



# PA-FE-TX and PA-FE-FX Fast Ethernet 100BaseT Port Adapter Installation and Configuration

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Product Numbers: PA-FE-TX(=) and PA-FE-FX(=)

Platforms Supported: Cisco 7200 Series, Cisco 7000 Series and Cisco 7500 Series with VIP2, Cisco uBR7200 Series, Cisco 7100 Series

**Note** If you ordered this port adapter as a spare, for your convenience Cisco has included a port adapter installation and configuration note for the Catalyst 5000 series Route Switch Module/Versatile Interface Processor 2 (RSM/VIP2). Your port adapter is fully compatible with the RSM/VIP2.

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# Preface

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

- Objectives, page v
- Organization, page vi
- Related Documentation, page vi
- Cisco Connection Online, page viii
- Cisco Documentation CD-ROM, page viii

## Objectives

This document describes how to install and configure the 100BaseTX and 100BaseFX port adapters (PA-FE-TX[=] and PA-FE-FX[=]) in the following platforms:

- 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
- Cisco uBR7200 series universal broadband routers—which consist of the six-slot (four cable modem card slots and two port adapter slots) Cisco uBR7246 and the three-slot (two cable modem card slots and one port adapter slot) Cisco uBR7223
- Cisco 7100 series routers—which consist of the Cisco 7120 series and Cisco 7140 series
- Second-generation Versatile Interface Processor (VIP2) in all Cisco 7500 series routers and in Cisco 7000 series routers using the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) installed

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**Note** The Cisco 7206VXR and the Cisco 7206 can be used as router shelves in a Cisco AS5800 Universal Access Server. For information about the Cisco 7206VXR and the Cisco 7206 as router shelves, refer to the Cisco AS5800 Universal Access Server documentation listed in the “Related Documentation” section on page vi.

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## Organization

This document is organized into the following chapters:

Section	Title	Description
Chapter 1	Overview	Provides information about the PA-FE-TX and PA-FE-FX 100BaseT port adapters, illustrates their location in the supported hardware platforms, and describes their LED displays, cables, and receptacles
Chapter 2	Preparing for Installation	Provides information about safety considerations, tools required, and procedures you should perform <i>before the actual installation</i>
Chapter 3	VIP2 and the PA-FE Port Adapters	Provides instructions for installing the PA-FE port adapters on a VIP2 interface processor installed in a Cisco 7500 or Cisco 7000 series router
Chapter 4	Cisco 7200 Series and the PA-FE Port Adapters	Provides instructions for installing the PA-FE port adapters in a Cisco 7200 series router
Chapter 5	Cisco uBR7200 Series and the PA-FE Port Adapters	Provides instructions for installing the PA-FE port adapters in a Cisco uBR7200 series universal broadband router
Chapter 6	Cisco 7100 Series and the PA-FE-TX and PA-FE-FX	Provides instructions for installing the PA-FE port adapters in the Cisco 7100 series routers
Chapter 7	Installing PA-FE Port Adapter Interface Cables	Provides instructions for installing PA-FE port adapter cables on supported platforms
Chapter 8	Configuring PA-FE Port Adapter Interfaces	Provides instructions for configuring PA-FE port adapter interfaces on 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.

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**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>.

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- For hardware installation and maintenance information on Cisco 7000 series and Cisco 7500 series routers, and the VIP2, 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 and Configuration* (for VIP2 users only)

- For hardware installation and maintenance information on Cisco 7100 series routers, refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide* publication that shipped with your Cisco 7100 series router.
- For information on setting up a Virtual Private Network, see the *Cisco 7100 Series VPN Configuration Guide*.
- 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 hardware installation and maintenance information on Cisco 7200 routers, refer to the *Cisco 7200 Series Installation and Configuration Guide* that shipped with your Cisco 7200 series router.
- For port adapter hardware and memory configuration guidelines for Cisco 7200 series routers (including the Cisco 7206VXR or Cisco 7206 as router shelves 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 uBR7200 series universal broadband routers, refer to the following publications that shipped with your router:
  - *Cisco uBR7246 Universal Broadband Router Installation and Configuration Guide*
  - *Cisco uBR7223 Universal Broadband Router Installation and Configuration Guide*
- For international agency compliance, safety, and statutory information for interfaces for Cisco 7500 series routers, Cisco 7000 series routers, Cisco 7200 series routers, Cisco 7100 series routers, and Cisco uBR7200 series universal broadband routers, refer to the following publications:
  - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*
  - *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 uBR7246 Universal Broadband Router or Regulatory Compliance and Safety Information for the Cisco uBR7223 Universal Broadband Router.*
  - *Regulatory Compliance and Safety Information for the Cisco 7100 Series VPN Routers*
- To view Cisco documentation or obtain general information about the documentation, refer to the “Related Documentation” section on page vi, the “Cisco Documentation CD-ROM” 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](mailto:cs-rep@cisco.com), refer to the *Cisco Information Packet* that shipped with your router, or access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

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Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

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## Cisco Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

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# Overview

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This chapter provides physical and functional overviews of the PA-FE-TX and PA-FE-FX Fast Ethernet 100BaseT port adapters. The chapter contains the following sections:

- Port Adapter Overview, page 1-1
- Port Adapter Locations on the Supported Platforms, page 1-2
- LEDs, page 1-5
- Receptacles, Cables, and Pinouts, page 1-5
- Fast Ethernet Overview, page 1-9
- IEEE 802.3u 100BaseT Specifications, page 1-10

## Port Adapter Overview

The PA-FE-TX and PA-FE-FX port adapters provide a 100-Mbps, 100BaseT Fast Ethernet interface and support both full-duplex and half-duplex operation. Refer to the “Fast Ethernet Overview” section on page 1-9 for additional information. Figure 1-1 shows the PA-FE-TX and Figure 1-2 shows the PA-FE-FX.

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**Note** While the VIP2 supports online insertion and removal (OIR), individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then replace port adapters as required.

Cisco 7100 series routers, Cisco 7200 series routers, and Cisco uBR7200 series universal broadband routers support online insertion and removal (OIR) of port adapters.

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**Figure 1-1 PA-FE-TX—Faceplate View**

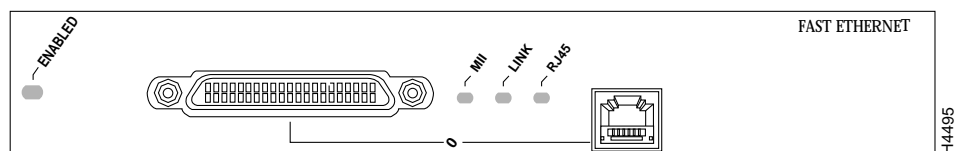
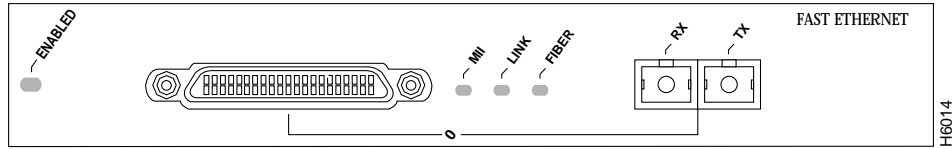


Figure 1-2 PA-FE-FX Port Adapter—Faceplate View



The PA-FE can be installed in the following slots on the hardware platforms described in this document:

- VIP2—Port adapter slot 0 and port adapter slot 1
- Cisco 7200 series routers—Port adapter slot 1 and slot 2 of the Cisco 7202; port adapter slot 1 through slot 4 of the Cisco 7204 and Cisco 7204VXR; port adapter slot 1 through slot 6 of the Cisco 7206 and Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers—Port adapter slot 1 and slot 2 of the Cisco uBR7246; port adapter slot 1 of the Cisco uBR7223
- Cisco 7100 series—Port adapter slot 3

**Note** Port adapters have a handle attached, but this handle is occasionally not shown to allow a full view of detail on the port adapter’s faceplate.

## Port Adapter Locations on the Supported Platforms

Figure 1-3 and Figure 1-4 show VIP2 models with installed port adapters. With the VIP2 oriented as shown in Figure 1-3 or Figure 1-4, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1.

In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP2 is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP2 is installed horizontally.

Figure 1-3 VIP2-15 or VIP2-40 with Two Port Adapters Installed—Horizontal Orientation

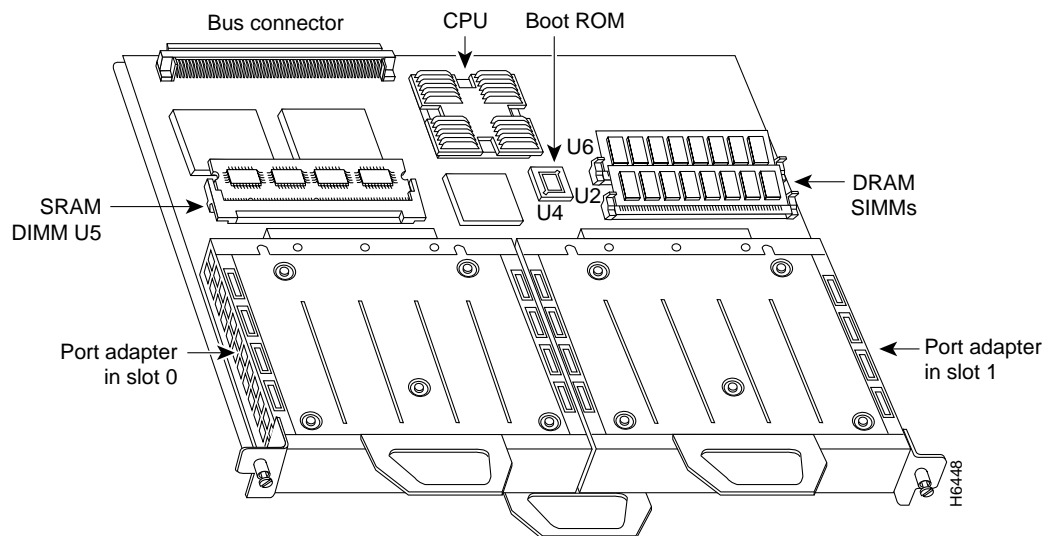
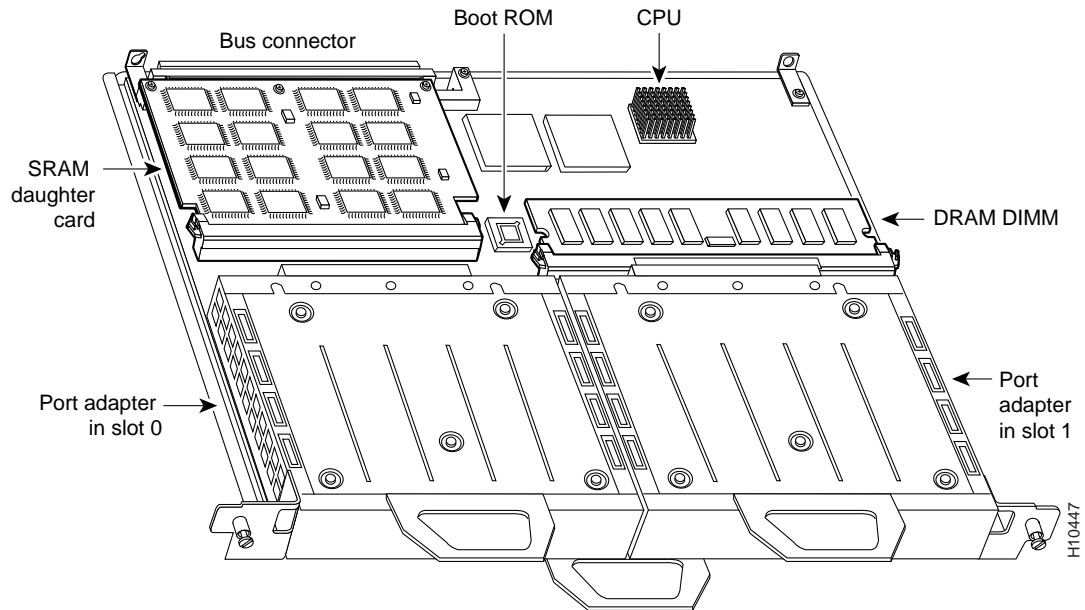




Figure 1-4 VIP2-50 with Two Port Adapters Installed—Horizontal Orientation



In Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204 and Cisco 7204VXR, and slot 6 for the Cisco 7206 and Cisco 7206VXR. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present.

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**Note** The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

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Figure 1-5 shows a Cisco 7206 with installed port adapters and an I/O controller with a Fast Ethernet port. Not shown are the Cisco 7202, which has two port adapter slots, the Cisco 7204 and Cisco 7204VXR, which have four port adapter slots, and the Cisco 7206VXR, which has six port adapter slots. The PA-FE port adapters can be installed in any available port adapter slot in Cisco 7200 series routers.

