PA-F/FD-SM and PA-F/FD-MM Full-Duplex FDDI Port Adapter Installation and Configuration

Product Numbers: PA-F/FD-SM(=), PA-F/FD-MM(=), and CAB-FMDD(=)
Platforms Supported: Cisco 7200 Series, VIP in the Cisco 7000 Series and Cisco 7500 Series, Catalyst RSM/VIP2 in the Catalyst 5000 Family Switches

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PA-F/FD-SM and PA-F/FD-MM Full-Duplex FDDI Port Adapter Installation and Configuration

CONTENTS

Preface

This preface explains the objectives and organization of this document and explains how to find additional information on related products and services. This preface contains the following sections:

Objectives

This document describes how to install and configure the PA-F/FD-SM and PA-F/FD-MM full-duplex Fiber Distributed Data Interface (FDDI) port adapters, hereafter referred to as the PA-F/FD, which can be used in the following platforms:

- Versatile Interface Processor (VIP) in all Cisco 7500 series routers and in Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)
- Catalyst Route Switch Module (RSM)/VIP2 in the Catalyst 5000 family switches
- Cisco 7200 series routers—which consist of the two-slot Cisco 7202, the four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and Cisco 7206VXR

Note The PA-F/FD-SM and PA-F/FD-MM are not supported in Cisco 7200 VXR routers.

For complete descriptions of interface subcommands and the configuration options available for interfaces, and which ones support PA-F/FD functionality, refer to the appropriate software configuration publication listed in the "Related Documentation" section on page vi.

Note The Cisco 7206 can be used as a router shelf in a Cisco AS5800 Universal Access Server. The steps for installing and configuring a port adapter or service adapter in a Cisco 7200 series router and a Cisco 7206 router shelf are the same; therefore, the procedures in this document that reference the Cisco 7200 series also apply to the Cisco 7206 router shelf, unless noted otherwise.

Organization

This document is organized into the following sections:

Section	Title	Description
Chapter 1	Overview	Describes the PA-F/FD and describes its LEDs, cables, and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform before the actual installation.
Chapter 3	Removing and Installing Port Adapters	Provides instructions for installing the PA-F/FD.
Chapter 4	Attaching the PA-F/FD Port Adapter Cables	Provides instructions for installing port adapter cables on the supported platforms.
Chapter 5	Configuring the PA-F/FD	Provides instructions for configuring your port adapter on the supported platforms.

Related Documentation

Your router and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- For Cisco IOS software configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

  Note You can access Cisco IOS software configuration and hardware installation and maintenance documentation on the World Wide Web at http://www.cisco.com, http://www-china.cisco.com, or http://www-europe.cisco.com.

- For hardware installation and maintenance information and software configuration information on the Cisco AS5800 Universal Access Server, refer to the following publications:
  - Cisco AS5800 Universal Access Server Hardware Installation and Configuration Guide
  - Cisco AS5800 Universal Access Server Software Installation and Configuration Guide
- For hardware installation and maintenance information on Cisco 7000 series and Cisco 7500 series routers, and the VIP, refer to the following publications:
  - The installation and configuration guide that shipped with your Cisco 7000 series or Cisco 7500 series router
  - *Second-Generation Versatile Interface Processor (VIP2) Installation, Configuration and Maintenance*
  - *Fourth-Generation Versatile Interface Processor (VIP4) Installation, Configuration and Maintenance*
  - *Versatile Interface Processor (VIP6-80) Installation and Configuration*

- For hardware installation and maintenance information on the Catalyst 5000 family switches, and the Catalyst RSM/VIP2, refer to the following publications:
  - The installation and configuration guide that shipped with your Catalyst 5000 family switch
  - *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note* (Document Number 78-4780-01) which shipped with your Catalyst RSM/VIP2.
- For hardware installation and maintenance information on Cisco 7200 series routers, refer to the *Cisco 72xx Installation and Configuration Guide* publication that shipped with your router.
- For port adapter hardware and memory configuration guidelines for Cisco 7200 series routers (including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server), refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
- For hardware installation and maintenance information on Cisco 7200 VXR routers, refer to the *Cisco 7200 VXR Installation and Configuration Guide* publication that shipped with your Cisco 7200 VXR router.
- For international agency compliance, safety, and statutory information for interfaces for the Cisco AS5800 Universal Access Server, Cisco 7000 series routers, Cisco 7200 series routers, and Cisco 7500 series routers, refer to the following publications:
  - Cisco AS5800 Universal Access Server Regulatory Compliance and Safety Information.
  - Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers
  - Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers
  - Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers

Note The regulatory and safety information documentation listed above applies to the Catalyst 5000 family switches and the Catalyst RSM/VIP2.

- To view Cisco documentation or obtain general information about the documentation, see the "Obtaining Documentation" section on page vii, the "Obtaining Technical Assistance" section on page viii, or call customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding company holidays). You can also send e-mail to cs-rep@cisco.com, or refer to the *Cisco Information Packet* that shipped with your router.

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

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Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

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- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

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- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

http://www.cisco.com/register/

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Overview

This chapter describes the PA-F/FD-SM and PA-F/FD-MM full-duplex FDDI port adapters and contains the following sections:

Port Adapter Overview

The PA-F/FD port adapters provide a full-duplex FDDI interface for both single-mode and multimode fiber-optic cable. The two physical ports (PHY A and PHY B) are available with either single-mode (SC) or multimode media interface connector (MIC) receptacles. Each FDDI connection allows a maximum bandwidth of 100 Mbps, per the FDDI standard for half-duplex operation, and 200-Mbps aggregate bandwidth with full-duplex operation enabled.

The following FDDI port adapter combinations are available:

- PA-F/FD-MM—FDDI PHY-A multimode, PHY-B multimode port adapter with optical bypass switch capability and full-duplex capability (see)
- PA-F/FD-SM—FDDI PHY-A single-mode, PHY-B single-mode port adapter with optical bypass switch capability and full-duplex capability (see)

Figure 1-1 PA-F/FD-MM Faceplate

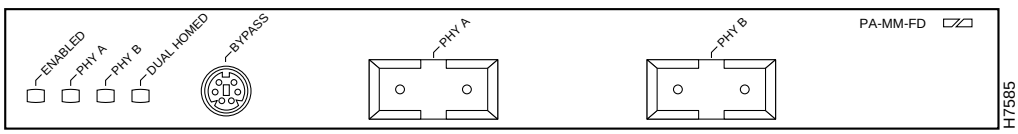
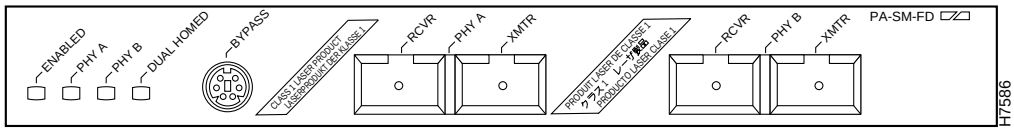


Figure 1-2 PA-F/FD-SM Faceplate



Warning **Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures*.**

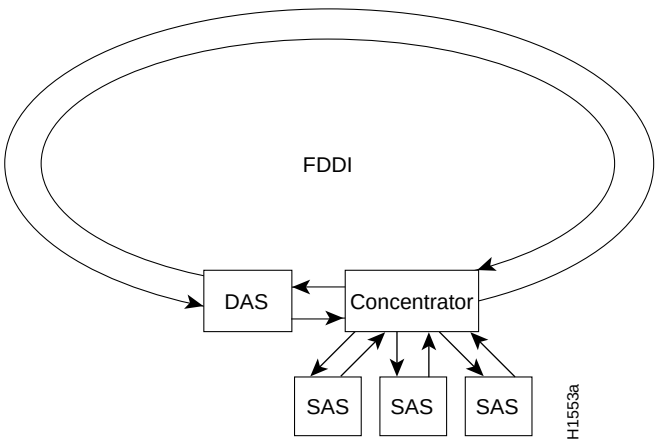
FDDI Overview

FDDI, which specifies a 100-Mbps, wire-speed, token-passing dual-ring network using fiber-optic transmission media, is defined by the ANSI X3.1 standard and by ISO 9314, the international version of the ANSI standard. A FDDI network comprises two token-passing fiber-optic rings: a primary ring and a secondary ring.

A *ring* consists of two or more point-to-point connections between adjacent stations. On most networks, the primary ring is used for data communication, and the secondary ring is used as a backup. Single attachment stations (SASs) attach to one ring and are typically attached through a concentrator; Class A, or dual attachment stations (DASs), attach to both rings.

shows a typical FDDI configuration with both dual-attached and single-attached connections. SASs typically attach to the primary ring through a concentrator, which provides connections for multiple single-attached devices. The concentrator ensures that a failure or power down of any SAS does not interrupt the ring. SAS use one transmit port and one receive port to attach to the single ring. DASs (Class A) have two physical ports, designated PHY A and PHY B, each of which connects the station to both the primary and the secondary rings. Each port is a receiver for one ring and a transmitter for the other. For example, PHY A receives traffic from the primary ring, and PHY B transmits to it.

Figure 1-3 Typical Configuration with DAS, Concentrator, and SASs

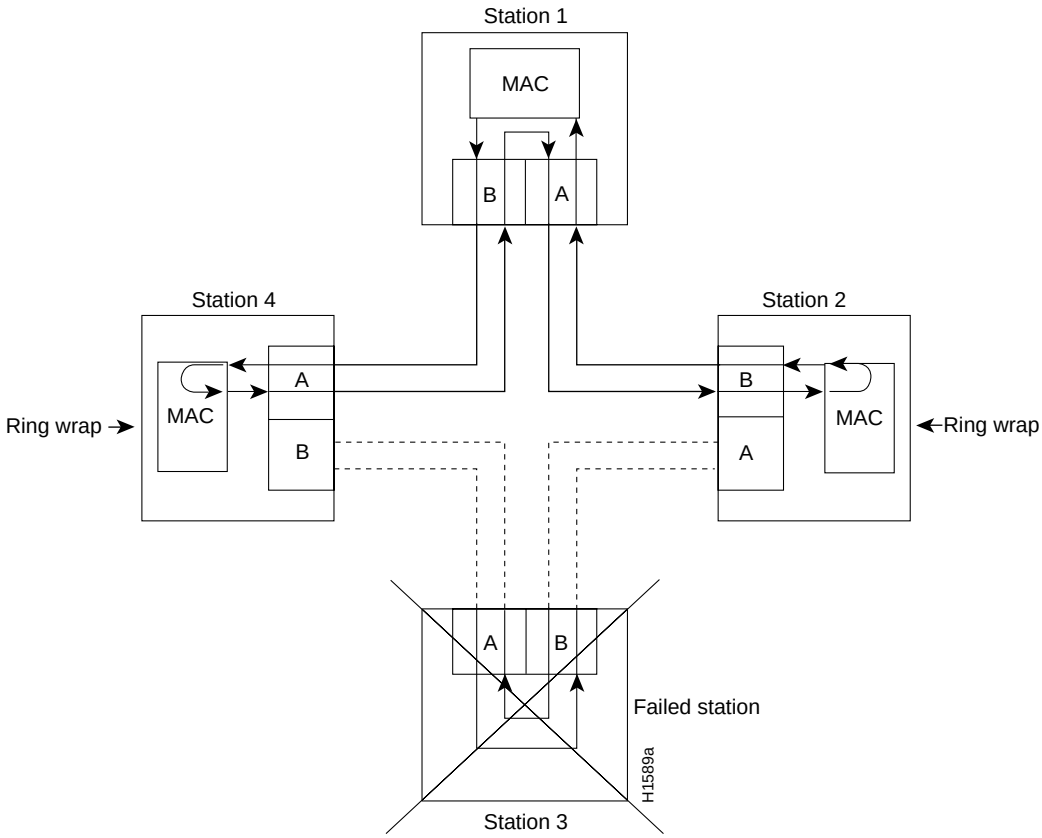


The dual rings in a FDDI network provide fault tolerance. If a station on a dual ring shuts down or fails, such as Station 3 in , the ring automatically wraps (doubles back on itself) to form a single contiguous ring. This removes the failed station from the ring, but allows the other stations to continue operation.

