICE=): Take these considerations into account.

- Only an OSA-1 can operate in either of the LANRES/MVS modes, which are supported by the OS/390 and MVS/ESA system levels that OSA-1 supports. An OSA-2 cannot operate in these modes. For an introduction to these modes, see the topics that start on page 266.
- For each OSA-1 to be configured in either the LANRES/MVS or LANRES/MVS SAA mode, specify one even/odd pair of devices with UNIT=OSA and the unit address pair of `X'FC'` and `X'FD'`. This read/write pair of device numbers is needed so that the OSA-1 can read from, and write to, its disk server, which is a predefined MVS/ESA VSAM linear data set.
- For each LANRES/MVS session, or subchannel function:
  - LANRES/MVS mode, specify one even/odd read/write pair of user device numbers for each logical partition if the system is running in logically-partitioned mode, or for the system if the system is in base mode.

– LANRES/MVS SAA mode, specify one device number for the one logical partition (or base system) in which this mode can run.

- Specify a unit address in the range from `X'00'` through `X'DB'`. (Remember that an even/odd pair of unit addresses is required for the LANRES/MVS mode.)
- The OSA/SF default number of sessions is 16 (page 271), but you can specify a number from 1 through 65 535.
- A device number is also called a subchannel address in this context.

For the LANRES/MVS Mode, Specify These Devices:

x user device numbers, where *x* is twice the sum of the functions.

Specify the device numbers in even/odd pairs. Note that some functions can be shared among partitions; others cannot. For more information, see *LAN Resource and Extension Services/MVS Guide and Reference* (page xviii).
For example, assume that you want to specify the following functions concurrently:

3 subchannel pairs for the administration function (2 TSO user IDs and 1 batch machine)
5 subchannel pairs for the distribution functions (4 TSO user IDs and 1 batch machine)
5 subchannel pairs for print servers (2 host-to-LAN and 3 LAN-to-host)
8 subchannel pairs for the LANRES/MVS disk servers
x = 42 device numbers for the 21 subchannel functions in this example.

For the LANRES/MVS SAA Mode, Specify These Devices:

1 device number for the service profile that has EWXSLA1 specified in the Logical Adapter Name field in the host program.

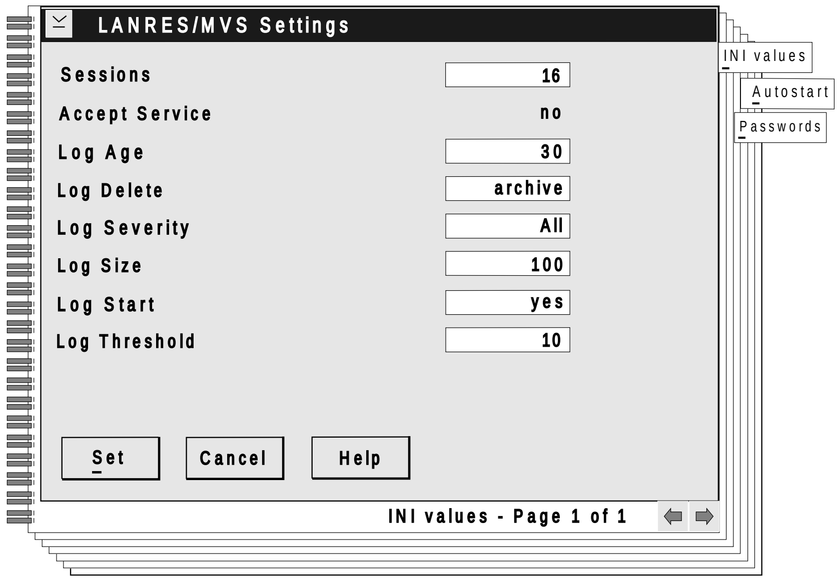
If both PU type 2 and PU type 2.1 are running through the EWSXLA channel driver program, also specify:

1 device number for the address that has EWXSLA2 specified in the Logical Adapter Name field in the host program.

Create the Subchannel OAT Entries and Files: Each entry contains a base segment and an extension. The format of the base segment is common to all entries. The Subchannel extension with a group size =1 is used for the LANRES/MVS modes.

User Input for LANRES/MVS Files: Several OSA/SF configuration panels are needed for the LANRES/MVS modes. The LANRES/MVS SAA mode requires only a small amount of user input on one of these panels. Each panel is described in a section with its output file. The OAT entries, which are called subchannel entries, are described separately on page 276. For more information, refer to the LANRES/MVS books listed in the bibliography (page xviii).