Figure 1-5 Port Adapter Slots in the Cisco 7200 Series—Cisco 7206

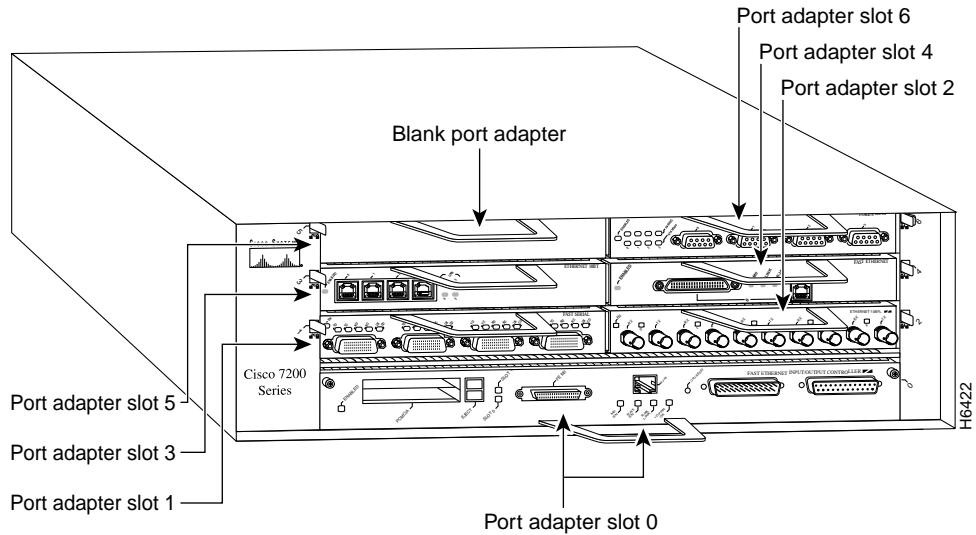
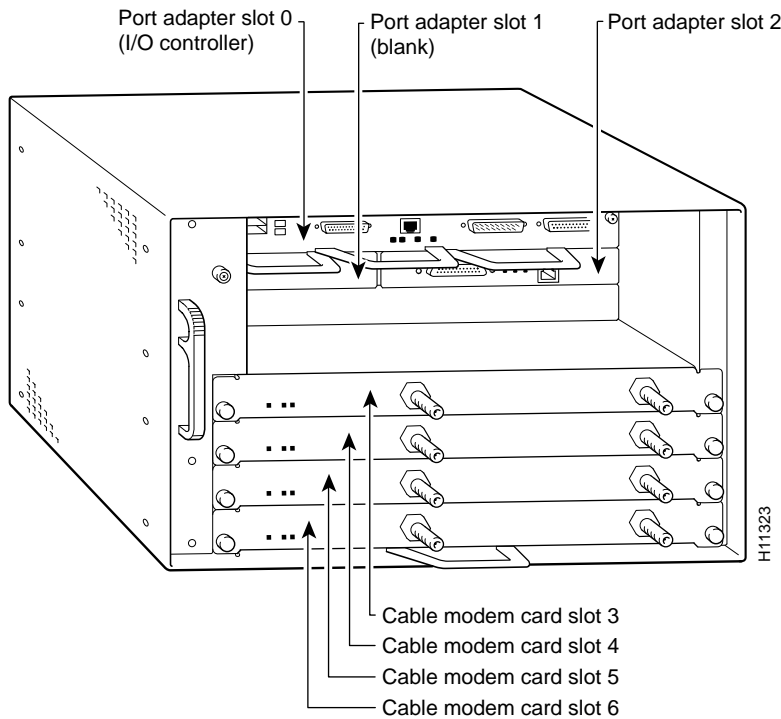


Figure 1-6 shows a Cisco uBR7200 series router with port adapters installed. In the Cisco uBR7246, port adapter slot 1 is in the upper left position, and port adapter slot 2 is in the upper right position. In the Cisco uBR7223, port adapter slot 1 is in the upper right position. The port adapters are recessed into the chassis just below the I/O controller.

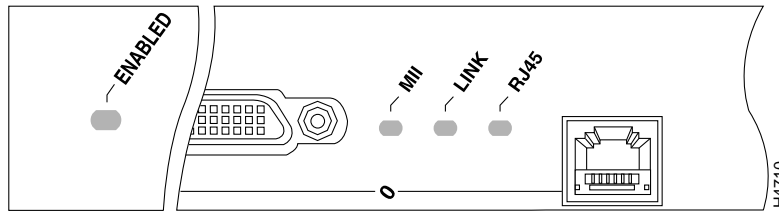
Figure 1-6 Cisco uBR7200 Series with Port Adapters Installed—Cisco uBR7246



## LEDs

The PA-FE-TX and the PA-FE-FX have an enabled LED, standard on all port adapters, and a bank of three status LEDs for the ports. After system initialization, the enabled LED goes on to indicate that the PA-FE has been enabled for operation. (The LEDs are shown in Figure 1-7.)

**Figure 1-7 LEDs on the PA-FE Port Adapter—Partial Faceplate View of PA-FE-TX**



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

- The PA-FE is correctly connected and receiving power.
- The FE-equipped card or chassis contains a valid microcode version that has been downloaded successfully.
- The bus recognizes the PA-FE port adapter or PA-FE-equipped VIP2.

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

Following are the three status LEDs and an explanation of what each indicates:

- **MII**—On when the MII port is selected as the active port by the controller.
- **Link**—When the RJ-45 or SC port is active, this LED is on when the port adapter is receiving a carrier signal from the network. When the MII port is active, this LED is an indication of network activity, and it flickers on and off proportionally to this activity.
- **RJ-45 (or FIBER on PA-FE-FX)**—On when the RJ-45 (or FIBER) port is selected as the active port by the controller.

Either the MII LED *or* the RJ-45 (or FIBER) LED should be on at any one time; never both.

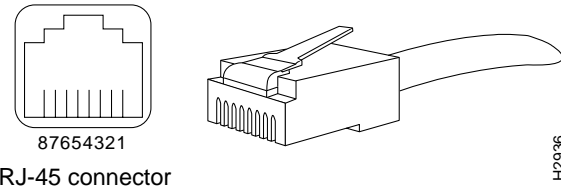
## Receptacles, Cables, and Pinouts

Each Fast Ethernet port on the PA-FE-TX has an RJ-45 connector to attach to Category 5 unshielded twisted-pair (UTP) for 100BaseTX, and a MII connector that permits connection through external transceivers to multimode fiber for 100BaseFX, or to Category 3, 4, and 5 UTP or foil twisted-pair (FTP) for 100BaseT4 physical media. Only one connector can be used at one time. The RJ-45 connection does not require an external transceiver. The MII connection (a 40-pin, D-shell type connector) requires an external physical sublayer (PHY) and an external transceiver.

Each Fast Ethernet port on the PA-FE-FX port adapter has an SC-type fiber-optic connector for 100BaseFX, and an MII connector that permits connection through external transceivers to multimode fiber for 100BaseFX, or to Category 3, 4, and 5 UTP or STP for 100BaseT4 physical media. Only one connector can be used at one time. The MII connection (a 40-pin, D-shell type connector) requires an external physical sublayer (PHY) and an external transceiver.

Figure 1-8 shows the RJ-45 cable connectors. Cisco Systems does not supply Category 5 UTP RJ-45 cables; these cables are available commercially. Table 1-1 lists the pinouts and signals for the PA-FE-TX RJ-45 connectors.

**Figure 1-8 PA-FE-TX RJ-45 Connections—Plug and Receptacle**



**Warning** The ports labeled “Ethernet,” “10BaseT,” “Token Ring,” “Console,” and “AUX” are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage (TNV) circuits.

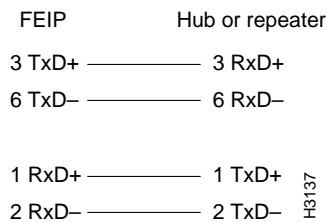
**Table 1-1 PA-FE-TX RJ-45 Connector Pinout**

Pin	Description
1	Receive Data + (RxD+)
2	RxD-
3	Transmit Data + (TxD+)
6	TxD-

**Note** Referring to the RJ-45 pinout in Table 1-1, proper common-mode line terminations should be used for the unused Category 5, UTP cable pairs 4/5 and 7/8. Common-mode termination reduces the contributions to electromagnetic interference (EMI) and susceptibility to common-mode sources. Wire pairs 4/5 and 7/8 are actively terminated in the RJ-45, 100BaseTX port circuitry in the PA-FE-TX.

Depending on your RJ-45 interface cabling requirements, use the pinouts in Figure 1-9 and Figure 1-10.

**Figure 1-9 Straight-Through Cable Pinout—PA-FE-TX RJ-45 Connection to a Hub or Repeater**



**Figure 1-10 Crossover Cable Pinout—PA-FE-TX RJ-45 Connections Between Hubs and Repeaters**

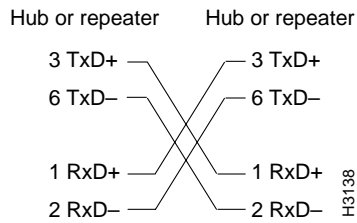
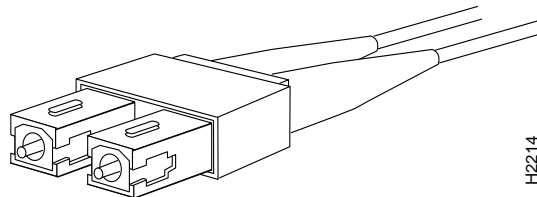
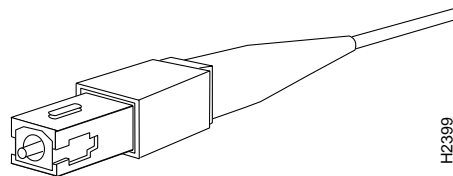


Figure 1-11 shows the duplex SC connector (one required for both transmit and receive), and Figure 1-12 shows the simplex SC connector (two required, one for each transmit and receive) used for PA-FE-FX optical-fiber connections. These multimode optical-fiber cables are commercially available, and are not available from Cisco Systems.

**Figure 1-11 PA-FE-FX Duplex SC Connector**



**Figure 1-12 PA-FE-FX Simplex SC Connector**



Depending on the type of media you use between the MII connection on the port adapter and your switch or hub, the network side of your 100BaseT transceiver should be appropriately equipped with ST-type connectors (for optical fiber), BNC connectors, and so forth. Figure 1-13 shows the pin orientation of the female MII connector on the port adapter. The port adapters are field-replaceable units (FRUs).

The MII receptacle uses 2-56 screw-type locks, called *jackscrews* (shown in Figure 1-13), to secure the cable or transceiver to the MII port. MII cables and transceivers have knurled thumbscrews that you fasten to the jackscrews on the PA-FE-TX’s MII connector. Use the jackscrews to provide strain relief for your MII cable. Figure 1-13 shows the MII female connector (receptacle).



**Caution** Before you attach your MII transceiver to the MII receptacle on your PA-FE port adapter, ensure that your MII transceiver responds to physical sublayer (PHY) address 0 per section 22.2.4.4. “PHY Address” of the IEEE 802.3u specification; otherwise, interface problems might result. Confirm that this capability is available on your MII transceiver with the transceiver’s vendor or in the transceiver’s documentation. If a selection for Isolation Mode is available, we recommend you use this setting (if no mention is made of PHY addressing).

**Figure 1-13 PA-FE-TX or PA-FE-FX MII Connection—Receptacle**

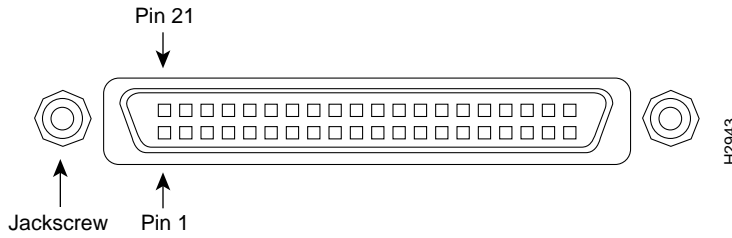


Table 1-2 lists the MII connector pinout and signals. MII cables are available commercially and are not available from Cisco Systems. Table 1-2 refers to MII cables used between the MII connector on the PA-FE-TX and an appropriate transceiver. The connection between this transceiver and your network can be Category 3, 4, or 5, 150-ohm UTP or FTP, or multimode optical fiber.