In , the ring wraps to eliminate Station 3 and forms a smaller ring that includes only Stations 1, 2, and 4. A second failure could cause the ring to wrap in both directions from the point of failure, which would segment the ring into two separate rings that could not communicate with each other.

For example, if Station 1 in fails after Station 3 fails, Stations 2 and 4 will each be isolated because no path for communication exists between them. Subsequent failures cause additional segmentation.

Figure 1-4 DAS Station Failure and Ring Recovery Example



Optical Bypass Switch Overview

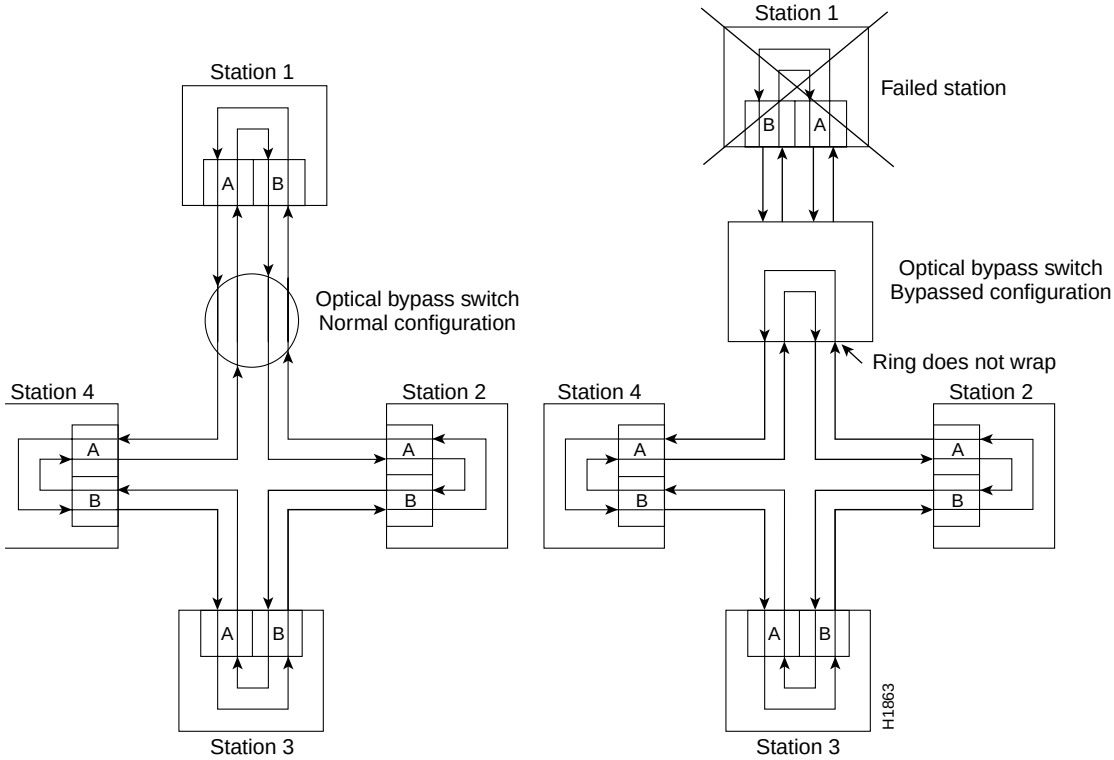
Optical bypass switching avoids segmentation by eliminating failed stations from a ring. An optical bypass switch allows the light signal to pass directly through it, completely bypassing the failed or shutdown station.

Note For example, if an optical bypass switch had been installed at Station 3 in the sample ring in , it would have allowed the light signal to pass through the switch and maintain its existing path and direction without wrapping back on itself.

The FDDI port adapters have an optical bypass switch feature by way of a DIN connection. During normal operation, an optical bypass switch allows the light signal to pass uninterrupted directly through itself. When a station with a bypass switch fails, the bypass switch reroutes the signal back onto the ring before it reaches the failed station, so the ring does not have to wrap back on itself.

shows an optical bypass switch installed at Station 1. In the normal configuration shown, Station 1 is functioning normally, so the optical bypass switch appears transparent. The switch essentially allows the signals to pass through it without interruption. However, if Station 1 fails, the optical bypass switch enables the bypassed configuration shown on the right in .

Figure 1-5 Optical Bypass Operation on a DAS



The optical bypass switch reroutes the light signal by intercepting it before it reaches the failed Station 1 and sends it back out to the ring. This rerouting allows the signal to maintain its existing path and direction without wrapping back on itself. However, stations that are operating normally repeat the signal when sending it back out to the ring. Optical bypass switches do not repeat or drive the signal (they just allow the signal to pass through them), so significant signal loss can occur when the downstream neighbor (the next station on the ring) is far away.

Another technique for fault tolerance is *dual homing*, where critical devices are attached to two concentrators. Only the designated primary concentrator is active unless it (or its link) fails. If the primary does fail, the backup (passive) concentrator is automatically activated and sustains the ring.

FDDI Full-Duplex Overview

FDDI full-duplex allows a FDDI ring with exactly two stations to transform the ring into a full-duplex, point-to-point topology. In order to operate in full-duplex mode, there must be only two stations on the ring, the two stations must be capable of operating in full-duplex mode, and both stations must complete a full-duplex autoconfiguration protocol. There is no FDDI token in full-duplex mode.

Full-duplex autoconfiguration protocol allows a station to dynamically and automatically operate in either half-duplex (or ring) or full-duplex mode, and ensures that the stations fall back to ring mode when a configuration change occurs, such as a third station joining the ring.

After booting up, the stations begin operation in ring mode. While the station performs the full-duplex autoconfiguration protocol, the station continues to provide data-link services to its users. Under normal conditions, the transition between half-duplex mode and full-duplex mode is transparent to the data-link users. The data-link services provided by full-duplex mode are functionally the same as the services provided by half-duplex mode.

FDDI Specifications

Typically, FDDI uses two types of fiber-optic cable:

- Single-mode (also called monomode) optical fiber with SC-type, duplex and simplex connectors
- Multimode optical fiber with media interface connectors (MICs)

Mode refers to the angle at which light rays (signals) are reflected and propagated through the optical fiber core, which acts as a waveguide for the light signals. Multimode fiber has a relatively thick core (62.5/125-micron) that reflects light rays at many angles. Single-mode fiber has a narrow core (8.7 to 10/125-micron) that allows the light to enter only at a single angle.

Although multimode fiber allows more light signals to enter at a greater variety of angles (modes), the different angles create multiple propagation paths that cause the signals to spread out in time and limit the rate at which data can be accurately received. This distortion does not occur on the single path of the single-mode signal; therefore, single-mode fiber is capable of higher bandwidth and greater cable run distances than multimode fiber. In addition, multimode transmitters usually use LEDs as a light source, and single-mode transmitters use a laser diode, which is capable of sustaining faster data rates. Both transmitter types use a photodiode detector at the receiver to translate the light signal into electrical signals.

The FDDI standard sets total fiber lengths of 1.2 miles (2 kilometers) for multimode fiber and 9.3 miles (15 kilometers) for single-mode fiber. (The maximum circumference of the FDDI network is only half the specified distance because of signal wrapping or loopback that occurs during fault correction.) The FDDI standard allows a maximum of 500 stations with a maximum distance between active stations of 1.2 miles (2 kilometers).

Table 1-1 lists the signal descriptions for the mini-DIN optical bypass switch available on the FDDI port adapters. The mini-DIN-to-DIN adapter cable (Product Number CAB-FMDD=) allows connection to an optical bypass switch with a DIN connector (which is larger than the mini-DIN connector on the FDDI port adapters).

Table 1-1 Optical Bypass Switch Pinout

Pin	Direction	Description
1	Out	+5V to secondary switch
2	Out	+5V to primary switch
3	Out	Enable optical bypass switch primary
4	Out	Enable optical bypass switch secondary

Table 1-1 Optical Bypass Switch Pinout (continued)

Pin	Direction	Description
5	In	Sense optical bypass switch—1 kohm to +5V
6	Out	Ground—Sense optical bypass switch return

Note Up to 160 milliamperes (mA) of current can be supplied to the optical bypass switch.

The FDDI port adapter implementation complies with Version 6.1 of the X3T9.5 FDDI specification, offering a Class A dual attachment interface that supports the fault-recovery methods of DAS. The FDDI port adapter supports dual homing and optical bypass and complies with ANSI X3.1 and ISO 9314 FDDI standards.

Maximum Transmission Distances for FDDI Connections

The maximum transmission distances for single-mode and multimode FDDI stations are shown in Table 1-2. If the distance between two connected stations is greater than the maximum distance shown, significant signal loss can result.

Table 1-2 FDDI Maximum Transmission Distances

Transceiver Type	Maximum Distance Between Stations
Single-mode	Up to 9.3 miles (up to 15 km)
Multimode	Up to 1.2 miles (up to 2 km)

FDDI Port Adapter Optical Power Parameters

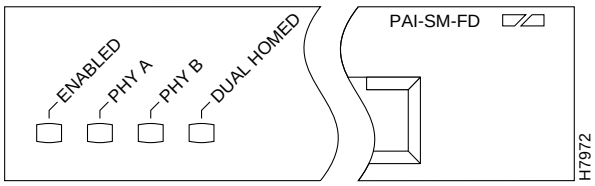
The multimode and single-mode optical-fiber connections conform to the following optical power parameters:

- Output power: –19 to –14 dBm
- Input power: –31 to –14 dBm
- Input sensitivity: –31 dBm @ $2.5x10^{-10}$ bit error rate @ 125 Mbps

LEDs

The PA-F/FD contains the enabled LED, which is standard on all port adapters, and status LEDs for each port. After system initialization, the enabled LED goes on to indicate that the port adapter has been enabled for operation. (The LEDs are shown in .) The LEDs on both the PA-F/FD-SM and the PA-F/FD-MM are identical to the LEDs shown in and are described in Table 1-3.

Figure 1-6 LEDs on the PA-F/FD—Partial Faceplate



The following conditions must be met before the enabled LED goes on:

- The port adapter is correctly connected and receiving power.
- The FDDI-equipped card or chassis contains a valid microcode version that has been downloaded successfully.
- The bus recognizes the FDDI-equipped card or chassis.

If any of these conditions is not met, or if the initialization fails for other reasons, the enabled LED does not go on.

Table 1-3 PA-F/FD LEDs

LED Label	Color	State	Indication
ENABLED	Green	On	Port adapter is enabled for operation
PHY A	Green	On	PHY A connection is active on FDDI ring
PHY B	Green	On	PHY B connection is active on FDDI ring
DUAL HOMED	Green	On	FDDI station is dual homed

The LED states are described in Table 1-4.

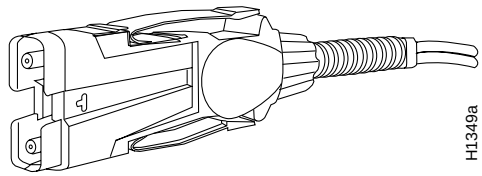
Table 1-4 PA-F/FD LED States

PHY A	PHY B	DUAL HOMED	Indications
Off	Off	Off	Not connected
Off	Off	On	Not possible
Off	On	Off	Wrap B
Off	On	On	Dual homed (B connected to M port)
On	Off	Off	Wrap A
On	Off	On	Dual homing backup (A connected to M port; B port not connected)
On	On	Off	Through A
On	On	On	Not possible

Cables and Connectors

The interface receptacles on the PA-F/FD are MICs for multimode and SC-type connectors for simplex and duplex single-mode applications. The multimode receptacle is a FDDI-standard physical sublayer (PHY) connector that encodes and decodes the data into a format acceptable for fiber transmission. The multimode receptacle accepts standard 62.5/125-micron multimode fiber-optic cable using the MIC and, with proper cable terminators, can accept 50/125-micron fiber-optic cable. Fiber-optic cables are commercially available; they are not available from Cisco Systems. Multimode operation uses the integrated MIC shown in Figure 1-7 at both the port adapter end and the network end.