For the LANRES/MVS EWXCOMM.INI File: After you enter values for the parameters displayed on the following panel, OSA/SF puts them in the EWXCOMM.INI file. Note that Accept Service is always No and is not settable through user input.



Sessions

Accept the default of 16 or specify a number from 1 through 65 535 to satisfy all your requirements for MVS/ESA connections that will be concurrently active.

- Each active MVS connection uses one session, so specify a number that is not less than the total number of sessions you specify on the other panels.
- There are five types of sessions, or subchannel functions: administrative sessions, disk sessions, distribution sessions, host-to-LAN print sessions, and LAN-to-host print sessions.
- For each LANRES/MVS session, or subchannel function, you will be asked on subsequent notebook pages to specify an LP number and the even unit address of a unique unit-address pair.
- For the LANRES/MVS modes, you cannot specify the same pair of unit addresses across logical partitions.

Log Start

Accept the default of Yes to record the messages issued by the LANRES/MVS NLMs, specify No, or leave the field blank. If you specify No or leave the field blank, no messages are recorded and none of the following parameters takes effect.

Log Age

Accept the default of 30 or specify 0–365 for the number of days you want a log file kept after its last modification date. 0 means that the log will be deleted at midnight of that date. Or, accept the default of 30 days.

Log Delete

Accept Archive (to archive) or specify either Yes (to delete) or No (to neither delete nor achieve) the current log file at midnight.

Log Severity

Accept the default value of All if you want messages with any level of severity (Informational, Warning, Error, or Severe), to be recorded in the current log file. Specify Warning to get all messages except the informational ones, Error to get error and severe error messages, and Severe to get only severe messages. In the EWXCOMM.INI file, log severity is designated by return code values, not characters. For example, All is listed as 0 (zero).

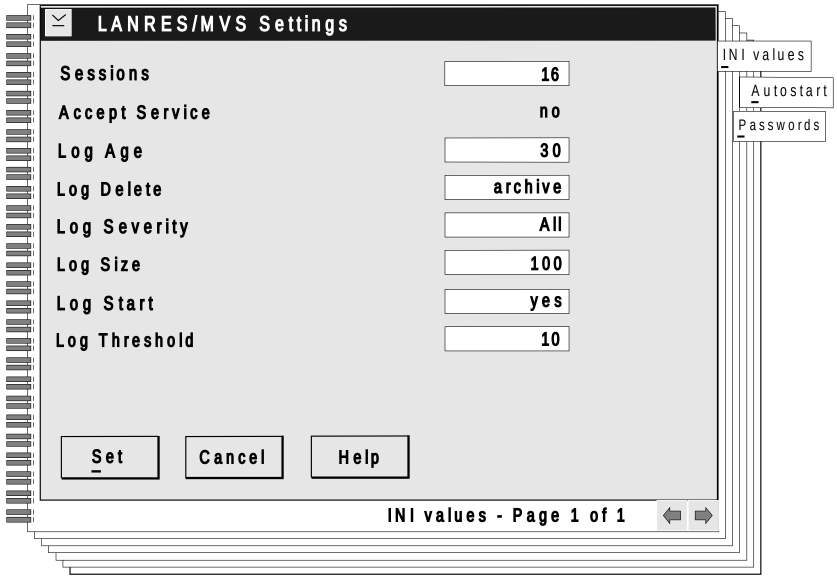
Log Size

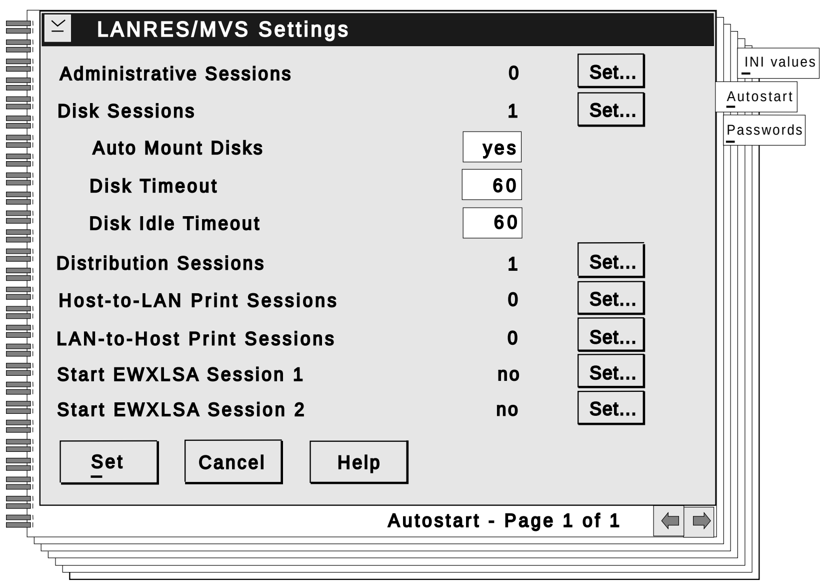
Accept the default of 100 to limit the size of the current log file to 100 kilobytes (KB), or specify a KB limit from 1 through 1 000 000 (decimal), or specify Nolimit for no limit.