**Table 1-2 MII Connector Pinout**

Pin <sup>1</sup>	In	Out	In/Out	Description
14–17	–	Yes	–	Transmit Data (TxD)
12	Yes	–	–	Transmit Clock (Tx_CLK) <sup>2</sup>
11	–	Yes	–	Transmit Error (Tx_ER)
13	–	Yes	–	Transmit Enable (Tx_EN)
3	–	Yes	–	MII Data Clock (MDC)
4–7	Yes	–	–	Receive Data (RxD)
9	Yes	–	–	Receive Clock (Rx_CLK)
10	Yes	–	–	Receive Error (Rx_ER)
8	Yes	–	–	Receive Data Valid (Rx_DV)
18	Yes	–	–	Collision (COL)
19	Yes	–	–	Carrier Sense (CRS)
2	–	–	Yes	MII Data Input/Output (MDIO)
22–39	–	–	–	Common (ground)
1, 20, 21, 40	–	–	–	+5.0 volts (V)

<sup>1</sup> Any pins not indicated are not used.

<sup>2</sup> Tx\_CLK and Rx\_CLK are generated by the external transceiver.

## Fast Ethernet Overview

The term *Ethernet* is commonly used for all carrier sense multiple access collision detect (CSMA/CD), LANs that generally conform to Ethernet specifications, including Fast Ethernet under IEEE 802.3u.

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**Note** 100BaseTX is intended for Environment A, and 100BaseFX is intended for Environment B.

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IEEE 802.3u is well suited to applications where a local communication medium must carry sporadic, occasionally heavy traffic at high peak data rates. Stations on a CSMA/CD LAN can access the network at any time. Before sending data, the station *listens* to the network to see if it is already in use. If it is, the station waits until the network is not in use, then transmits; this is half-duplex operation. A collision occurs when two stations listen for network traffic, hear none, and transmit almost simultaneously. When this happens, both transmissions are damaged, and the stations must retransmit. The stations detect the collision and use backoff algorithms to determine when they should retransmit.

Both Ethernet and IEEE 802.3u are broadcast networks, which means that all stations see all transmissions. Each station must examine received frames to determine whether it is the intended destination and, if it is, pass the frame to a higher protocol layer for processing.

IEEE 802.3u specifies the following different physical layers for 100BaseT:

- 100BaseTX—100BaseT, half and full duplex over Category 5 unshielded twisted-pair (UTP), Electronics Industry Association/Telecommunications Industry Association [EIA/TIA]-568-compliant cable
- 100BaseFX—100BaseT, half and full duplex over optical fiber
- 100BaseT4—100BaseT, half and full duplex over Category 3, 4, or 5 UTP or foil twisted-pair (FTP) cabling with four pairs; also called *4T+* or *T2*, which is 2-pair UTP over Category 3 cable.

Each physical layer protocol has a name that summarizes its characteristics in the format *speed/signaling method/segment length*, where *speed* is the LAN speed in Mbps, *signaling method* is either baseband or broadband, and *segment length* is typically the maximum length between stations in hundreds of meters. Therefore, 100BaseT specifies a 100-Mbps, baseband LAN with maximum network segments.

## IEEE 802.3u 100BaseT Specifications

Table 1-3 lists the cabling specifications for 100-Mbps Fast Ethernet transmission over UTP, FTP, and fiber-optic cables. Table 1-4 summarizes IEEE 802.3u 100BaseT physical characteristics.

**Table 1-3 Specifications and Connection Limits for 100-Mbps Transmission**

Parameter	RJ-45	MII	SC-Type
Cable specification	Category 5 <sup>1</sup> UTP <sup>2</sup> , 22 to 24 AWG	Category 3, 4, or 5, 150-ohm UTP or FTP, or multimode optical fiber	62.5/125 multimode optical fiber
Maximum cable length	–	1.64 ft (0.5 m) (MII-to-MII cable <sup>3</sup> )	–
Maximum segment length	328 ft (100 m) for 100BaseTX	3.28 ft (1 m) <sup>4</sup> or 1,312 ft (400 m) for 100BaseFX	328 ft (100 m)
Maximum network length	656 ft (200 m) <sup>4</sup> (with 1 repeater)	–	656 ft (200 m) <sup>4</sup> (with 1 repeater)

1 EIA/TIA-568 or EIA-TIA-568 TSB-36 compliant.

2 Cisco Systems does not supply Category 5 UTP RJ-45 or 150-ohm FTP MII cables. Both are available commercially.

3 This is the cable between the MII port on the PA-FE port adapter and the appropriate transceiver.

4 This length is specifically between any two stations on a repeated segment.

**Table 1-4 IEEE 802.3u Physical Characteristics**

Parameter	100BaseFX	100BaseTX
Data rate (Mbps)	100	100
Signaling method	Baseband	Baseband
Maximum segment length (meters)	100 m between repeaters	100 m between DTE <sup>1</sup> and repeaters
Media	SC-type: dual simplex or single duplex for Rx and Tx	RJ-45MII
Topology	Star or Hub	Star or Hub

1 DTE = data terminal equipment.



# Preparing for Installation

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This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-FE-TX and PA-FE-FX Fast Ethernet port adapters. The chapter contains the following sections:

- List of Parts and Tools, page 2-1
- Software and Hardware Requirements, page 2-2
- Safety Guidelines, page 2-3
- FCC Class B Compliance, page 2-6

## List of Parts and Tools

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-FE-TX(=) or PA-FE-FX(=) port adapter, and one of the following:
  - VIP2-15(=), VIP2-20, VIP2-40(=), or VIP2-50(=) (For specific VIP2 model information, see the “Software and Hardware Requirements” section on page 2-2)
  - Cisco 7100 series router with at least one available port adapter slot
  - Cisco 7200 series router with at least one available port adapter slot
  - Cisco uBR7200 series universal broadband router with at least one available port adapter slot
- Cables appropriate for the port adapter’s interfaces (RJ-45 and multimode optical fiber 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
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, FRUs, and spares

## Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the PA-FE-TX and PA-FE-FX in supported router platforms.

**Table 2-1 PA-FE-TX and PA-FE-FX Software Requirements**

Router Platform	Recommended Minimum Cisco IOS Release
<b>Cisco 7000 series and Cisco 7500 series</b>	
• With VIP2-15(=) or VIP2-40(=)	Cisco IOS Release 11.1(472) or a later release of Cisco IOS Release 11.1 Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.2(1) or a later release of Cisco IOS Release 11.2 Cisco IOS Release 11.2(5)P or a later release of Cisco IOS Release 11.2 P
• With VIP2-50(=)	Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1 CA
<b>Cisco 7200 series</b>	
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0 T
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(472) or a later release of Cisco IOS Release 11.1 Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.2(1) or a later release of Cisco IOS Release 11.2 Cisco IOS Release 11.2(5)P or a later release of Cisco IOS Release 11.2 P
• 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 7206 router shelf	Cisco IOS Release 11.3(2)AA or a later release of Cisco IOS Release 11.3 AA
<b>Cisco uBR7200 series</b>	
• Cisco uBR7246 and Cisco uBR7223	Cisco IOS Release 11.3(7)NA or a later release of Cisco IOS Release 11.3 NA Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0 T
<b>Cisco 7100 series</b>	
• Cisco 7120 series and Cisco 7140 series	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0 T

In Cisco 7000 series or Cisco 7500 series routers, PA-FE-FX and PA-FE-TX require the following VIP2 models:

- VIP2-15 (1 MB of SRAM, 8 MB of DRAM)
- VIP2-40 (2 MB of SRAM, 32 MB of DRAM)
- VIP2-50 (4 to 8 MB of SRAM, 32 to 128 MB of DRAM)

**Note** The minimum recommended VIP2 model is a VIP2-15. The maximum transmission unit (MTU) size available for two Fast Ethernet port adapters on a VIP2 require the additional VIP2 SRAM available on VIP2-15 models, or greater, to ensure adequate packet buffers. The VIP2-15 can also be used if you only have one Fast Ethernet port adapter on a VIP2.

The VIP2-10 has certain configuration constraints because of its limited SRAM for packet buffers; therefore, we do not recommend you use VIP2-10 with Fast Ethernet port adapters.



**Caution** The VIP2 requires that Cisco 7000 series routers have the RSP7000 and RSP7000CI installed. The VIP2 will *not* operate properly with the Route Processor (RP), Switch Processor (SP), or Silicon Switch Processor (SSP) installed in a Cisco 7000 series router.

## Safety Guidelines

Following are 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 være 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.

**Warning!** 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 förekommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

## 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, can result 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 component board 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.

## FCC Class B Compliance

The equipment described in this document generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

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.

# VIP2 and the PA-FE Port Adapters

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This chapter provides information on the PA-FE-TX and the PA-FE-FX port adapters and their use in the VIP2 in Cisco 7000 series and Cisco 7500 series routers. This chapter contains the following sections:

- Installation Overview, page 3-1
- Removing a Port Adapter, page 3-4
- Installing a Port Adapter, page 3-6

## Installation Overview

Depending on the circumstances, you might need to install a new port adapter on a VIP2 motherboard or replace a failed port adapter in the field. In either case, you need a number 1 Phillips screwdriver, an antistatic mat onto which you can place the removed interface processor, and an antistatic container into which you can place a failed port adapter for shipment back to the factory.



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

---

**Note** Each port adapter circuit board is mounted to a metal carrier and is sensitive to ESD damage. Each port adapter has one Phillips-head screw that secures it to its port adapter slot. We strongly recommend that the following procedures be performed by a Cisco-certified service provider; however, this is not a requirement.

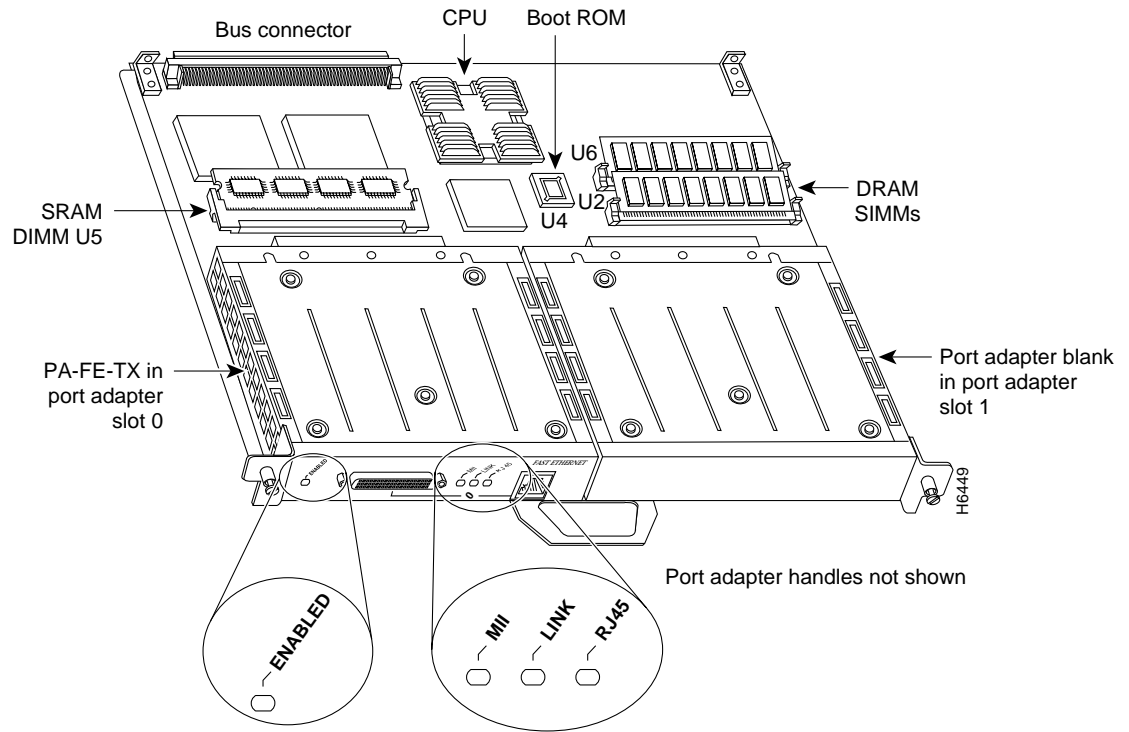
While the VIP2 supports online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then install or replace port adapters as required. If a blank port adapter is installed on the VIP2 in which you want to install a new port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

---

When only one port adapter is installed on a VIP2, a blank port adapter must fill the empty slot to allow the VIP2 and router chassis to conform to electromagnetic interference (EMI) emissions requirements and to allow proper air flow through the chassis. If you plan to install a new port adapter, you must first remove the blank port adapter.

The PA-FE-TX and PA-FE-FX can be installed in either port adapter slot 0 or port adapter slot 1 on the VIP2. Figure 3-1 shows a PA-FE-TX installed in port adapter slot 0 on a VIP2-15 or VIP2-40. Figure 3-2 shows a PA-FE-FX installed in port adapter slot 0 on a VIP2-15 or VIP2-40.