Figure 1-7 Multimode FDDI Network Interface MIC



For FDDI single-mode connections, use one duplex SC-type connector (see Figure 1-8) or two single SC-type connectors at both the port adapter end and the network end (see Figure 1-9). Single-mode optical fiber cable has a narrow core (8.7 to 10/125-micron), which allows the light to enter only at a single angle.

Figure 1-8 Duplex SC-type Connector

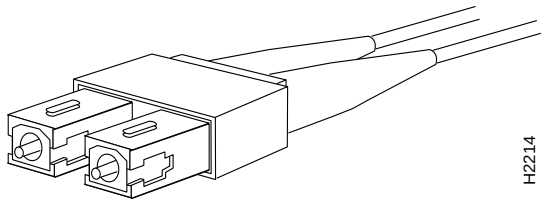
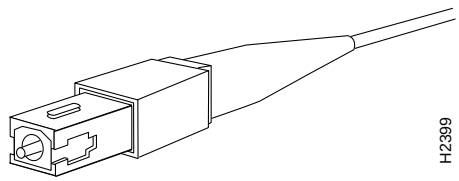


Figure 1-9 Simplex SC-type Connector



Warning **Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.***

Port Adapter Locations on the Supported Platforms

This section provides information about where you can install the PA-F/FD on the VIP, the Catalyst RSM/VIP2, and in the Cisco 7200 series routers (including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server).

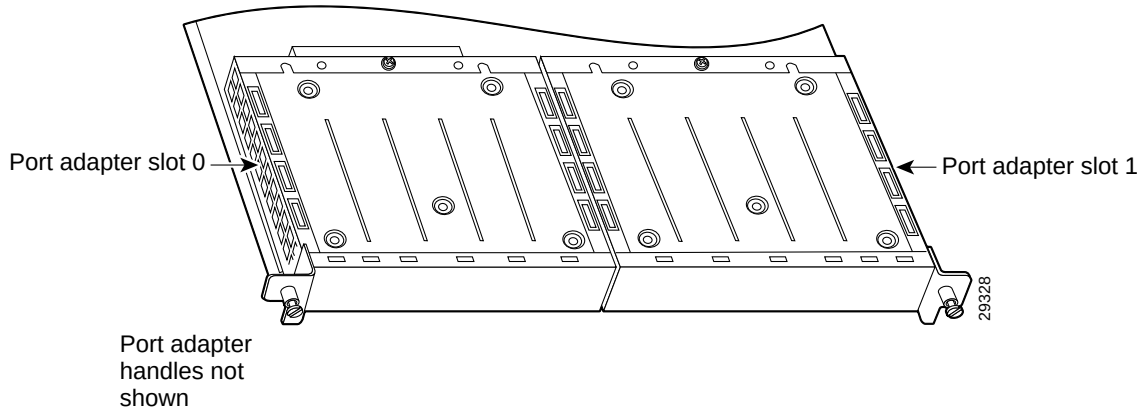
The PA-F/FD can be installed on the VIP or Catalyst RSM/VIP2 in port adapter slot 0 or port adapter slot 1 or in the Cisco 7200 series routers in any of the chassis port adapter slots. Port adapters have a handle attached, but this handle is occasionally not shown in this publication to allow a full view of detail on the port adapter's faceplate.

Note Interface ports are numbered from left to right starting with 0.

Note The PA-F/FD-SM and PA-F/FD-MM are not supported on Cisco 7200 VXR routers.

Figure 1-10 shows a VIP with installed port adapters. With the VIP oriented as shown, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1.

Figure 1-10 VIP Motherboard with Two Port Adapters Installed—Horizontal Orientation

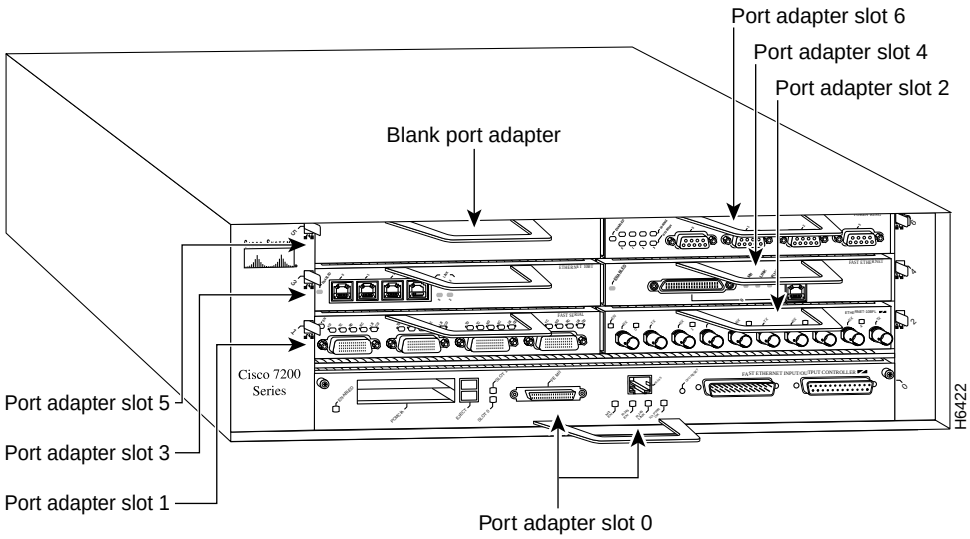


Note In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP is installed vertically. In the Cisco 7010 and Cisco 7505 chassis the VIP is installed horizontally.

Note Refer to Chapter 4 for illustrations of the PA-F/FD port adapters installed on a Catalyst RSM/VIP2-40.

Figure 1-11 shows a Cisco 7206 with port adapters installed. In the Cisco 7206, port adapter slot 1 is in the lower left position, and port adapter slot 6 is in the upper right position.

Figure 1-11 Port Adapters in the Cisco 7206



Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing PA-F/FD full-duplex FDDI port adapters. The chapter contains the following sections:

Required Tools and Equipment

You need the following tools and parts to install a port adapter. If you need additional equipment, contact a service representative for ordering information.

- PA-F/FD-SM or PA-F/FD-MM and one of the following:
  - Versatile Interface Processor (VIP)
  - Catalyst RSM/VIP2-15 or Catalyst RSM/VIP2-40
  - Cisco 7200 series router (including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server) with at least one available port adapter slot
- Cables appropriate for the port adapter interfaces (single-mode, SC-type simplex or duplex, optical-fiber cables and multimode optical-fiber cables with media interface connectors [MICs]. These cables are not available from Cisco Systems; they are available from outside commercial cable vendors).
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver (for VIP and Catalyst RSM/VIP2 installation).
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, FRUs, and spares.
- Antistatic mat
- Antistatic container

Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the PA-F/FD in supported router platforms.

Table 2-1 PA-F/FD Software Requirements

Platform	Recommended Minimum Cisco IOS Release[1]
Cisco 7000 and Cisco 7500 series	
• With VIP	Cisco IOS Release 11.1(6)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.2(5)P or a later release of Cisco IOS Release 11.2 P Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1 CA
Cisco 7200 series	
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(7)CA1 or a later release of Cisco IOS Release 11.1 CA1 Cisco IOS Release 11.2(5)P or a later release of Cisco IOS Release 11.2 P Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
• Cisco 7202	Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1 CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3 AA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
Cisco AS5800 Universal Access Server	
• Cisco 7206 router shelf	Cisco IOS Release 11.3(2)AA or a later release of Cisco IOS Release 11.3 AA
Catalyst 5000 Family Switches	
• With Catalyst RSM/VIP2-15 or Catalyst RSM/VIP2-40	Cisco IOS Release 11.2(9)P or a later release of Cisco IOS Release 11.2P

1. Also refer to the Cisco IOS software release note for the version of Cisco IOS software you are running.

Note The PA-F/FD-SM and PA-F/FD-MM are not supported on Cisco 7200 VXR routers. If you insert either of these port adapters in a Cisco 7200 VXR router, a message similar to the following is displayed:

```
PA-3-NOTSUPPORTED: PA in slot<n> (PA-F/FD-MM) is not supported on this chassis
```

Note In the Cisco 7200 series routers, specific configuration guidelines must be observed for high-bandwidth port adapters such as FDDI port adapters. For port adapter hardware and memory configuration guidelines for the Cisco 7200 series routers (including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server), refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* that shipped with your Cisco 7200 series router.

In the Catalyst 5000 family switches, the PA-F/FD requires one of the following Catalyst RSM/VIP2 models:

- Catalyst RSM/VIP2-15 (1 MB of SRAM, 16 MB of DRAM)
- Catalyst RSM/VIP2-40 (2 MB of SRAM, 32 MB of DRAM)

Note The maximum transmission unit (MTU) sizes available for two FDDI port adapters on a VIP require the additional VIP SRAM to ensure adequate packet buffers.

Note To prevent system problems, the VIP requires that the Cisco 7000 series router has the RSP7000 and RSP7000CI installed. The VIP will *not* operate properly with the Route Processor (RP), Switch Processor (SP), or Silicon Switch Processor (SSP) installed in the Cisco 7000 series router.

Verifying Full-Duplex Port Adapter Capability in Your Router

The PA-F/FD-SM and PA-F/FD-MM support full-duplex operation. (The PA-F-SM and PA-F-MM half-duplex FDDI port adapters *do not* support full-duplex operation.) To determine which FDDI port adapters are installed in your system, use the **show diagbus** command and verify that the PA-F/FD-SM or PA-F/FD-MM port adapters are installed.

If you discover that you do *not* have the appropriate Cisco IOS software release *and* PA-F/FD-SM or PA-F/FD-MM installed in your system, you *cannot* configure your FDDI port adapters for full-duplex operation. You require a minimum Cisco IOS software release *and* PA-F/FD-MM or PA-F/FD-SM for full-duplex operation.

For specific full-duplex configuration requirements, see the "Configuring Full-Duplex Operation" section on page 5-7.

Checking Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the Software Advisor tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum IOS requirements for individual hardware modules or components.

Note Access to this tool is limited to users with Cisco.com login accounts.

To access Software Advisor, click **Login** at Cisco.com and go to **Technical Support Help—Cisco TAC**: **Tool Index**: **Software Advisor**. You can also access the tool by pointing your browser directly to http://www.cisco.com/cgi-bin/support/CompNav/Index.pl.

Choose a product family or enter a specific product number to search for the minimum supported software release needed for your hardware.

Safety Guidelines

This section provides safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Warning **This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Waarschuwing **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.**

Varoitus **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).**

Attention **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.**

Warnung **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.**

Avvertenza **Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.**

Aviso **Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.**

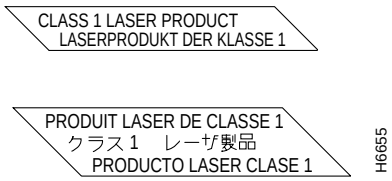
¡Advertencia! **Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.**

Varning! **Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.**

Laser Safety Guidelines

The single-mode aperture port on the PA-F/FD-SM contains a FDDI laser warning label, as shown in Figure 2-1.

Figure 2-1 Laser Warning Labels on PA-F/FD-SM



Warning **Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.***

Warning **Class 1 laser product.**

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis.
- Do not work alone when potentially hazardous conditions exist and never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Telephone Wiring Guidelines

Use the following guidelines when working with any equipment that is connected to telephone wiring or to other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and processor modules consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.

- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed board component-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms (Mohms).