Log Threshold

Accept the default of 10 if you want a warning message issued when the log file is 90% full, or specify an integer from 0 through 99 for percentage of *empty* space left in the log when a warning message is issued.

For the LANRES/MVS Autostart:





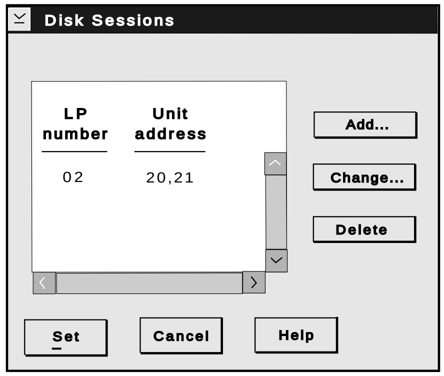
Administrative Sessions

is zero in this example. If you specify a session, you must also specify the LP number and unit address on the Administrative Sessions panel.

Disk Sessions

is 1 in the preceding figure and its panel is now shown.

- Enter a valid logical partition (LP) number if the system is in logically-partitioned (LPAR) mode and the OSA channel is defined as shared. Otherwise, enter a 0 (page 22).
- Enter the even unit address for the pair of unit addresses to be associated with this disk session and LP number. Note that the same pair of unit addresses cannot be specified across logical partitions.



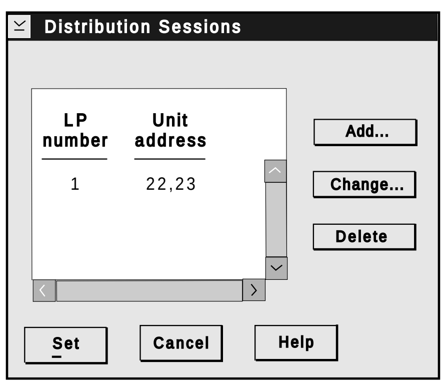
Auto Mount Disks
Specify Yes if you want the LANRES disk volumes to be mounted (accessed) automatically as they are needed. Specify No if you want these disk volumes to be mounted (accessed) manually.

Disk Timeout
Accept the default of 60 or specify a decimal value from 1 through 3600. This parameter specifies the maximum number of seconds that a disk drive waits for a reply from the host.

Disk Idle Timeout
Accept the default of 60 or specify a decimal value from 1 through 3600. This parameter specifies the maximum number of seconds that no communications can take place between the host and OSA on which the NetWare server is located. If this idle timeout is exceeded, a handshake is sent to the host LANRES/MVS program.

Distributions Sessions
is 1 in this example.

- Enter a valid LP number if the OSA channel path has been defined to be shared. Otherwise, enter an LP number of 0.
- Enter the even unit address for the pair of unit addresses to be associated with this disk session and LP number. Note that the same pair of unit addresses cannot be specified across logical partitions.



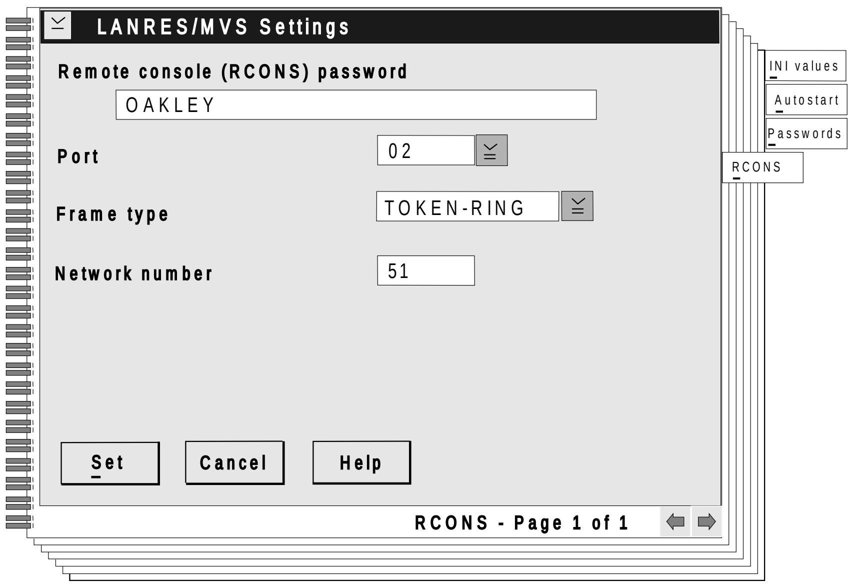
Host-to-LAN Print Sessions
is 0 (zero) in this example. If you specify this session, specify the following parameters on the Host-to-LAN Sessions panel: LP number, which is a valid number if the OSA is shared and 0 otherwise, unit address, Host-to-LAN Query time, buffers, and processes.