**Figure 3-1** VIP2-15 or VIP2-40 with a PA-FE-TX in Port Adapter Slot 0



**Note** The PA-FE-FX has the MII connector like the PA-FE-TX, but has an SC-type fiber-optic connector in place of the RJ-45 connector.



**Figure 3-2 VIP2-15 or VIP2-40 with a PA-FE-FX in Port Adapter Slot 0**

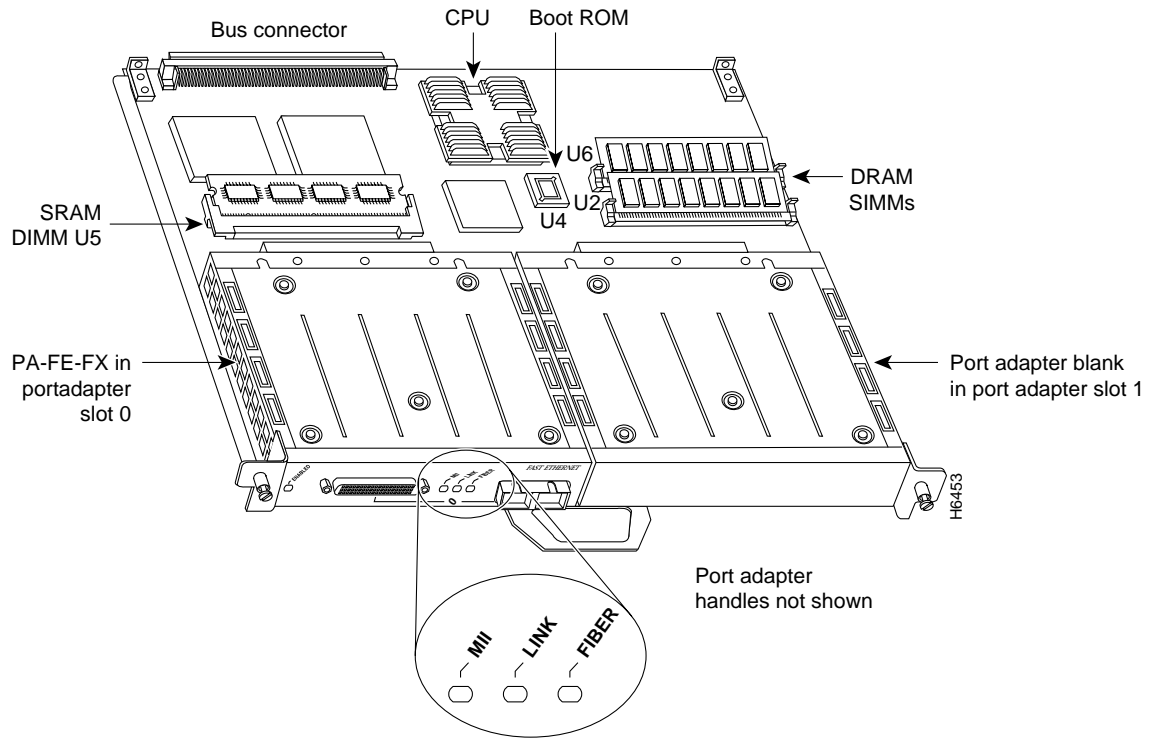


Figure 3-3 shows a PA-FE-TX installed in port adapter slot 0 on a VIP2-50. Figure 3-4 shows a PA-FE-FX installed in port adapter slot 0 on a VIP2-50.

**Figure 3-3 VIP2-50 with an PA-FE-TX in Port Adapter Slot 0**

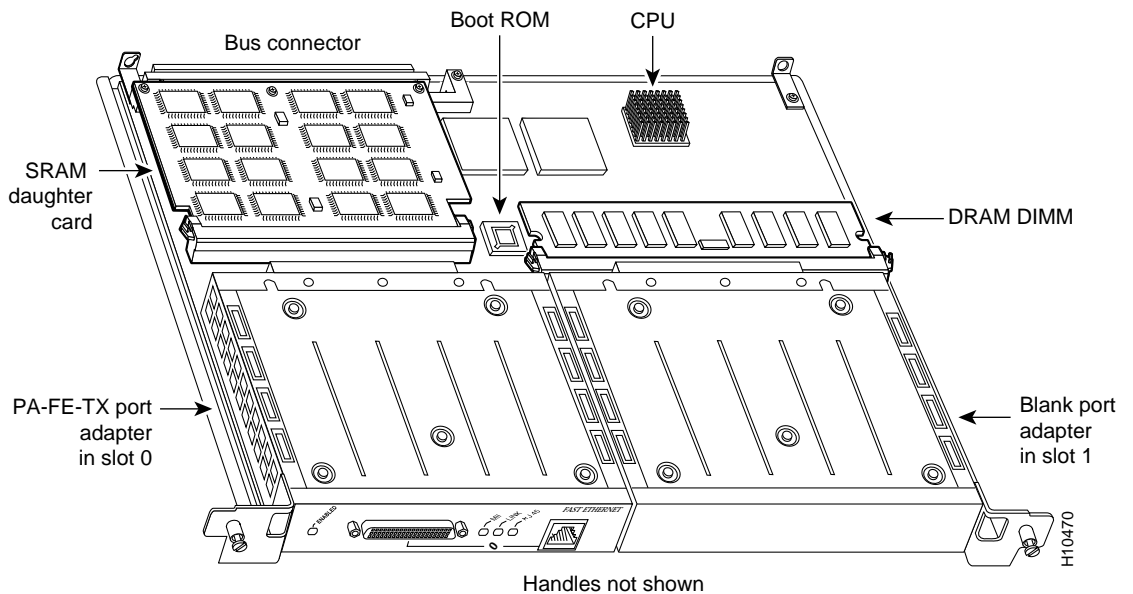
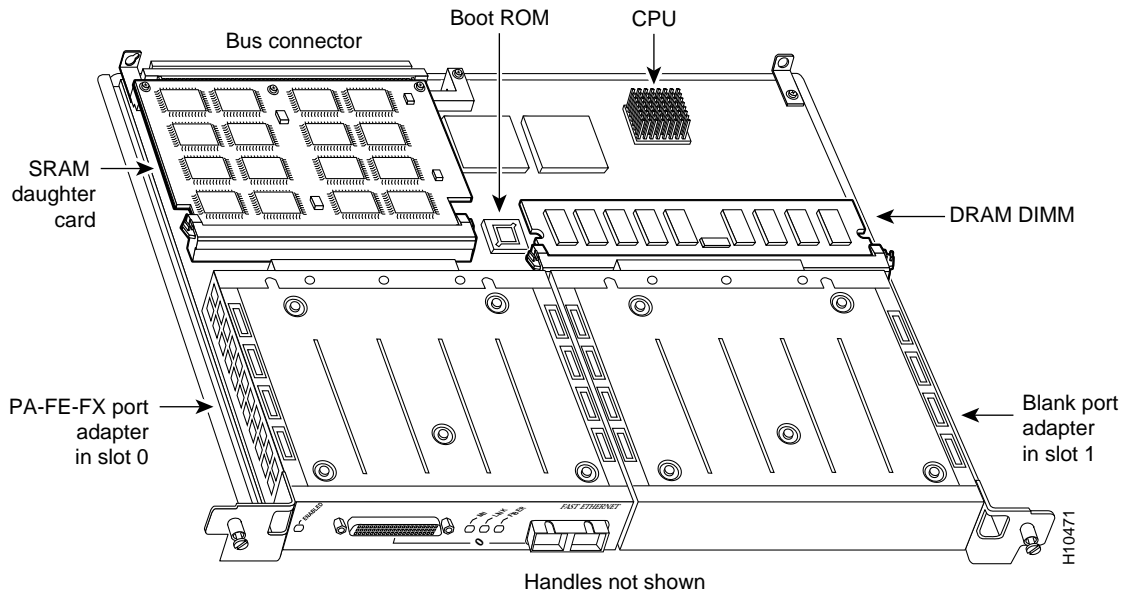


Figure 3-4 VIP2-50 with an PA-FE-FX in Port Adapter Slot 0



## Removing a Port Adapter

Use the following standard procedure to remove a port adapter from a VIP2:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.



**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

---

**Note** If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

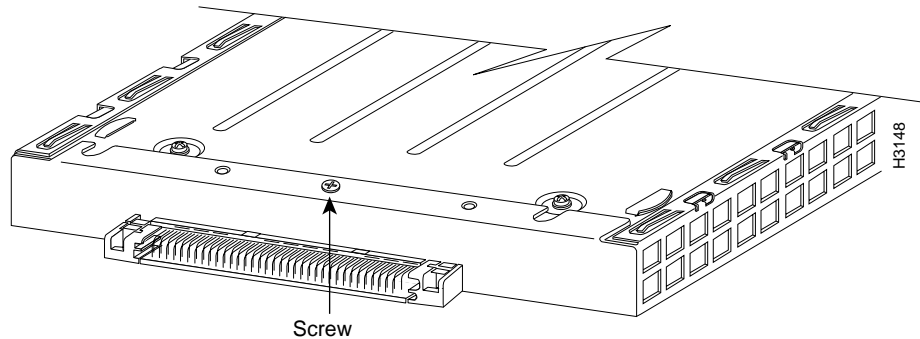
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**Step 2** For a new port adapter installation or a port adapter replacement, disconnect any interface cables from the ports on the front of the port adapter (although this is not required). You can remove VIP2s with cables attached; however, we do not recommend it.

**Step 3** Remove the VIP2 from the system. To do so, follow the steps in the section “Removing a VIP2” in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*, which shipped with your VIP2. Place the removed VIP2 on an antistatic mat.

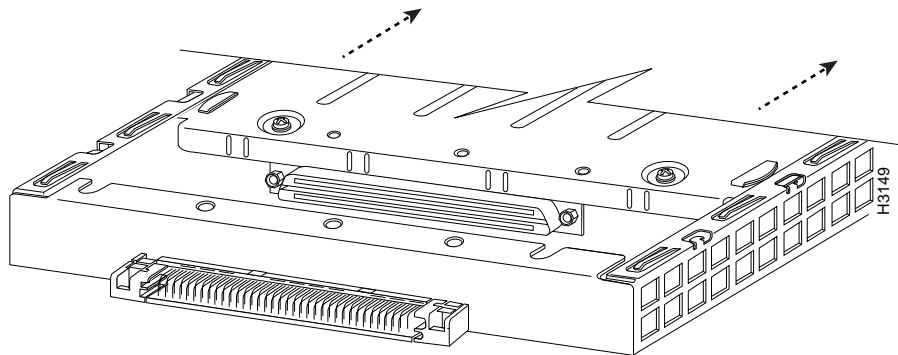
- Step 4** Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See Figure 3-5.) This screw secures the port adapter (or blank port adapter) to its slot.

**Figure 3-5 Location of Port Adapter Screw—Partial Port Adapter**



- Step 5** Remove the screw that secures the port adapter (or blank port adapter).
- Step 6** 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 Figure 3-6.)

**Figure 3-6 Pulling a Port Adapter Out of a Slot—Partial Port Adapter**



- Step 7** If you removed a port adapter, place it in an antistatic container for safe storage or shipment back to the factory. If you removed a blank port adapter, no special handling is required; however, store the blank port adapter for potential future use.

This completes the procedure for removing a port adapter from a VIP2.