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

Removing and Installing Port Adapters

This chapter describes how to remove thePA-F/FD-SM and PA-F/FD-MM port adapters from supported platforms and also how to install new or replacement port adapters. This chapter contains the following sections:

Each port adapter circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

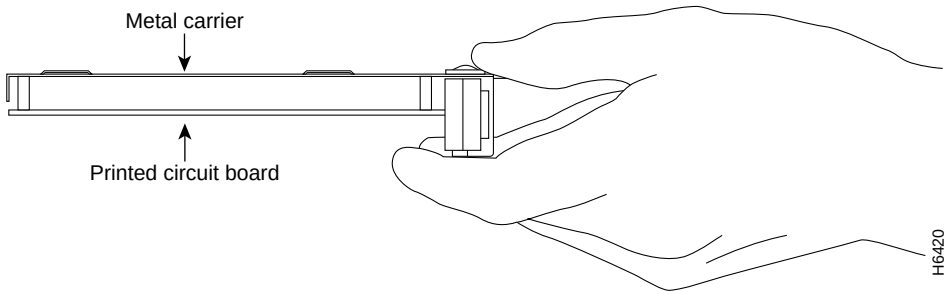
Note When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove the blank port adapter.

Caution When powering off the router, wait a minimum of 30 seconds before powering it on again.

Handling Port Adapters

Caution Always handle the port adapter by the carrier edges and handle; never touch the port adapter components or connector pins. (See Figure 3-1.)

Figure 3-1 Handling a Port Adapter



Online Insertion and Removal

Several platforms support online insertion and removal (OIR) of port adapters; therefore, you do not have to power down routers when removing and replacing a PA-F/FDD-SM or a PA-F/FD-MM in Cisco 7200 series routers or Cisco 7500 series routers.

Although the VIP and the Catalyst RSM/VIP2 support online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the VIP or Catalyst RSM/VIP2 from the chassis and then install or replace port adapters as required. If a blank port adapter is installed on the VIP or Catalyst RSM/VIP2 on which you want to install a new port adapter, you must first remove the VIP or Catalyst RSM/VIP2 from the chassis and then remove the blank port adapter.

Caution To prevent system problems, do not remove port adapters from the VIP or Catalyst RSM/VIP2 motherboard or attempt to install other port adapters on the motherboard when the system is operating. To install or replace port adapters, first remove the VIP or Catalyst RSM/VIP2 from its interface processor slot.

It is wise to gracefully shut down the system before removing a port adapter that has active traffic moving through it. Removing a module while traffic is flowing through the ports can cause system disruption. Once the module is inserted, the ports can be brought back up.

Note As you disengage the module from the router or switch, online insertion and removal (OIR) administratively shuts down all active interfaces in the module.

OIR allows you to install and replace modules while the router is operating; you do not need to notify the software or shut down the system power, although you should not run traffic through the module you are removing while it is being removed. OIR is a method that is seamless to end users on the network, maintains all routing information, and preserves sessions.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a module in a supported platform, refer to the "Port Adapter Removal and Installation" section on page 3-4.

Each module has a bus connector that connects it to the router. The connector has a set of tiered pins in three lengths that send specific signals to the system as they make contact with the module. The system assesses the signals it receives and the order in which it receives them to determine if a module is being removed from or introduced to the system. From these signals, the system determines whether to reinitialize a new interface or to shut down a disconnected interface.

Specifically, when you insert a module, the longest pins make contact with the module first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a module, the pins send signals to notify the system of changes. The router then perfoms the following procedure:

1. Rapidly scans the system for configuration changes.
2. Initializes newly inserted port adapters or administratively shuts down any vacant interfaces.
3. Brings all previously configured interfaces on the module back to their previously installed state. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar module type is reinserted into a slot, its ports are configured and brought online up to the port count of the originally installed module of that type.

Note Before you begin installation, read Chapter 2, "Preparing for Installation," for a list of parts and tools required for installation.

Warnings and Cautions

Observe the following warnings and cautions when installing or removing port adapters.

Caution Do not slide a port adapter all the way into the slot until you have connected all required cables. Trying to do so disrupts normal operation of the router or switch.

Note If a port adapter lever or other retaining mechanism does not move to the locked position, the port adapter is not completely seated in the midplane. Carefully pull the port adapter halfway out of the slot, reinsert it, and move the port adapter lever or other mechanism to the locked position.

Caution To prevent jamming the carrier between the upper and the lower edges of the port adapter slot, and to ensure that the edge connector at the rear of the port adapter mates with the connection at the rear of the port adapter slot, make certain that the carrier is positioned correctly, as shown in the cutaway in the following illustrations.

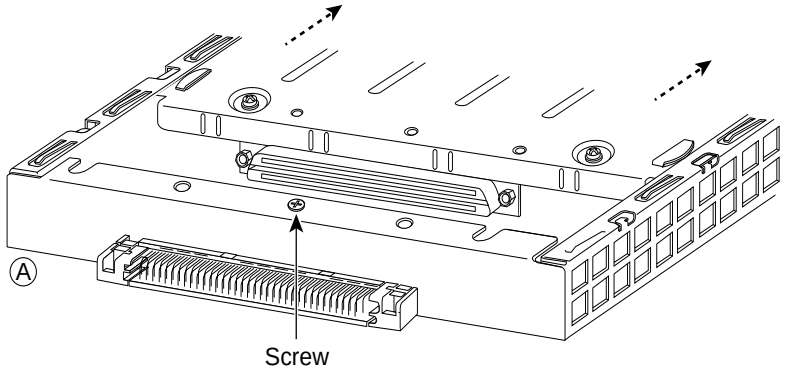
Warning **When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the card. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.**

Port Adapter Removal and Installation

In this section, the illustrations that follow give step-by-step instructions on how to remove and install port adapters. This section contains the following illustrations:

Catalyst RSM/VIP2—Removing and Installing a Port Adapter

Note: You must first remove the Catalyst RSM/VIP2 from the chassis before removing a port adapter from the Catalyst RSM/VIP2.



Step 1

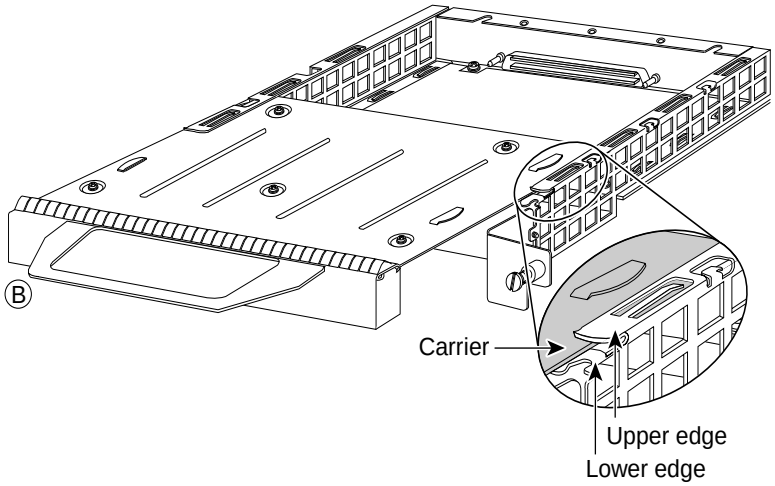
To remove the port adapter, remove the screw that secures the port adapter (or blank port adapter). (See A.)

Step 2

With the screw removed, grasp the handle on the front of the port adapter (or blank port adapter) and carefully pull it out of its slot, away from the edge connector at the rear of the slot. (See A.)

Step 3

To install the port adapter, carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)



Step 4

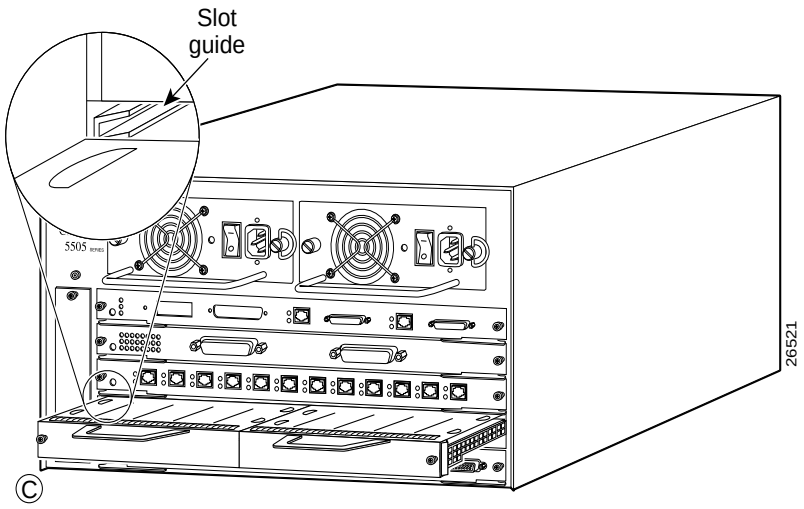
Install the screw in the rear of the port adapter slot. Do not overtighten the screw. (See A.)

Step 5

Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely seated in the connector at the rear of the port adapter slot. (See B.)

Step 6

Reinstall the Catalyst RSM/VIP2 motherboard in the chassis and tighten the captive installation screw on each side of the Catalyst RSM/VIP2 faceplate. (See C.)



Cisco 7200 Series—Removing and Installing a Port Adapter

Step 1

To remove the port adapter, place the port adapter lever in the unlocked position. (See A.) The port adapter lever remains in the unlocked position.

Step 2

Grasp the handle of the port adapter and pull the port adapter from the router, about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 3

With the port adapter halfway out of the slot, disconnect all cables from the port adapter. After disconnecting the cables, pull the port adapter from its chassis slot.

Step 4

To insert the port adapter, carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)

Step 5

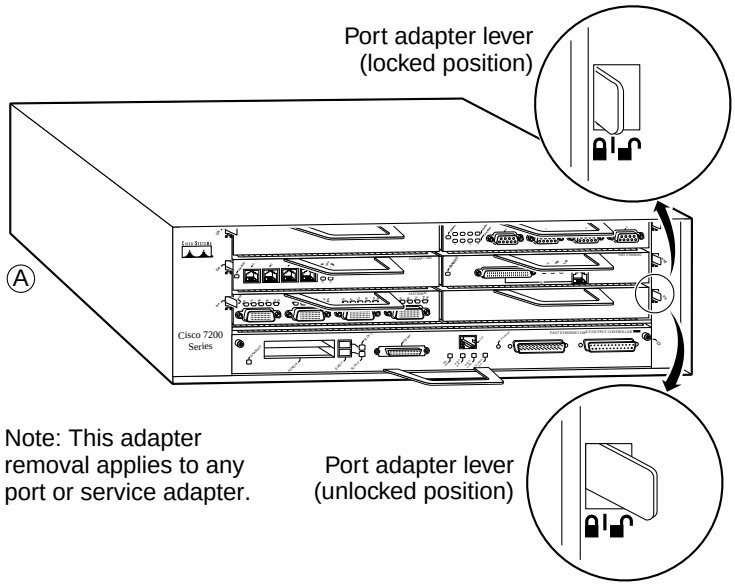
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

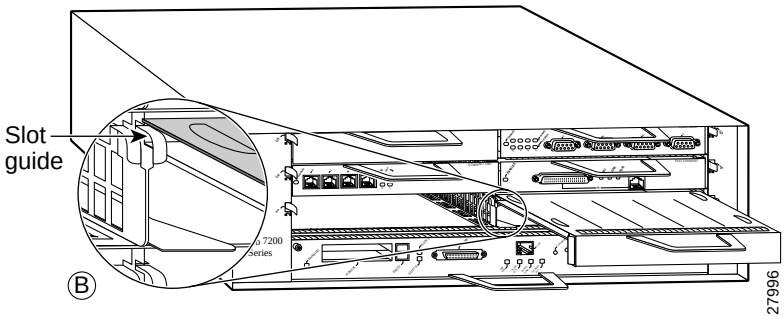
Step 6

With the port adapter halfway into the slot, connect all required cables to the port adapter. After connecting all required cables, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane.