LAN-to-host Print Sessions
is 0 (zero) in this example. If you specify this session, enter the LP number, which is a valid number if OSA is shared and 0 otherwise, and the unit address on the LAN-to-Host Sessions panel.

Start EWXLSA Session 1
is No in this example. If Yes, specify the parameters on the Start EWXLSA Session 1 panel.

Start EWXLSA Session 2
is No in this example. If Yes, specify the parameters on the Start EWXLSA Session 2 panel.

For the Remote Console (RCONS) Utility:



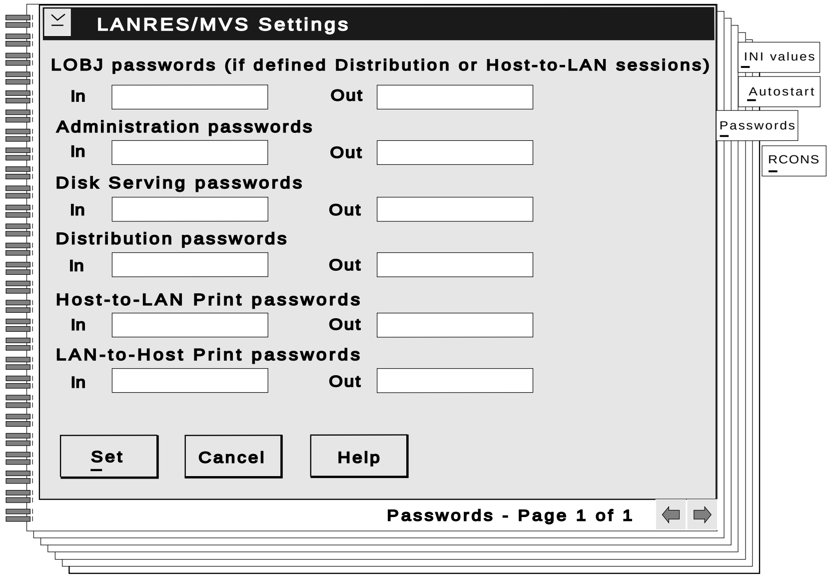
RCONS password
requires from 1 through 47 alphanumeric characters.

P **Port**
number is 02 in this example and is the port used by the client that has the remote console running.

E **Frame type,**
which is also called LAN network protocol, is one of the LAN frame protocols supported by OSA.

N **Network number**
requires a number in hexadecimal notation from 1 through 8 digits.

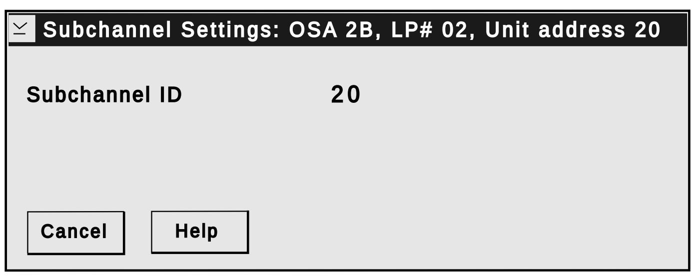
For the LANRES/MVS Passwords:



See the LANRES/MVS books, which are listed in the bibliography (page xviii), for information on these passwords.

OSA/SF Output for the LANRES/MVS Modes:

- An OAT subchannel entry for each user device number. Each entry consists of a base segment, which is common to all entry types and shown on page 7, and an extension. The subchannel extension resulting from the input on the preceding pages is shown here. The subchannel ID equates to the unit address of the device number that is used for this LANRES/MVS session. An OSA/SF user ID can view OAT entries.



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