## Installing a Port Adapter

Use the following standard procedure to install a port adapter on a VIP2:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

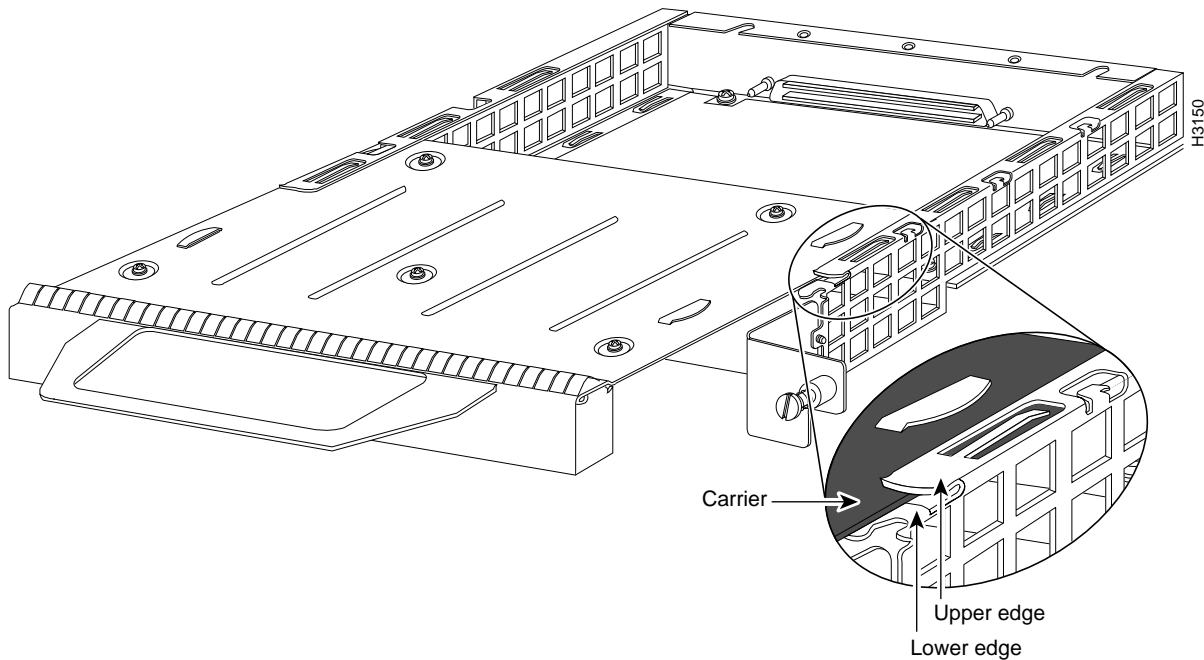


**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

**Step 2** Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See Figure 3-6.)

**Step 3** Carefully align the port adapter carrier between the upper and lower edges of the port adapter slot, as shown in Figure 3-7.

Figure 3-7 Installing a New Port Adapter



**Caution** To prevent jamming the carrier between the upper and lower edges of the port adapter slot, and to ensure that the edge connector at the rear of the port adapter seats in the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and lower slot edges, as shown in the cutaway in Figure 3-7.



**Caution** To ensure a positive ground attachment between the port adapter carrier and the VIP2 motherboard and port adapter slot, and to ensure that the connectors at the rear of the port adapter and slot seat properly, the carrier must be between the upper and lower slot edges.

- 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 on the motherboard.
- Step 5** Replace the screw in the rear of the port adapter slot. (See Figure 3-5 for its location.) Do not overtighten this screw.
- Step 6** Reinstall the VIP2 in the system. To do so, follow the steps in the section “Installing a VIP2” in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*, which shipped with your VIP2.
- Step 7** If the interface cables are disconnected, reconnect the interface cables to the port adapters.

This completes the procedure for installing any type of port adapter on the VIP2. Proceed to Chapter 7, “Installing PA-FE Port Adapter Interface Cables,” to connect the necessary cables to your port adapter.



# Cisco 7200 Series and the PA-FE Port Adapters

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This chapter provides information on the PA-FE-TX and PA-FE-FX port adapters and their use in the Cisco 7200 series routers. This chapter contains the following sections:

- Installation Overview, page 4-1
- Removing a Port Adapter, page 4-2
- Installing a Port Adapter, page 4-4

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**Note** The Cisco 7206VXR and the Cisco 7206 can be used as router shelves in a Cisco AS5800 Universal Access Server. For information about the Cisco 7206VXR and the Cisco 7206 as router shelves, see the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.

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## Installation Overview

You might need to install a new port adapter in a Cisco 7200 series router or replace a failed port adapter in the field. In either case, no tools are necessary; all port adapters available for the Cisco 7200 series routers connect directly to the router midplane and are locked into position by a port adapter lever. When removing and replacing a port adapter, you need an antistatic mat onto which you can place a removed port adapter and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

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**Note** Cisco 7200 series routers support online insertion and removal (OIR); therefore, you do not have to power down the routers when removing and replacing a PA-FE.

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When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to 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 a blank port adapter.

The PA-FE-TX and PA-FE-FX can be installed in any available port adapter slot in Cisco 7200 series routers. Figure 4-1 shows a Cisco 7206 with a PA-FE-TX installed in slot 4.

Figure 4-1 Cisco 7206 with a PA-FE-TX in Slot 4

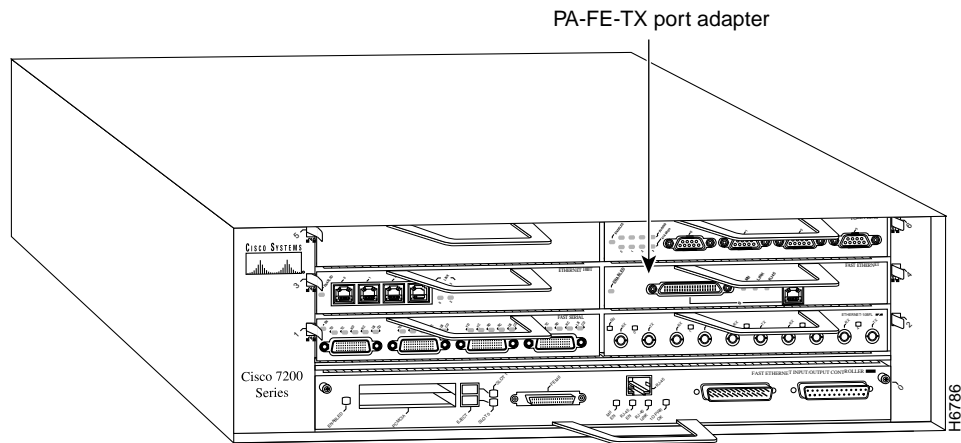
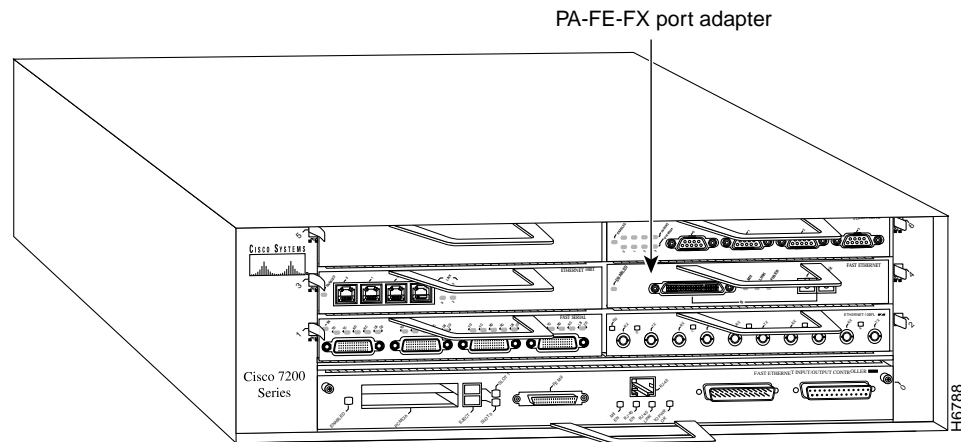


Figure 4-2 shows a Cisco 7206 with a PA-FE-FX installed in slot 4.

Figure 4-2 Cisco 7206 with an PA-FE-FX in Slot 4



**Note** The PA-FE-FX has the MII connector like the PA-FE-TX, but has an SC-type fiber-optic connector in place of the RJ-45 connector.

## Removing a Port Adapter

Use the following procedure to remove a port adapter from a Cisco 7200 series router:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

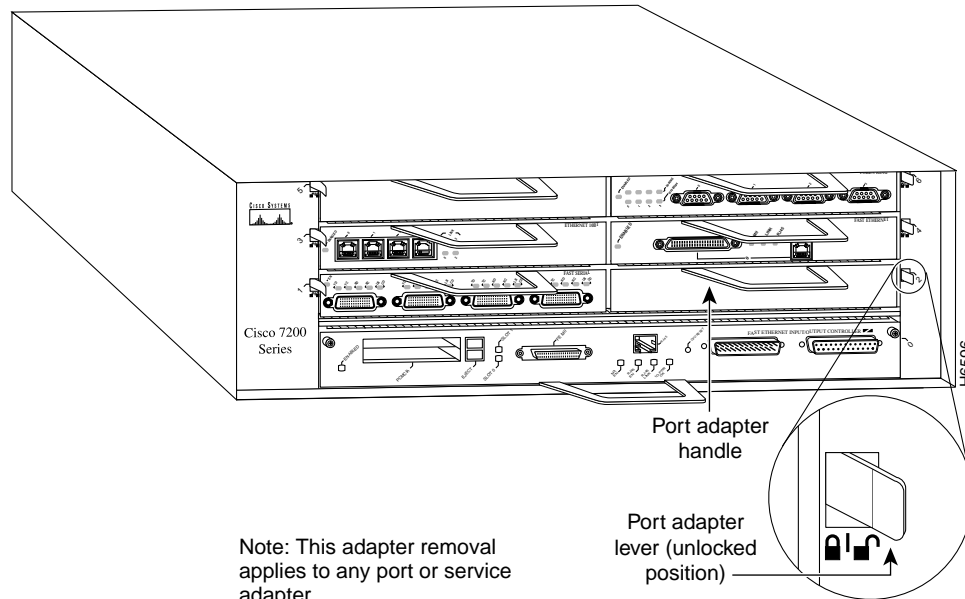


**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

**Step 2** Place the port adapter lever for the desired port adapter slot in the unlocked position. The lever remains in the unlocked position. (See Figure 4-3.)



**Figure 4-3** Placing the Port Adapter Lever in the Unlocked Position—Cisco 7206



Note: This adapter removal applies to any port or service adapter.

**Step 3** Grasp the handle on the port adapter and pull the port adapter from the midplane, about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the port adapter slot.

**Note** As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

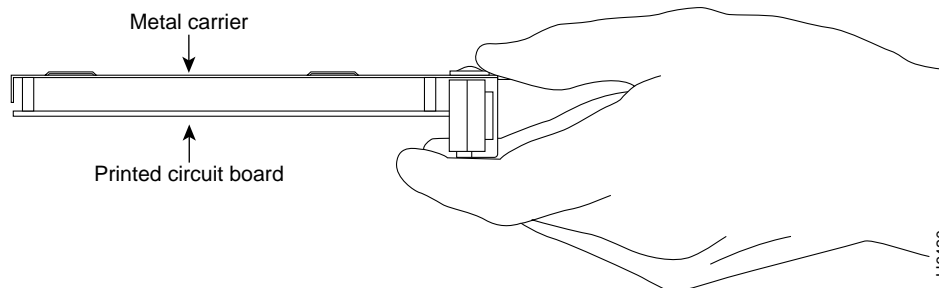
**Step 4** With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

**Step 5** After disconnecting the cables, pull the port adapter from its port adapter slot.



**Caution** Always handle the port adapter by the carrier edges and handle; never touch the port adapter's components or connector pins. (See Figure 4-4.)

**Figure 4-4** Handling a Port Adapter



**Step 6** Place the port adapter on an antistatic surface with its components facing upward or in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.

This completes the procedure for removing a port adapter from a Cisco 7200 series router.

## Installing a Port Adapter

Use the following procedure to install a new port adapter in a Cisco 7200 series router:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

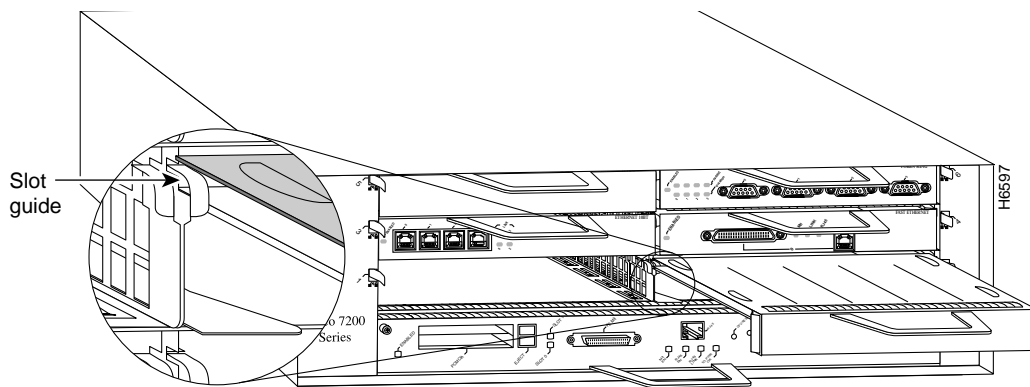


**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

**Step 2** Use both hands to grasp the port adapter by its metal carrier edges and position the port adapter so that its components face downward. (See Figure 4-4.)

**Step 3** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 4-5.)

**Figure 4-5** Aligning the Port Adapter Metal Carrier Between the Slot Guides—Cisco 7206



Note: This adapter alignment applies to any port or service adapter.

**Step 4** With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



**Caution** Do not slide the 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.

**Step 5** With the port adapter halfway in the slot, connect all required cables to the port adapter.

**Step 6** After connecting the cables, carefully slide the port adapter all the way into the slot until you feel the port adapter's connectors make contact with the midplane.