Step 7

After the port adapter is properly seated, lock the port adapter lever. (See A.)





VIP—Removing and Installing a Port Adapter

Note: You must first remove the VIP from the chassis before removing a port adapter from the VIP.

Step 1

To remove the port adapter, remove the screw that secures the port adapter (or blank port adapter). (See A.)

Step 2

With the screw removed, grasp the handle on the front of the port adapter (or blank port adapter) and carefully pull it out of its slot, away from the edge connector at the rear of the slot. (See A.)

Step 3

To insert the port adapter, carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)

Step 4

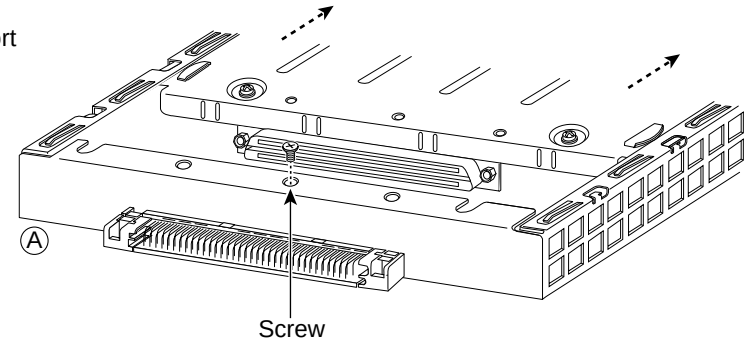
Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely seated in the connector at the rear of the port adapter slot. (See B.)

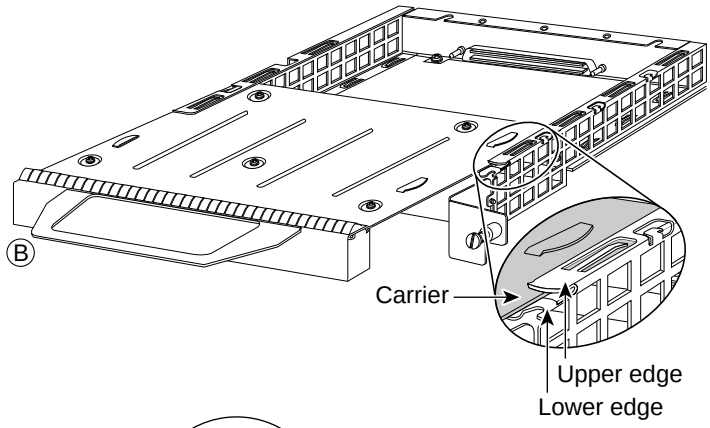
Step 5

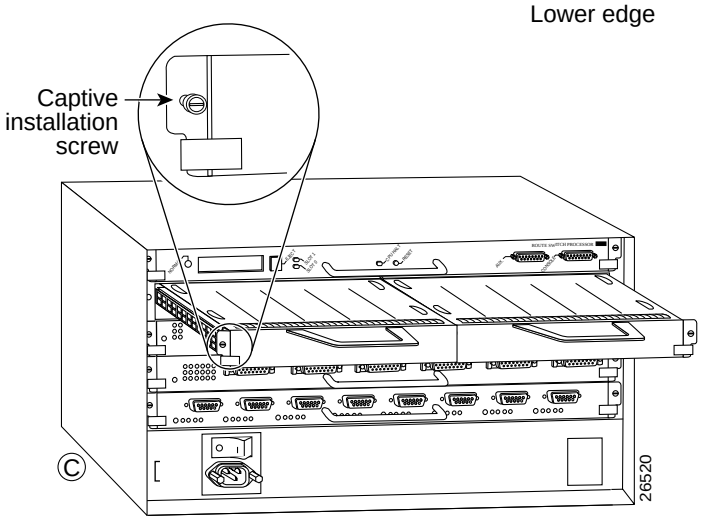
Install the screw in the rear of the port adapter slot on the VIP. Do not overtighten the screw. (See A.)

Step 6

Carefully slide the VIP motherboard into the interface processor slot until the connectors at the rear of the VIP are completely seated in the connectors at the rear of the interface processor slot. Use the ejector levers to seat the VIP in the interface processor slot. Tighten the captive installation screws on the VIP. (See C.)







Attaching the PA-F/FD Port Adapter Cables

To continue your PA-F/FD-SM and PA-F/FD-MM port adapter installation, you must attach the port adapter cables. The instructions that follow apply to all supported platforms. This chapter contains the following sections:

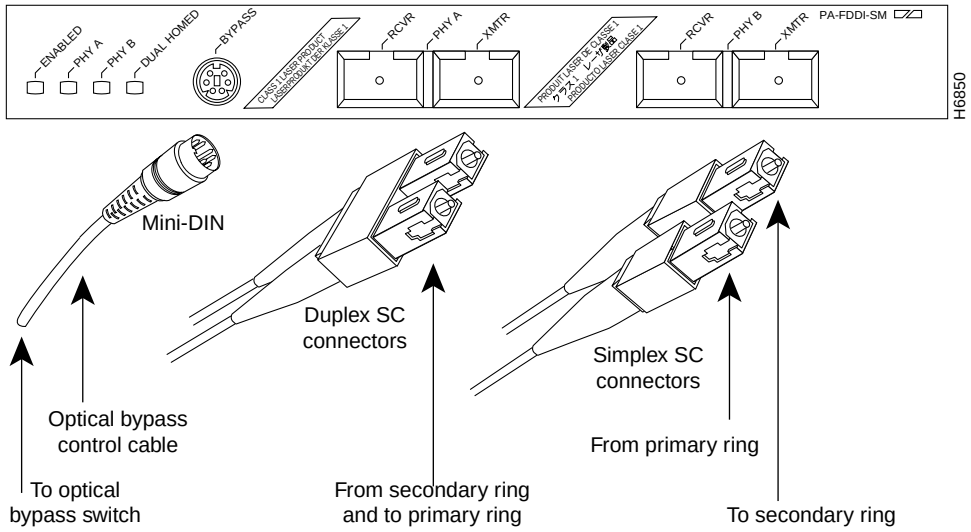
Connecting a FDDI Cable

Both single-mode and multimode dual-attachment connections are available. Fiber-optic cable connects directly to the FDDI ports. Single-mode transmission uses simplex or duplex SC-type transmit and receive cables. Multimode transmission uses media interface connector (MIC) cables.

Warning **Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.***

Connect cables for single-mode transmission on dual-attachment stations as shown in Figure 4-1.

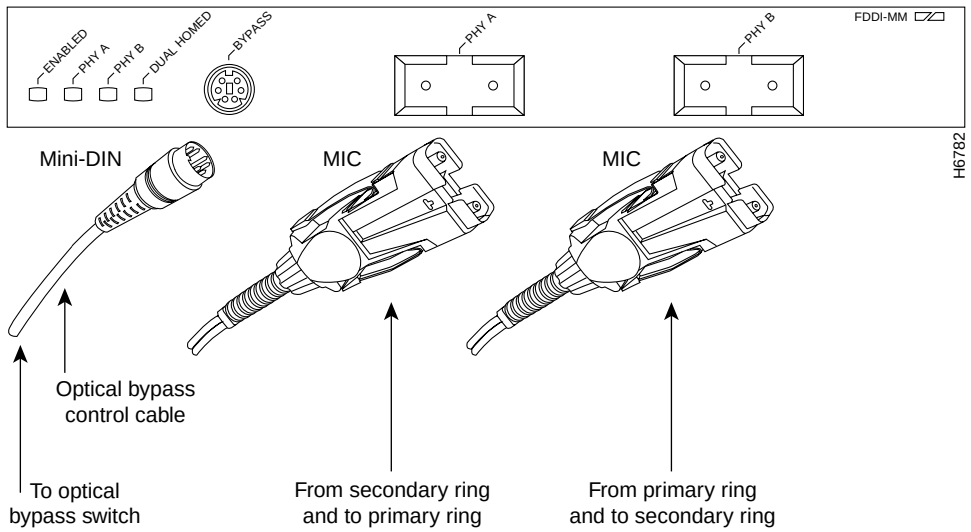
Figure 4-1 Single-Mode Dual-Attachment Connection with Duplex and Simplex SC-Type Cables and Optical Bypass Control Cable



Note Use four single-mode SC-type simplex cables or two SC-type duplex cables for a dual-attachment connection.

Connect cables for multimode transmission on dual-attachment stations as shown in Figure 4-2.

Figure 4-2 Multimode Dual-Attachment Connection with MIC Cables and Optical Bypass Control Cable



Attaching an Optical Bypass Switch

This section describes the procedures for attaching an optical bypass switch to the full-duplex FDDI port adapters. (Use these procedures for FDDI port adapters installed on a VIP, Catalyst RSM/VIP2, or in a Cisco 7200 series router [including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server].)

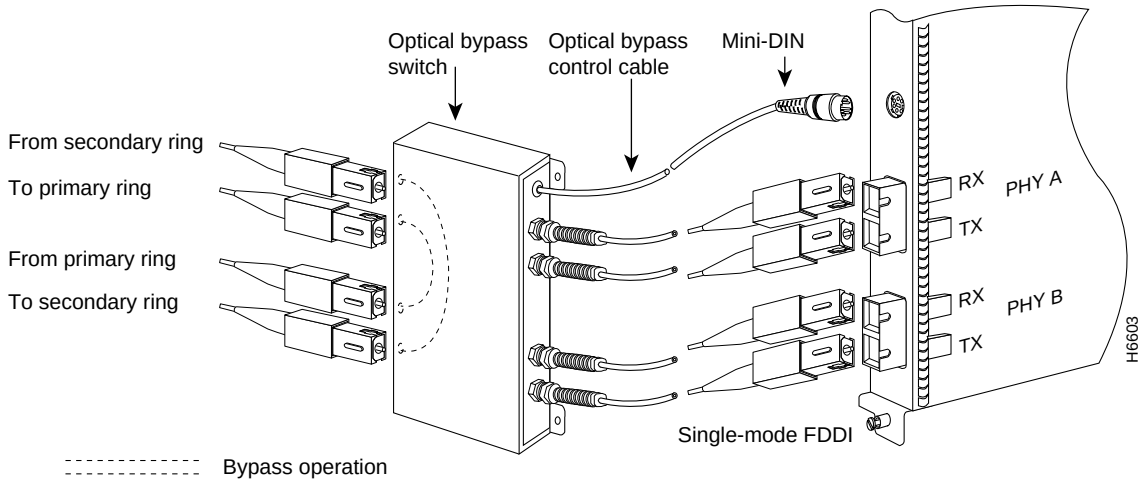
An optical bypass switch is a device installed between the ring and the station that provides additional fault tolerance to the network. If a FDDI port adapter that is connected to a bypass switch fails or shuts down, the bypass switch activates automatically and allows the light signal to pass directly through it, bypassing the port adapter completely.

Following are general instructions for connecting an optical bypass switch to the FDDI port adapter; however, your particular bypass switch may require a different connection scheme. Use these steps and Figure 4-3 and as general guidelines, but for specific connection requirements, refer to the instructions provided by the manufacturer of the optical bypass switch.

1. Connect the bypass switch to the ring. Unless the documentation that accompanies the bypass switch instructs otherwise, observe the same guidelines for connecting the A/B ports on the bypass switch that you would to connect the ring directly to the FDDI ports. Use the receive label on the cable connectors as a key and connect the multimode or single-mode cables to the network (ring) side of the bypass switch as follows:
   a. Connect the cable coming in from the primary ring (*from* PHY B at the preceding station) to the PHY A receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the secondary ring to the PHY A transmit port.
   b. Connect the cable coming in from the secondary ring (*from* PHY A at the preceding station) to the PHY B receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the primary ring to the PHY B transmit port.
2. Connect the bypass switch to the port adapter. Unless the documentation that accompanies the bypass switch instructs otherwise, consider the bypass an extension of the FDDI ports and connect A to A and B to B. The network cables are already connected to the bypass switch following the standard B-to-A/A-to-B scheme.
   a. Connect an interface cable between the PHY A port on the station (port adapter) side of the bypass switch and the FIP PHY A port.
   b. Connect an interface cable between the PHY B port on the station (port adapter) side of the bypass switch and the FIP PHY B port.
3. Connect the bypass switch control cable. If the control cable on your optical bypass switch uses a mini-DIN connector, connect the cable directly to the female mini-DIN optical bypass port on the FDDI port adapter. If the switch uses a standard DIN connector, use the optical bypass adapter cable (Product Number CAB-FMDD=) supplied with each FDDI port adapter. Connect the DIN end of the adapter cable to the DIN on the control cable, and connect the mini-DIN end of the adapter cable to the mini-DIN optical bypass port on the FDDI port adapter.

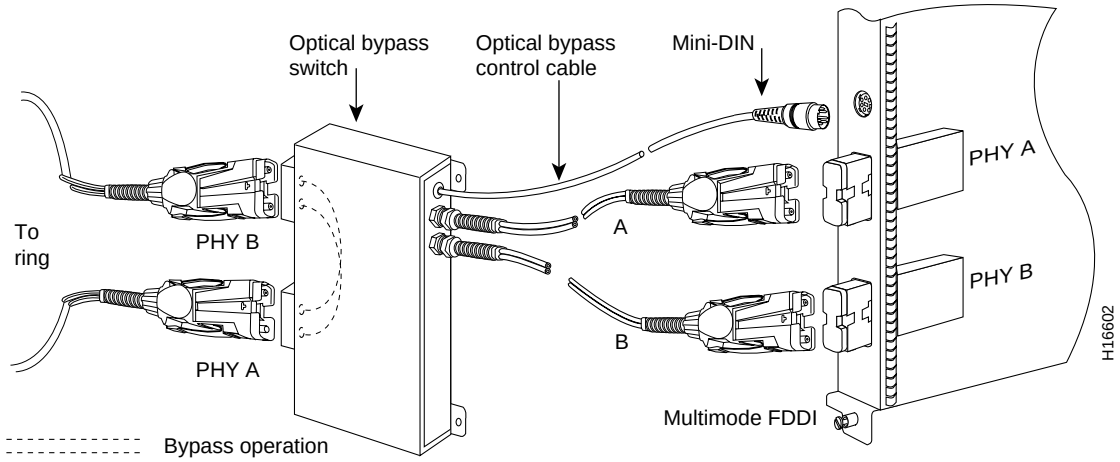
A port for connecting an optical bypass switch is provided on the single-mode port adapter (PA-F/FD-SM, shown in) and the multimode port adapter (PA-F/FD-MM, shown in).

Figure 4-3 Optical Bypass Switch Connection—PA-F/FD-SM



Note Up to 160 milliamperes of current can be supplied to the optical bypass switch.

Figure 4-4 Optical Bypass Switch Connection—PA-F/FD-MM



Configuring the PA-F/FD

To continue your PA-F/FD-SM or PA-F/FD-MM installation, you must configure the FDDI interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—for example, with Cisco IOS software commands—are noted.

This chapter contains the following sections:

Using the EXEC Command Interpreter

You modify the configuration of your router through the software command interpreter called the *EXEC* (also called enable mode). You must enter the privileged level of the EXEC command interpreter with the **enable** command before you can use the **configure** command to configure a new interface or change the existing configuration of an interface. The system prompts you for a password if one has been set.

The system prompt for the privileged level ends with a pound sign (#) instead of an angle bracket (>). At the console terminal, use the following procedure to enter the privileged level:

Step 1 At the user-level EXEC prompt, enter the **enable** command. The EXEC prompts you for a privileged-level password as follows:

```
Router> enable

Password:
```

Step 2 Enter the password (the password is case sensitive). For security purposes, the password is not displayed.

When you enter the correct password, the system displays the privileged-level system prompt (#):

```
Router#
```

Configuring the FDDI Interfaces

If you installed a new FDDI port adapter or if you want to change the configuration of an existing interface, you must enter configuration mode using the **configure** command. If you replaced a FDDI port adapter that was previously configured, the system recognizes the new FDDI interfaces and brings them up in their existing configuration. After you verify that the new FDDI port adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you need, such as the following:

- Protocols you plan to route on each new interface
- IP addresses if you plan to configure the interfaces for IP routing
- Bridging protocol you plan to use (for example, source-route bridging)

The **configure** command requires privileged-level access to the EXEC command interpreter, which usually requires a password. Contact your system administrator if necessary to obtain EXEC-level access.

Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-F/FD-MM and the PA-F/FD-SM in Cisco 7200 series routers, on the VIP used in Cisco 7000 series and Cisco 7500 series routers, and on the Catalyst RSM/VIP2 used in Catalyst 5000 family switches.

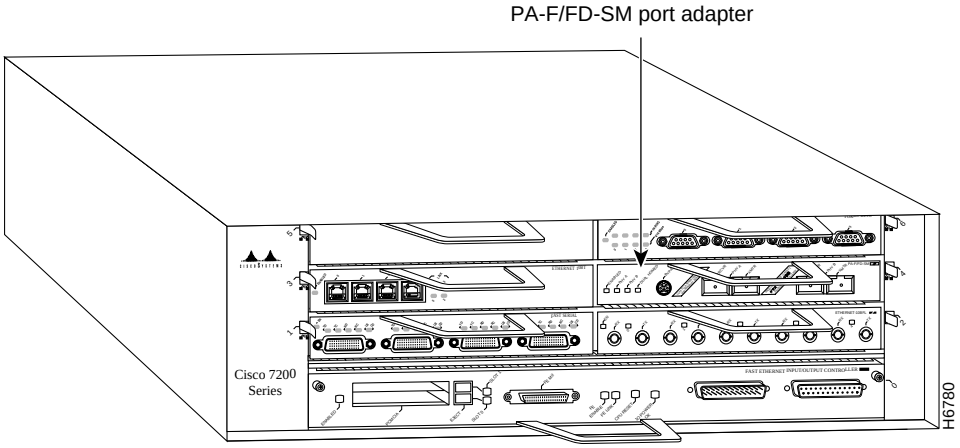
Cisco 7200 Series Interface Addresses

This section describes how to identify the interface addresses used for Cisco 7200 series routers.

In a Cisco 7200 series router, physical port addresses specify the actual physical location of each interface port on the router. (See .) This address is composed of a two-part number in the format *port adapter slot number/interface port number,* as follows:

- The first number identifies the port adapter slot in which the FDDI port adapter is installed.
- The second number identifies the interface port on each FDDI port adapter, which is always numbered interface 0.

Figure 5-1 FDDI Interface Port Number Example—Cisco 7206



Note For the Cisco 7206 router shelf, physical port addresses are composed of a three-part number in the format *shelf number/port adapter slot number/interface port number*, where the *shelf number* is a number assigned to the Cisco 7206 router shelf during the initial configuration of the Cisco AS5800 Universal Access Server. A Cisco AS5800 Universal Access Server can consist of several shelves; therefore, each shelf is assigned a shelf number.

Interface ports maintain the same address regardless of whether other port adapters are installed or removed from the slot. However, when you move a port adapter to a different slot, the port adapter slot number in the address changes to reflect the new port adapter slot number.

shows some of the port adapter slots and interface ports of a Cisco 7206. The port adapter slot numbers start with 1 and continue through 6 (slot 0 is always reserved for the Fast Ethernet port on the I/O controller—if present). The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

For example, the FDDI port adapter in port adapter slot 4 would have the address 4/0. (See Figure 5-1.) If the FDDI port adapter was in port adapter slot 1, this same interface port would be numbered 1/0. Port adapters can occupy any port adapter slot; there are no restrictions.

Note For the Cisco 7206 router shelf, the FDDI port adapter in port adapter slot 4 would have the address *x*/4/0, where *x* is the number assigned to the router shelf during the initial configuration of the Cisco AS5800 Universal Access Server.

You can identify interface ports by physically checking the slot/interface port location on the front of the router or by using **show** commands to display information about a specific interface or all interfaces in the router.

VIP Interface Addresses

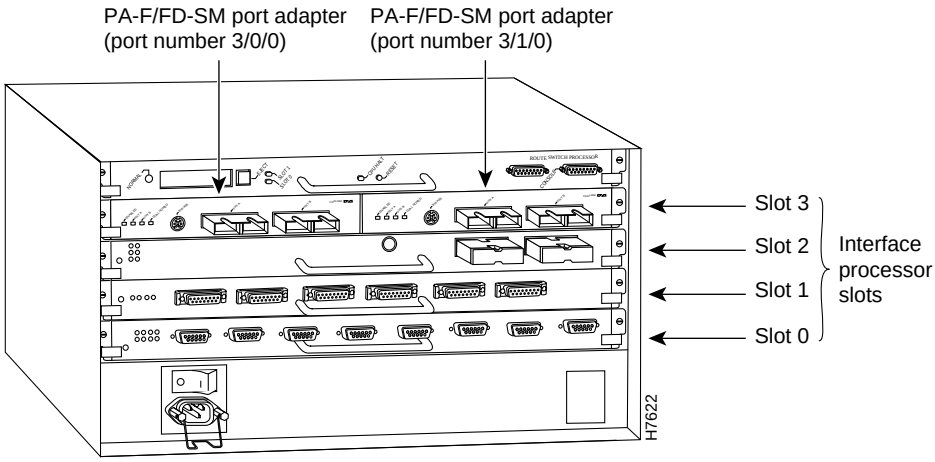
This section describes how to identify the interface addresses used for the PA-F/FD-MM and PA-F/FD-SM on a VIP in the Cisco 7000 series and Cisco 7500 series routers.

Note Although the processor slots in the 7-slot Cisco 7000 and Cisco 7507 and 13-slot Cisco 7513 are vertically oriented and those in the 5-slot Cisco 7010 and Cisco 7505 are horizontally oriented, all models use the same method for slot and port numbering.

In the router, physical port addresses specify the actual physical location of each interface port on the router interface processor end. (See .) This address is composed of a three-part number in the format *interface processor slot number/port adapter number/interface port number*, as follows:

- The first number identifies the interface processor slot in which the VIP is installed (as shown in the sample system in).
- The second number identifies the physical port adapter slot number on the VIP and is either 0 or 1.
- The third number identifies the interface port on each FDDI port adapter and is always numbered interface 0.

Figure 5-2 Interface Port Number Example—Cisco 7505 Shown



Interface ports on the VIP maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP to a different slot, the first number in the address changes to reflect the new interface processor slot number.

Figure 5-2 shows some interface address examples on a sample Cisco 7505 system. For example, on a VIP equipped with two FDDI port adapters in slot 3, the address of the first FDDI port adapter is 3/0/0 (interface processor slot 3, port adapter slot 0, and interface port 0), and the address of the second FDDI port adapter is 3/1/0.

The first port adapter slot number is always 0. The second port adapter slot number is always 1. The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

Note If you remove a VIP with two FDDI port adapters from slot 3 and install it in slot 2, the addresses of those same FDDI ports become 2/0/0 through 2/1/0.

You can identify interface ports by physically checking the slot/port adapter/interface port location on the back of the router or by using software commands to display information about a specific interface or all interfaces in the router.