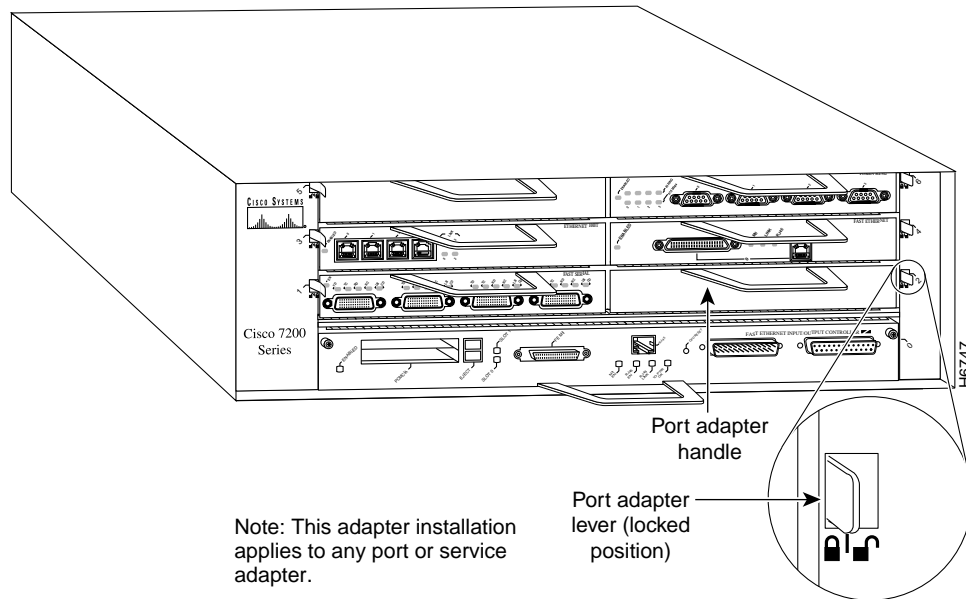
**Step 7** Move the port adapter lever to the locked position. Figure 4-6 shows the lever in the locked position.

---

**Note** If the lever 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 to the locked position.

---

**Figure 4-6** Placing the Port Adapter Lever in the Locked Position—Cisco 7206



This completes the procedure for installing a new port adapter in a Cisco 7200 series router. Proceed to Chapter 7, “Installing PA-FE Port Adapter Interface Cables,” to connect the necessary cables to your port adapter.



# Cisco uBR7200 Series and the PA-FE Port Adapters

---

This chapter provides information on the PA-FE-TX and PA-FE-FX port adapters and their use in Cisco uBR7200 series universal broadband routers. This chapter contains the following sections:

- Installation Overview, page 5-1
- Removing a Port Adapter, page 5-2
- Installing a Port Adapter, page 5-4

## Installation Overview

You might need to install a new port adapter in a Cisco uBR7200 series universal broadband router or replace a failed port adapter in the field. In either case, no tools are necessary; all port adapters available for the Cisco uBR7200 series connect directly to the router midplane and are locked into position by a port adapter lever (Cisco uBR7223) or retention clip (Cisco UBR7246). When removing and replacing a port adapter, you need an antistatic mat onto which you can place a removed port adapter and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

---

**Note** Cisco uBR7200 series universal broadband routers support online insertion and removal (OIR); therefore, you do not have to power down the routers when removing and replacing a PA-FE.

---

When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to 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 a blank port adapter.

The PA-FE-TX and PA-FE-FX can be installed in any of the available port adapter slots in a Cisco uBR7200 series universal broadband router. Figure 5-1 shows a PA-FE-TX installed in port adapter slot 2 of a Cisco uBR7200 series router.

**Figure 5-1 Cisco uBR7200 Series with a PA-FE-TX in Slot 2—Cisco uBR7246**

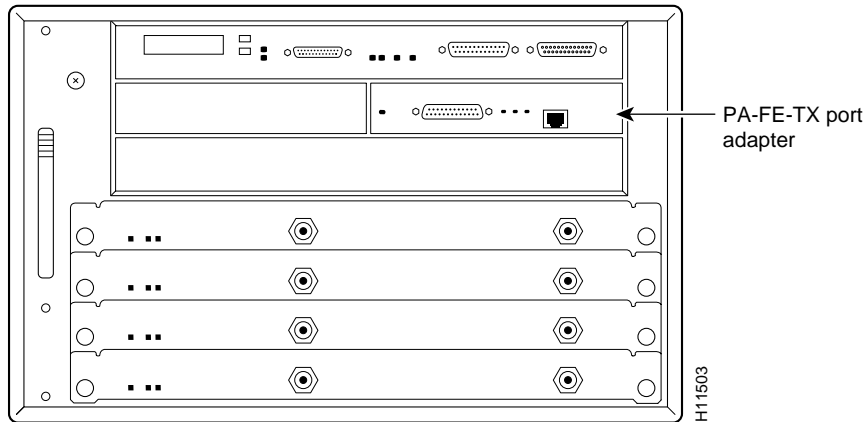
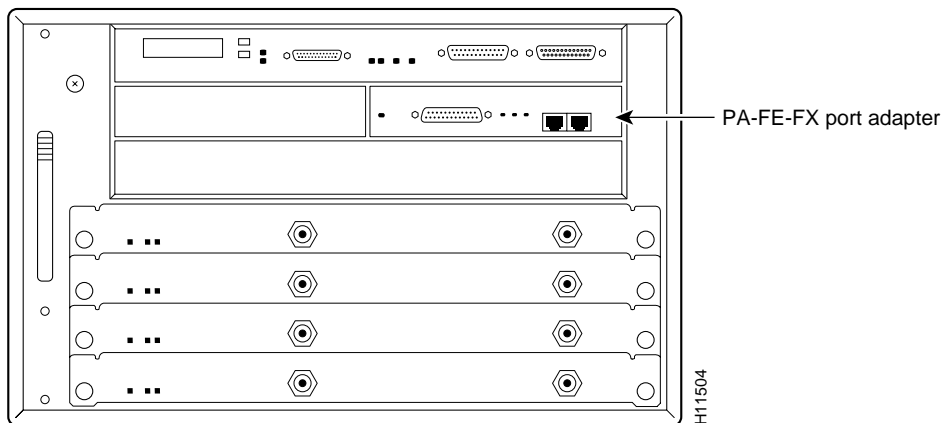


Figure 5-2 shows a PA-FE-FX installed in slot 2 of a Cisco uBR7200 series router.

**Figure 5-2 Cisco uBR7200 Series with an PA-FE-FX in Slot 2—Cisco uBR7246**



## Removing a Port Adapter

Use the following procedure to remove a port adapter from a Cisco uBR7200 series universal broadband router:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

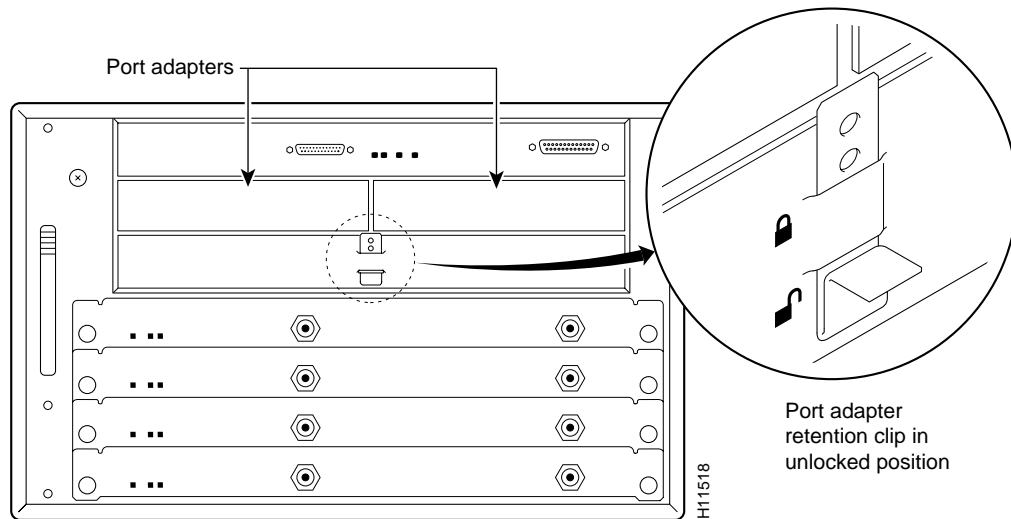


**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

**Step 2** Unlock the retaining mechanism of the port adapter:

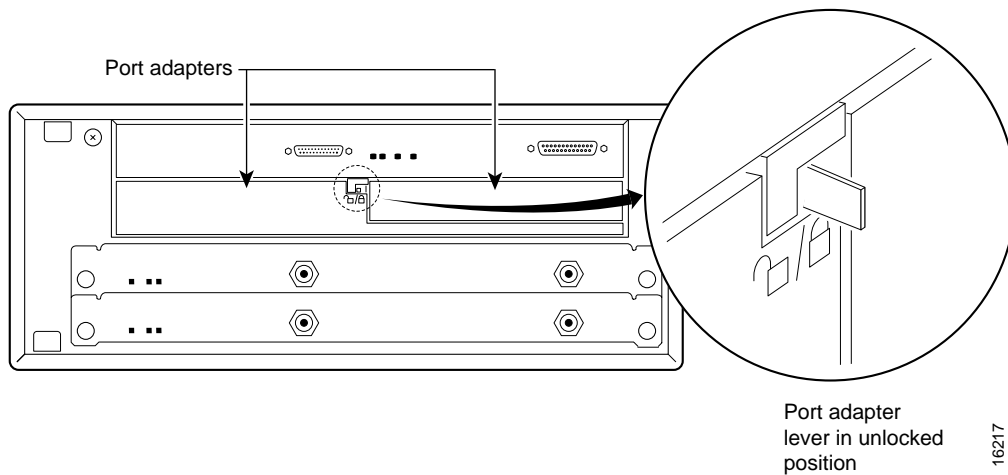
- For a Cisco uBR7246, slide the port adapter retention clip for the desired port adapter slot down in the unlocked position. The retention clip remains in the unlocked position. (See Figure 5-3.)

**Figure 5-3** Placing the Port Adapter Retention Clip in the Unlocked Position—Cisco uBR7246



— For a Cisco uBR7223, place the port adapter lever in the unlocked position. (See Figure 5-4.)

**Figure 5-4** Placing the Port Adapter Lever in the Unlocked Position—Cisco uBR7223



**Step 3** Grasp the handle on the port adapter and pull the port adapter from the router midplane, 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.

---

**Note** As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

---

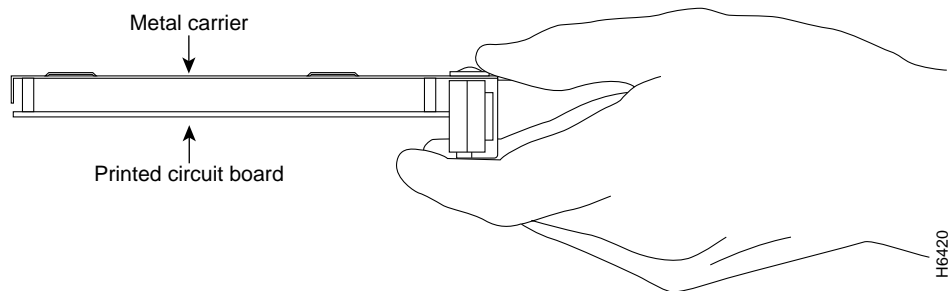
**Step 4** With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

**Step 5** After disconnecting the cables, pull the port adapter from its chassis slot.



**Caution** Always handle the port adapter by the carrier edges and handle; never touch the port adapter's components or connector pins. (See Figure 5-5.)

**Figure 5-5 Handling a Port Adapter**



**Step 6** Place the port adapter on an antistatic surface with its components facing upward, or in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.

This completes the procedure for removing a port adapter from a Cisco uBR7200 series universal broadband router.