Catalyst RSM/VIP2 Interface Addresses

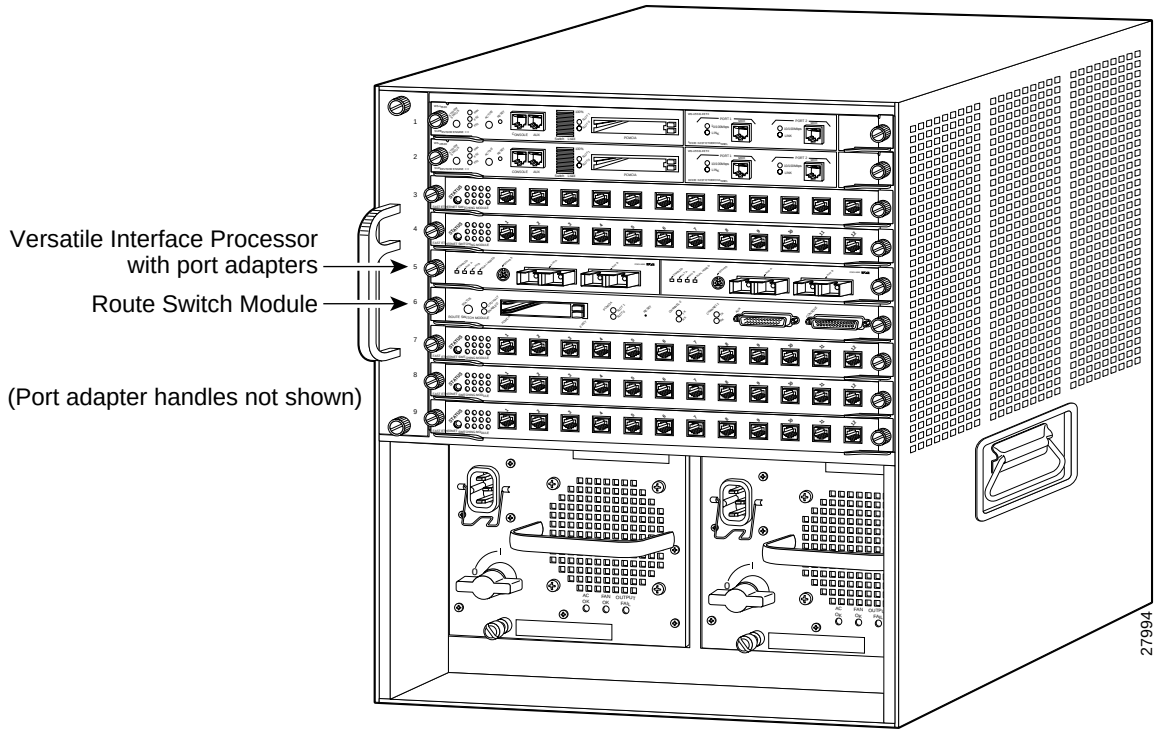
This section describes how to identify the interface addresses used for the PA-F/FD-MM and PA-F/FD-SM on a Catalyst RSM/VIP2 in the Catalyst 5000 family switches.

In the Catalyst RSM/VIP2, each address is composed of a two-part number in the format *port adapter number/interface port number*, as follows:

- The first number identifies the physical port adapter slot number on the Catalyst RSM/VIP2 and is either 0 or 1.
- The second number identifies the interface port on each FDDI port adapter and is always numbered interface 0.

 shows the port adapters on a Catalyst RSM/VIP2 installed in a Catalyst 5509 switch. The addresses for the port adapters, on a Catalyst RSM/VIP2 equipped with two FDDI port adapters, is 0/0 (port adapter slot 0 and interface port 0) for the first port adapter and 1/0 for the second port adapter.

Figure 5-3 PA-F/FD-SM Port Adapter in the Catalyst 5509 Switch



The first port adapter slot number is always 0. The second port adapter slot number is always 1. The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

You can identify interface ports by physically checking the port adapter/interface port location or by using software commands to display information about a specific interface.

Performing a Basic Configuration

This section describes the procedures for performing a basic configuration. Press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable

Router>
```

Use the following procedure to perform a basic configuration:

Step 1 At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
```

Step 2 Specify the first interface to configure.

- For the Cisco 7200 series, at the prompt, enter the subcommand **interface**, followed by the *type* (**fddi**) *slot/port* (port adapter slot number and interface number). The example that follows is for the first interface of the port adapter in slot 4:

  ```
  Router(config)# interface fddi 4/0
  ```

  Note For the Cisco 7206 router shelf, the interface specified in Step 2 would include a shelf number. For example, the command **interface fddi 5/4/0** would specify the first FDDI interface of the port adapter in slot 4 of Cisco 7206 router shelf 5.

- For the VIP, at the prompt, enter the subcommand **interface**, followed by the *type* (**fddi**) *slot/port adapter/port* (interface processor slot number, port adapter slot number, and interface number). The example that follows is for the first interface of the first port adapter on a VIP in interface processor slot 1:

  ```
  Router(config)# interface fddi 1/0/0
  ```

- For the Catalyst RSM/VIP2, at the prompt, enter the subcommand **interface**, followed by the *type* (**fddi**) *port adapter/port* (port adapter slot number and interface number). The example that follows is for the first interface of the first port adapter on a Catalyst RSM/VIP2:

  ```
  Router(config)# interface fddi 0/0
  ```

Step 3 If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand, as in the following example:

```
Router(config-int)# ip address 10.1.1.10 255.255.255.0
```

Step 4 Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

Step 5 Change the shutdown state to up and enable the interface as follows:

```
Router(config-int)# no shutdown
```

Step 6 Configure additional interfaces as required.

Step 7 When you have included all of the configuration subcommands to complete the configuration, press **Ctrl-Z** to exit configuration mode.

Step 8 Write the new configuration to nonvolatile memory as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

Configuring Full-Duplex Operation

Full-duplex operation requires the PA-F/FD-SM or PA-F/FD-MM port adapter, and requires that the host router have a specific, minimum Cisco IOS software release. (See the "Software and Hardware Requirements" section on page 2-2.)

Full-duplex operation is *not* the default configuration and must be turned on using the **full-duplex** command. To turn off full-duplex operation (and enable half-duplex operation) and reset the interface, use the **no full-duplex** (or **half-duplex**) command.

Following is an example of configuring a FDDI interface for full-duplex operation on a VIP using the **full-duplex** command:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface fddi 5/0/0
Router(config-if)# full-duplex
Ctrl-z
Router#
```

Following is an example of configuring a FDDI interface for full-duplex operation on a Catalyst RSM/VIP2 using the **full-duplex** command:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface fddi 0/0
Router(config-if)# full-duplex
Ctrl-z
Router#
```

Following is an example of configuring a FDDI interface for full-duplex operation in a Cisco 7200 series router using the **full-duplex** command:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface fddi 4/0
Router(config-if)# full-duplex
Ctrl-z
Router#
```

Note If the port adapter does not support full-duplex operation, the following error message appears:

```
%FDDI4/0 interface does not support full-duplex
```

If the port adapter *does* support full-duplex operation, the interface resets as it changes to full-duplex operation.

The output of the **show interfaces fddi** *slot/port-adapter/port* command displays the state of the FDDI port adapter interface and the state of full-duplex operation. Following is a partial sample output of this command from a FDDI interface on a VIP with full-duplex operation enabled:

```
Router# show interfaces fddi 3/0/0
Fddi3/0/0 is up, line protocol is up
  Hardware is cxBus FDDI, address is 0000.0c0c.4444 (bia 0060.3e47.4360)
  Internet address is 14.0.0.2/8
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 10/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX enabled, FDX state is *
```

The output of the **show interfaces fddi** *port-adapter/port* command displays the state of the FDDI port adapter interface and the state of full-duplex operation. Following is a partial sample output of this command from a FDDI interface on a Catalyst RSM/VIP2 with full-duplex operation enabled:

```
Router# show interfaces fddi 0/0
Fddi0/0 is up, line protocol is up
  Hardware is cxBus FDDI, address is 0000.0c0c.4444 (bia 0060.3e47.4360)
  Internet address is 14.0.0.2/8
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 10/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX enabled, FDX state is *
```

The asterisk (*) in the last line could be *idle*, *request*, *confirm*, or *operation*, depending on the state of the FDDI interface when the **show interfaces fddi** command is entered.

Following is a partial sample output of the **show interfaces fddi** command from a FDDI interface in a Cisco 7200 series router with full-duplex operation enabled:

```
Router# show interfaces fddi 4/0
Fddi4/0 is up, line protocol is up
  Hardware is MIF68840_MM, address is 0060.7054.8808 (bia 0060.7054.8808)
  Internet address is 2.1.1.3/24
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 9/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX enabled, FDX state is *
```

The asterisk (*) in the last line could be *idle*, *request*, *confirm*, or *operation*, depending on the state of the FDDI interface when the **show interfaces fddi** command is entered.

Note For the Cisco 7206 router shelf, the interface specified in the preceding example would include a shelf number. For example, the command **interface fddi 5/4/0** or the command **show interfaces fddi 5/4/0** would specify the first FDDI interface of the port adapter in slot 4 of Cisco 7206 router shelf 5.

Note When full-duplex operation is turned off using the **no full-duplex** (or **half-duplex**) command, the last line of the preceding display includes the following information:

```
FDX supported, FDX disabled
```

If the port adapter does *not* support full-duplex operation, the following message is displayed:

```
FDX NOT supported
```

Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces and use the **ping** command to check connectivity.

Using show Commands to Verify the New Interface Status

Use **show** commands to verify that the new interfaces are configured and operating correctly, as follows:

Step 1 Display the system hardware configuration with the **show version** command. Ensure that the list includes the new interfaces.

Step 2 Display all the current port adapters and their interfaces.

- For the Cisco 7200 series, use the **show controllers** command. Verify that the new FDDI port adapter appears in the correct slot.
- For the VIP and the Catalyst RSM/VIP2, use the **show controllers cbus** command. Verify that the new FDDI port adapter appears in the correct slot.

Note The slot values displayed by some commands (such as **show diag** and **show controllers cbus**) are not relevant to any physical connection; disregard these slot values for the Catalyst RSM/VIP2.

Step 3 Specify one of the new interfaces:

- For the Cisco 7200 series, use the **show interfaces** *type slot/port* command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.

Note For the Cisco 7206 router shelf, the **show interfaces** command requires a shelf number in the format **show interfaces** *type shelf number/port adapter slot/port.*

- For the VIP, use the **show interfaces** *type slot/port adapter/port* command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.
- For the Catalyst RSM/VIP2, use the **show interfaces** *port adapter/port* command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.

Step 4 Display the protocols configured for the entire system and specific interfaces with the **show protocols** command. If necessary, return to configuration mode to add or remove protocol routing on the system or specific interfaces.

Step 5 Display the running configuration file with the **show running-config** command. Display the configuration stored in NVRAM using the **show startup-config** command. Verify that the configuration is accurate for the system and each interface.

If the interface is down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. If you still have problems bringing the interface up, contact a service representative for assistance.

Using show Commands to Display Interface Information

To display information about a specific interface, use the **show interfaces** command with the interface type and port address in the format **show interfaces** [*type slot/port*] for the Cisco 7200 series and in the format show interfaces **[*type slot/port adapter/port*]** for the VIP2, and in the format show interfaces **[*port adapter/port*]** for the Catalyst RSM/VIP2.

Note For the Cisco 7206 router shelf, the **show interfaces** command requires a shelf number in the format **show interfaces** *type shelf number/port adapter slot/port*.

Cisco 7200 Series show Commands

Following is an example of how the **show interfaces** [*type slot/port] command* displays status information (including the physical slot and port address) for the interfaces you specify. In these examples, most of the status information for each interface is omitted. In the following example, the **show interfaces fddi** command shows all of the information specific to the FDDI port (interface port 0) in port adapter slot 4:

```
Router# show interfaces fddi 4/0
Fddi4/0 is up, line protocol is up
  Hardware is MIF68840_MM, address is 0060.7054.8808 (bia 0060.7054.8808)
  Internet address is 10.1.1.3/24
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 9/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX enabled, FDX state is operation
```

(*If full-duplex operation is not supported, the following is displayed:*

```
     FDX NOT supported)


  Phy-A state is connect, neighbor is Unknown, status Q
  Phy-B state is active, neighbor is A, status II
  ECM is in, CFM is c_wrap_b, RMT is ring_op,
  Requested token rotation 5000 usec, negotiated 4997 usec
  Configured tvx is 2500 usec ring operational 00:01:21
  Upstream neighbor 0060.3e33.3608, downstream neighbor 0060.3e33.3608
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of “show interface” counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 3678000 bits/sec, 152 packets/sec
  5 minute output rate 3678000 bits/sec, 152 packets/sec
     490909 packets input, 1695024765 bytes, 0 no buffer
     Received 2130 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     492973 packets output, 1695017763 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 transitions, 0 traces,  0 claims, 0 beacon
```

Interfaces are administratively shut down until you enable them. With the **show interfaces** *type slot/port* command, use arguments such as the interface type (fddi, and so forth), slot, and the port number (slot/port) to display information about a specific FDDI interface only.

Use the **show version** (or **show hardware**) command to display the configuration of the system hardware (the number of each port adapter type installed), the software version, the names and sources of configuration files, and the boot images. Following is an example of the **show version** command:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 11.1(7)CA1 [biff 105]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 21-Apr-95 12:22 by
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 11.1(7) RELEASED SOFTWARE

Router uptime is 8 hours, 22 minutes
System restarted by reload
System image file is "slot0:c7200-j-mz.960421", booted via slot0

cisco 7200 (R4700) processor with 22528K/10240K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
2 FDDI network interfaces.
125K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```

Use the **show diag** *slot* command to determine which type of port adapter is installed in your system. Specific port adapter information is displayed, as shown in the following examples of multimode and single-mode full-duplex FDDI port adapters in port adapter slots 4 and 3, respectively:

```
Router# show diag 4
Slot 4:
        FD FDDI DAS (Multimode), PA-F/FD-MM port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 03:23:10 ago
        Hardware revision 1.11          Board revision A0
        Serial number     3544601       Part number    73-2138-01
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 31 01 0B 00 36 16 19 49 08 5A 01 00 00 00 00
          0x30: 50 00 00 00 96 08 28 00 FF FF FF FF FF FF FF FF

Router# show diag 3
Slot 3:
        FD FDDI DAS (Singlemode), PA-F/FD-SM port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 00:08:34 ago
        Hardware revision 1.10          Board revision A0
        Serial number     3095203       Part number    73-2139-01
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 32 01 0A 00 2F 3A A3 49 08 5B 01 00 00 00 00
          0x30: 50 00 00 00 96 07 30 00 FF FF FF FF FF FF FF FF
```

For command descriptions and examples for Cisco 7200 series routers, refer to the documentation resources listed in the section "Related Documentation" section on page vi.

VIP show Commands

Use the **show interfaces** *type slot/port adapter/port* command to display status information (including the physical slot and port address) for the interfaces you specify. In the examples in this section, most of the status information for each interface is omitted. The following example shows all of the information specific to the first FDDI port (interface port 0) in interface processor slot 3, port adapter slot 0:

```
Router# show interfaces fddi 3/0/0
Fddi3/0/0 is up, line protocol is up
  Hardware is cxBus FDDI, address is 0000.0c0c.4444 (bia 0060.3e47.4360)
  Internet address is 14.0.0.2/8
   MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 10/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX disabled, FDX state is operation
  Phy-A state is connect, neighbor is Unknown, status QLS
  Phy-B state is active, neighbor is A, status SILS
  ECM is in, CFM is c_wrap_b, RMT is ring_op,
  Requested token rotation 5000 usec, negotiated 0 usec
  Configured tvx is 2500 usec
  LER for PortA = 09, LER for PortB = 0C ring operational 11:36:23
  Upstream neighbor 0000.0c0c.8888, downstream neighbor 0000.0c0c.8888
  Last input 00:02:22, output 00:00:06, output hang never
  Last clearing of "show interface" counters 14:57:58
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 3922000 bits/sec, 147 packets/sec
  5 minute output rate 3962000 bits/sec, 148 packets/sec
     7523044 packets input, 631964210 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     7523554 packets output, 625092443 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 transitions, 0 traces,  0 claims, 0 beacon
```

Interfaces are administratively shut down until you enable them. With the **show interfaces** command, use only the *type* argument to display information about a specific type of interface only. For example, **show interfaces fddi** displays information about only the FDDI ports in the system.

Use the **show version** (or **show hardware**) command to display the configuration of the system hardware (the number of each interface processor type installed), the software version, the names and sources of configuration files, and the boot images.

Following is an example of the **show version** command used with a Cisco 7500 series system in which a VIP with a PA-F/FD port adapter is installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Released Version 11.1(6)CA
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 10-May-96 16:20 by biff
Image text-base: 0x600108A0, data-base: 0x608DC000

ROM: System Bootstrap, Version 5.3(18168) [biff 61], INTERIM SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(6) [biff 103]

Router uptime is 20 hours, 34 minutes
System restarted by power-on
System image file is "slot0:zippy/biff/rsp-jv-mz.111.6ca", booted via slot0

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
```

```
G.703/E1 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Primary Rate ISDN software, Version 1.0.
Chassis Interface.
2 VIP2 controllers (8 Ethernet)(2 Fddi).
8 Ethernet/IEEE 802.3 interfaces.
2 FDDI network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 6.
Configuration register is 0x0
```

Use the **show diagbus** *slot* command to determine which type of port adapter is installed on a VIP in your system. Specific port adapter information is displayed, as shown in the following examples of PA-F/FD-SM and PA-F/FD-MM port adapters in interface processor slots 3 and 5:

```
Router# show diagbus 3
Slot 3:
        Physical slot 3, ~physical slot 0xC, logical slot 3, CBus 0
        Microcode Status 0xC
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: Console I/O
        EEPROM format version 1
        VIP2 controller, HW rev 2.2, board revision UNKNOWN
        Serial number: 03507946  Part number: 73-1684-02
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 15 02 02 00 35 86 EA 49 06 94 02 00 00 00 00
          0x30: 12 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x1988 (20:32:53 ago)

        Controller Memory Size: 8 MBytes

        PA Bay 0 Information:
                FDDI PA, 1 ports, PA-F/FD-SM
                EEPROM format version 1
                HW rev 1.0, Board revision 21
                Serial number: 03524551  Part number: 73-2139-01
```

"*Part number*" in the last line refers to a PA-F/FD-SM port adapter.

```
Router# show diagbus 5
Slot 5:
        Physical slot 5, ~physical slot 0xA, logical slot 5, CBus 0
        Microcode Status 0x4
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: None
        EEPROM format version 1
        VIP2 controller, HW rev 2.2, board revision UNKNOWN
        Serial number: 03507948  Part number: 73-1684-02
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible
```

```
EEPROM contents (hex):
  0x20: 01 15 02 02 00 35 86 EC 49 06 94 02 00 00 00 00
  0x30: 12 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4      Insertion time: 0x3C3C (20:32:59 ago)

Controller Memory Size: 8 MBytes

PA Bay 0 Information:
        FDDI PA, 1 ports, PA-F/FD-MM
        EEPROM format version 1
        HW rev 1.0, Board revision 21
        Serial number: 02825768 Part number: 73-2138-01
```

"*Part number"* in the last line refers to a PA-F/FD-MM port adapter.

Catalyst RSM/VIP2 show Commands

Use the **show interfaces** *port adapter/port* command to display status information for the interfaces you specify. In the examples in this section, most of the status information for each interface is omitted. The following example shows all of the information specific to the first FDDI port (interface port 0) in port adapter slot 0:

```
Router# show interfaces fddi 0/0
Fddi0/0 is up, line protocol is up
  Hardware is cxBus FDDI, address is 0000.0c0c.4444 (bia 0060.3e47.4360)
  Internet address is 14.0.0.2/8
   MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 10/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 04:00:00
  FDX supported, FDX disabled, FDX state is operation
  Phy-A state is connect, neighbor is Unknown, status QLS
  Phy-B state is active, neighbor is A, status SILS
  ECM is in, CFM is c_wrap_b, RMT is ring_op,
  Requested token rotation 5000 usec, negotiated 0 usec
  Configured tvx is 2500 usec
  LER for PortA = 09, LER for PortB = 0C ring operational 11:36:23
  Upstream neighbor 0000.0c0c.8888, downstream neighbor 0000.0c0c.8888
  Last input 00:02:22, output 00:00:06, output hang never
  Last clearing of "show interface" counters 14:57:58
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 3922000 bits/sec, 147 packets/sec
  5 minute output rate 3962000 bits/sec, 148 packets/sec
     7523044 packets input, 631964210 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     7523554 packets output, 625092443 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 transitions, 0 traces,  0 claims, 0 beacon
```

Interfaces are administratively shut down until you enable them. With the **show interfaces** command, use only the *type* argument to display information about a specific type of interface only. For example, **show interfaces fddi** displays information about only the FDDI ports in the system.

Use the **show version** (or **show hardware**) command to display the configuration of the system hardware (the number of each interface processor type installed), the software version, the names and sources of configuration files, and the boot images.

Following is an example of the **show version** command used with a Catalyst RSM/VIP2 with a PA-F/FD port adapter installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Released Version 11.1(6)CA
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 10-May-96 16:20 by biff
Image text-base: 0x600108A0, data-base: 0x608DC000

ROM: System Bootstrap, Version 5.3(18168) [biff 61], INTERIM SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(6) [biff 103]

Router uptime is 20 hours, 34 minutes
System restarted by power-on
System image file is "slot0:zippy/biff/rsp-jv-mz.111.6ca", booted via slot0

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Primary Rate ISDN software, Version 1.0.
Chassis Interface.
2 VIP2 controllers (8 Ethernet)(2 Fddi).
8 Ethernet/IEEE 802.3 interfaces.
2 FDDI network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 6.
Configuration register is 0x0
```

Use the **show diagbus** *slot* command to determine which type of port adapter is installed on a Catalyst RSM/VIP2 in your system. Specific port adapter information is displayed, as shown in the following example of the PA-F/FD-SM port adapter:

```
Router# show diagbus 3
Slot 3:
        Physical slot 3, ~physical slot 0xC, logical slot 3, CBus 0
        Microcode Status 0xC
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: Console I/O
        EEPROM format version 1
        VIP2 controller, HW rev 2.2, board revision UNKNOWN
        Serial number: 03507946  Part number: 73-1684-02
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 15 02 02 00 35 86 EA 49 06 94 02 00 00 00 00
          0x30: 12 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x1988 (20:32:53 ago)

        Controller Memory Size: 8 MBytes
```

```
PA Bay 0 Information:
        FDDI PA, 1 ports, PA-F/FD-SM
        EEPROM format version 1
        HW rev 1.0, Board revision 21
        Serial number: 03524551  Part number: 73-2139-01
```

"*Part number"* in the last line refers to a PA-F/FD-SM port adapter.

Using the ping Command

The **ping** command allows you to verify that an interface port is functioning properly and to check the path between a specific port and connected devices at various locations on the network. This section provides brief descriptions of the **ping** command. After you verify that the system has booted successfully and is operational, you can use this command to verify the status of interface ports. Refer to the documentation resources listed in the "Related Documentation" section on page vi for detailed command descriptions and examples.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 10.1.1.10:

```
Router# ping 10.1.1.10 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.1.1.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#

If the connection fails, verify that you have the correct IP address for the server and
that the server is active (powered on), and repeat the ping command.
```

If the connection fails, verify that you have the correct IP address for the server and that the server is active (powered on), and repeat the **ping** command. For complete descriptions of interface subcommands and the configuration options available for supported interfaces and functionality, refer to the documents listed in the "Obtaining Documentation" section on page vii.

This completes the PA-F/FD-SM and PA-F/FD/MM installation and configuration.