## Installing a Port Adapter

Use the following procedure to install a new port adapter in a Cisco uBR7200 series universal broadband router:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

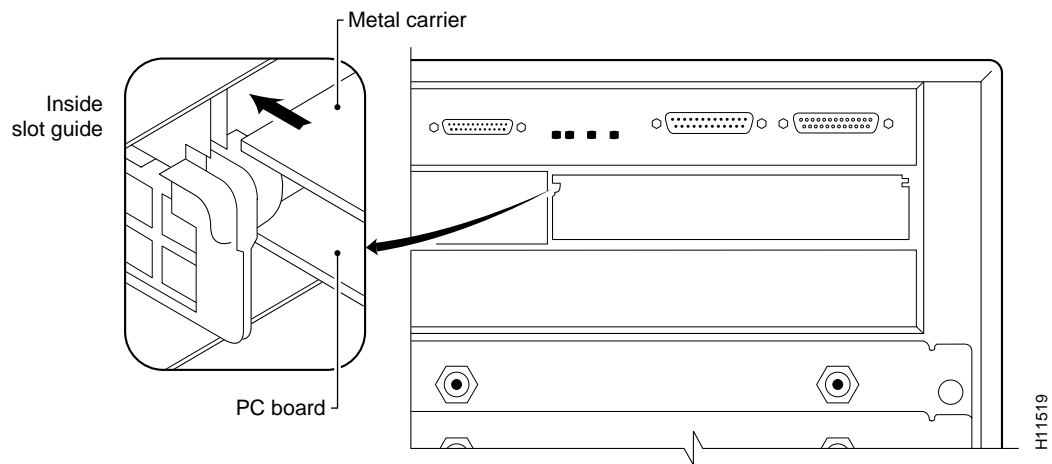


**Warning** During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

**Step 2** Use both hands to grasp the port adapter by its metal carrier edges and position the port adapter so that its components are downward. (See Figure 5-5.)

**Step 3** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 5-6.)



**Figure 5-6** Aligning the Port Adapter Metal Carrier Between the Slot Guides

**Step 4** With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



**Caution** Do not slide the 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.

**Step 5** With the port adapter halfway in the slot, connect all required cables to the port adapter.

**Step 6** After connecting the cables, carefully slide the port adapter all the way into the slot until you feel the port adapter's connectors make contact with the midplane.

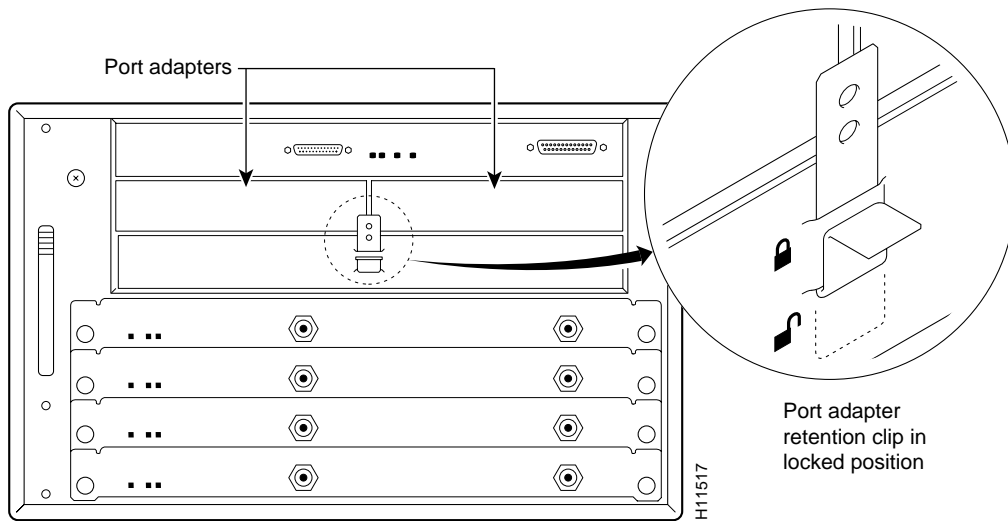
**Step 7** For a Cisco uBR7246, slide the port adapter retention clip to the locked position. Figure 5-7 shows the retention clip in the locked position.

---

**Note** If the retention clip does not slide up to the locked position, the port adapter is not completely seated in the midplane. Slide the retention clip completely down to the unlocked position. Carefully pull the port adapter halfway out of the slot, reinsert it, and slide the retention clip up to the locked position.

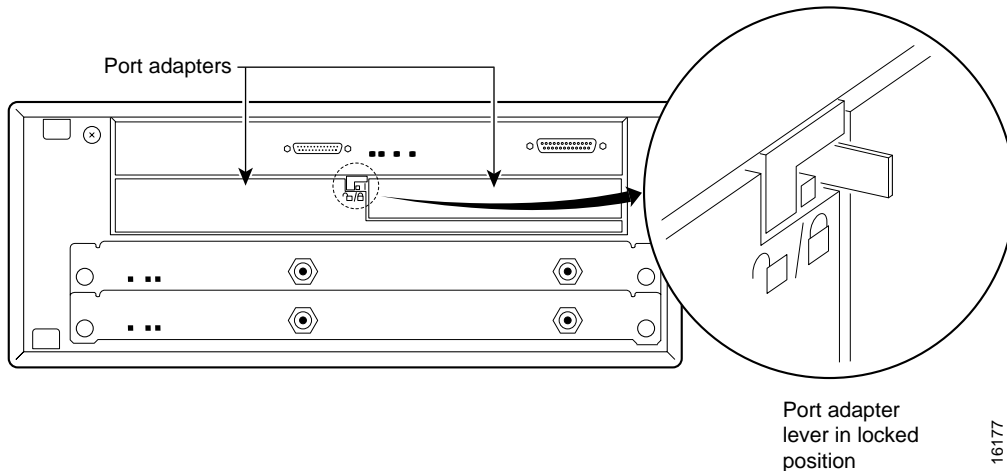
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**Figure 5-7** Placing the Port Adapter Retention Clip in the Locked Position—Cisco uBR7246



For a Cisco uBR7223, place the port adapter lever in the locked position. (See Figure 5-8.)

**Figure 5-8** Placing the Port Adapter Lever in the Locked Position—Cisco uBR7223



---

**Note** If the port adapter lever 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 to the locked position.

---

This completes the procedure for installing a new port adapter or replacing a port adapter in a Cisco uBR7200 series universal broadband router. Proceed to Chapter 7, “Installing PA-FE Port Adapter Interface Cables,” to connect the necessary cables to your port adapter.

# Cisco 7100 Series and the PA-FE-TX and PA-FE-FX

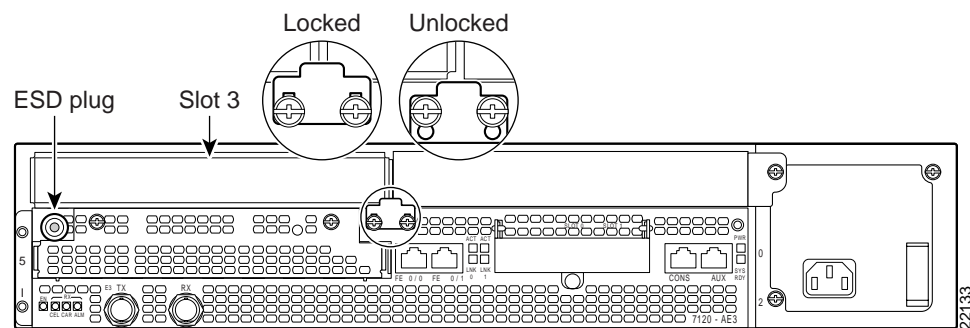
This chapter provides information on the PA-FE-TX and PA-FE-FX port adapters and their use in Cisco 7100 series routers. This chapter contains the following sections:

- Installation Overview, page 6-1
- Removing a Port Adapter, page 6-2
- Installing a Port Adapter, page 6-3

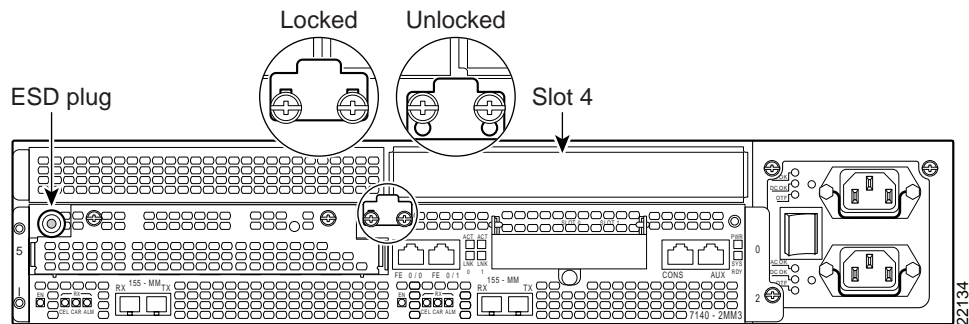
## Installation Overview

The PA-FE-TX and PA-FE-FX can be installed in port adapter slot 3 in the Cisco 7120 series and in port adapter slot 4 in the Cisco 7140 series. Figure 6-1 shows port adapter slot 3 of a Cisco 7120 series router. Figure 6-2 shows port adapter slot 4 of a Cisco 7140 series router.

**Figure 6-1 Cisco 7120 Series Router—Port Adapter Slot 3 Location**



**Figure 6-2 Cisco 7140 series Router—Port Adapter Slot 4 Location**



Depending on your circumstances, you might need to install a new port adapter in a Cisco 7100 series router or replace a failed port adapter in the field. All port adapters available for the Cisco 7100 series connect directly to the router and are locked into position by a locking tab with two screws (see Figure 6-1 or Figure 6-2). You need a number 2 Phillips screwdriver to loosen the screws.

---

**Note** Cisco 7100 series routers support online insertion and removal (OIR); therefore, you do not have to power down the router when removing and replacing a port adapter.

---

When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to 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 a blank port adapter.

## Removing a Port Adapter

Use the following procedure to remove a port adapter from a Cisco 7100 series router:

- Step 1** Attach an ESD-preventive wrist strap between you and the chassis. (See Figure 6-1 or Figure 6-2 for the location of the ESD plug.)
- Step 2** Use a number 2 Phillips screwdriver to loosen the screws on the locking tab; then slide the tab down to the unlocked position. (See Figure 6-1 or Figure 6-2.)
- Step 3** Grasp the handle on 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.

---

**Note** As you disengage the port adapter from the router, OIR administratively shuts down all active interfaces on the port adapter.

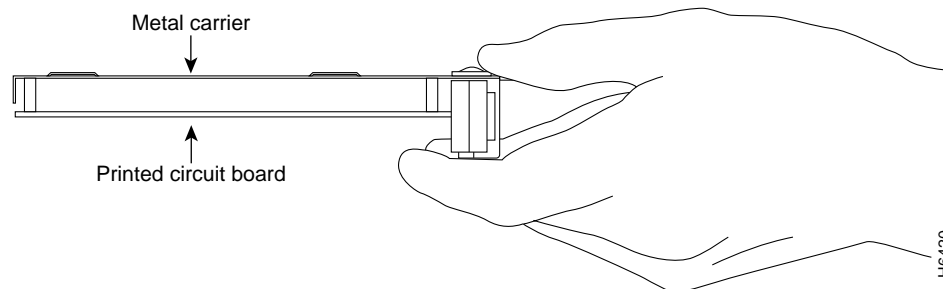
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- Step 4** With the port adapter halfway out of the slot, disconnect all cables from the port adapter.
- Step 5** After disconnecting the cables, pull the port adapter from its chassis slot.



**Caution** Always handle the port adapter by the carrier edges and handle; never touch the port adapter's components or connector pins. (See Figure 6-3.)

**Figure 6-3 Handling a Port Adapter**



- Step 6** Place the port adapter on an antistatic surface with its components facing upward, or in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.
- Step 7** Install a blank port adapter or replacement port adapter to maintain proper flow of cooling air across the internal components and move the port adapter lever to the locked position and secure. For procedures on how to install a port adapter, see the next section, “Installing a Port Adapter”.

---

**Note** The blank port adapter is available from Cisco Systems as a spare. The blank port adapter product number is MAS-7100-PABLANK.

---

This completes the procedure for removing a port adapter from a Cisco 7100 series router.

## Installing a Port Adapter

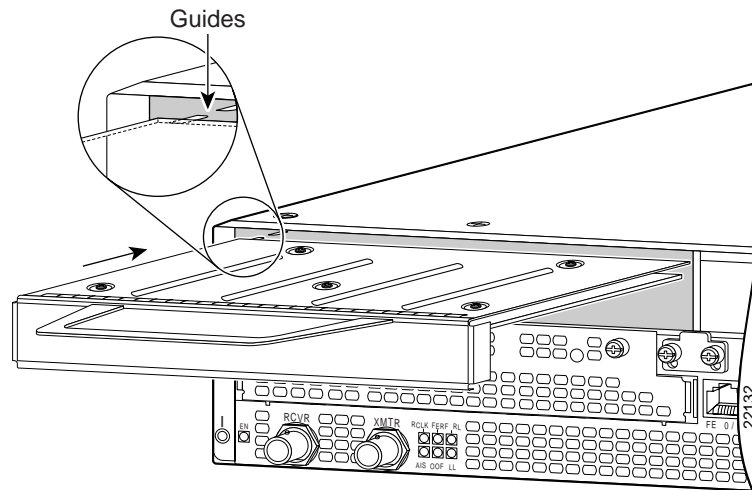
Use the following procedure to install a new port adapter in a Cisco 7100 series router:

- Step 1** Attach an ESD-preventive wrist strap between you and the chassis. (See Figure 6-1 or Figure 6-2 for the location of the ESD plug.)
- Step 2** Ensure that the locking tab is down in the unlocked position. If it is locked, use a number 2 Phillips to loosen the screws; then slide the tab down to the unlocked position. (See Figure 6-1 or Figure 6-2.)
- Step 3** Remove the new port adapter from its antistatic container and position it at the opening of the slot.
- Step 4** Use both hands to grasp the port adapter by its metal carrier edges, and position the port adapter so that its components face downward. (See Figure 6-3.)
- Step 5** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 6-4.)
- Step 6** With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



**Caution** Do not slide the 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.

**Figure 6-4**     **Aligning the Single-Width Port Adapter Between the Slot Guides**



- Step 7**     With the port adapter halfway in the slot, connect all required cables to the port adapter.
- Step 8**     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.
- Step 9**     After seating the port adapter in the router, slide the locking tab up to the locked position and tighten the screws. (Figure 6-1 or Figure 6-2 shows the locking tab in the locked position.)

---

**Note** If the port adapter lever is not in the locked position, the port adapter is not completely seated in the router. Carefully pull the port adapter halfway out of the slot, reinsert it, and move the port adapter lever to the locked position.

---

This completes the procedure for installing a new port adapter in a Cisco 7100 series router. Proceed to Chapter 8, “Configuring PA-FE Port Adapter Interfaces,” to connect the necessary cables to your port adapter.

# Installing PA-FE Port Adapter Interface Cables

---

To continue your PA-FE-TX and PA-FE-FX port adapter installation, you must install the port adapter's interface cables. The following instructions apply to all supported platforms. This chapter contains the following sections:

- PA-FE Port Adapter RJ-45 and MII Connections, page 7-1
- Attaching PA-FE Port Adapter Interface Cables, page 7-1

## PA-FE Port Adapter RJ-45 and MII Connections

On a single PA-FE, you can use *either* the RJ-45 (or SC for PA-FE-FX) connection *or* the MII connection. (RJ-45, SC, and MII cables are not available from Cisco Systems; they are available from outside commercial cable vendors.) If you have two PA-FE port adapters on your VIP2, you can use the RJ-45 (or SC for PA-FE-FX) connection on one port adapter and the MII connection on the other port adapter.



**Caution** Before you attach your MII transceiver to the MII receptacle on your PA-FE, ensure that your MII transceiver responds to physical sublayer (PHY) address 0 per section 22.2.4.4. “PHY Address” of the IEEE 802.3u specification; otherwise, interface problems might result. Confirm that this capability is available on your MII transceiver with the transceiver's vendor or in the transceiver's documentation. If a selection for Isolation Mode is available, we recommend you use this setting (if no mention is made of PHY addressing).

## Attaching PA-FE Port Adapter Interface Cables

Use the following procedure to connect RJ-45, SC (PA-FE-FX), or MII cables:

**Step 1** If you have MII connections, attach an MII cable directly to the MII receptacle on the PA-FE or attach a 100BaseT transceiver, with the media appropriate to your application, to the MII receptacle on the PA-FE. (See Figure 7-1 for the PA-FE-TX and Figure 7-2 for the PA-FE-FX.)

If you have RJ-45 connections, attach the Category 5 UTP cable directly to the RJ-45 port on the PA-FE. (See Figure 7-1 for PA-FE-TX and Figure 7-2 for PA-FE-FX.) The PA-FE is an end station device and not a repeater. You *must* connect the PA-FE to a repeater or hub.

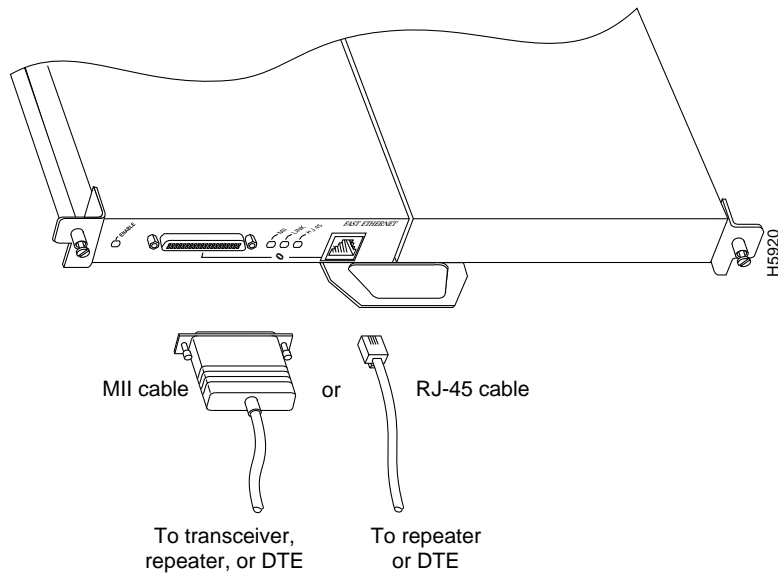
If you have an SC connection (PA-FE-FX), attach the cable directly to the SC port on the PA-FE-FX. (See Figure 7-2.) Use either one duplex SC connector or two simplex SC connectors, and observe the correct relationship between the receive (R) and transmit (T) ports on the PA-FE-FX and your repeater.

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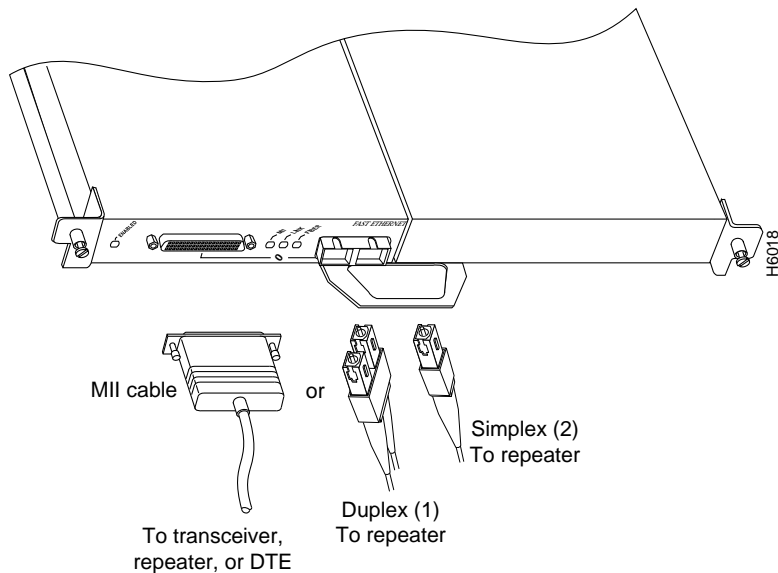
**Note** Each PA-FE-FX or PA-FE-TX can have *either* an MII attachment or an RJ-45 (or SC) attachment, but not both simultaneously. The MII and RJ-45 (or SC) receptacles represent two physical connection options for one Fast Ethernet interface.

---

**Figure 7-1 Connecting PA-FE-TX MII or RJ-45 Cables—Horizontal Orientation Shown Without Handles**



**Figure 7-2 Connecting PA-FE-FX MII or SC Cables—Horizontal Orientation Shown Without Handles**



**Warning** Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.

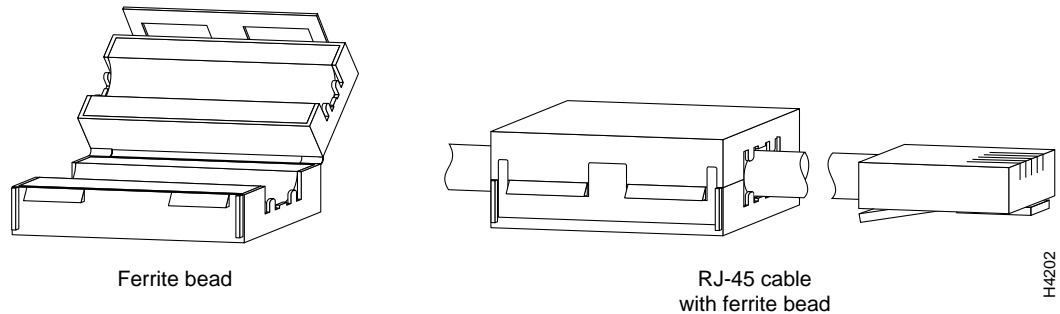


**Step 2** For the PA-FE-TX, attach the ferrite bead to the RJ-45 cable (at either end), as shown in Figure 7-3.



**Caution** The ferrite bead prevents electromagnetic interference (EMI) from affecting the PA-FE-TX-equipped system and is a required component for proper system operation.

**Figure 7-3 Attaching the Ferrite Bead around the RJ-45 Cable**



**Caution** To prevent problems on your PA-FE and network, do not simultaneously connect RJ-45 (or SC) and MII cables to one PA-FE. On a single PA-FE, only one network connection can be used at one time. Only connect cables that comply with EIA/TIA-568 standards. (See Table 1-1 and Table 1-2 in the “Receptacles, Cables, and Pinouts” section on page 1-5 for cable recommendations and specifications.)

**Step 3** Attach the network end of your RJ-45 (SC) or MII cable to your 100BaseT transceiver, switch, hub, repeater, DTE, or other external 100BaseT equipment.

---

**Note** After your MII transceiver is connected and the PA-FE interface is configured as up, you can verify that your MII transceiver responds to physical sublayer (PHY) address 0 by disconnecting the transceiver from the MII receptacle; if the PA-FE interface goes down, then your MII transceiver responds to PHY address 0.

---

This completes the PA-FE port adapter cable installation.



# Configuring PA-FE Port Adapter Interfaces

---

To continue your PA-FE-TX and PA-FE-FX port adapter installation, you must configure the PA-FE-TX and PA-FE-FX interfaces. The following instructions apply to all supported platforms. Minor differences between the platforms are noted. This chapter contains the following sections:

- Using the EXEC Command Interpreter, page 8-2
- Identifying Chassis Slot, Port Adapter Slot, and PA-FE Interface Port Numbers, page 8-2
- Performing a Basic Configuration, page 8-6
- Checking the Configuration, page 8-9

After you verify that the new PA-FE interface is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

- Protocols you plan to route on each new interface
- IP addresses if you plan to configure the interfaces for IP routing
- A decision about the use of bridging on the new interfaces

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.

For a summary of the configuration options available and instructions for configuring the Fast Ethernet interfaces on the supported platforms, refer to the documentation resources listed in the “Related Documentation” section on page vi.

---

**Note** You can configure each PA-FE interface on a PA-FE-TX or PA-FE-FX at 100 Mbps, half duplex or full duplex, for a maximum aggregate bandwidth of 200 Mbps. Half-duplex operation is the default.

You can configure each PA-FE interface on a PA-FE-TX or PA-FE-FX at 100 Mbps, half duplex, for a maximum aggregate bandwidth of 200 Mbps.

You can configure each PA-FE interface on a PA-FE-TX or PA-FE-FX port adapter at 100 Mbps, full duplex, for a maximum aggregate bandwidth of 400 Mbps.

You can configure one PA-FE interface at 100 Mbps, half duplex, and the second FE interface at 100 Mbps, full duplex, for a maximum aggregate bandwidth of 300 Mbps.

---

## Using the EXEC Command Interpreter

You modify the configuration of your router through the software command interpreter called the *EXEC*. You must enter the privileged level of the EXEC command interpreter (also called enable mode) with the **enable** command before you can use the **configure** command to configure a new interface or to 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#
```

If you installed a new PA-FE or if you want to change the configuration of an existing interface, you must enter configuration mode using the **configuration** command. If you replaced an interface that was previously configured, the system recognizes the new interface and brings it up in its existing configuration.

## Identifying Chassis Slot, Port Adapter Slot, and PA-FE Interface Port Numbers

The following section describes how to identify the chassis slot, port adapter slot, and PA-FE interface port numbers for Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series universal broadband routers, and the VIP2.

### Cisco 7200 Series and Cisco uBR7200 Series Ports

Physical port addresses specify the actual physical location of each interface port on the router. On Cisco 7200 series routers and Cisco uBR7200 series universal broadband routers, this address is composed of two parts in the format *port adapter slot number/interface port number*, as follows:

- The first number identifies the slot in which the PA-FE is installed.
- The second number identifies the interface port on the PA-FE, which is always numbered as interface 0.

---

**Note** For the Cisco 7206VXR and Cisco 7206 router shelves, 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 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.

The Cisco 7206VXR and the Cisco 7206 can be used as router shelves in a Cisco AS5800 Universal Access Server. For information about the Cisco 7206VXR and the Cisco 7206 as router shelves, see the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.

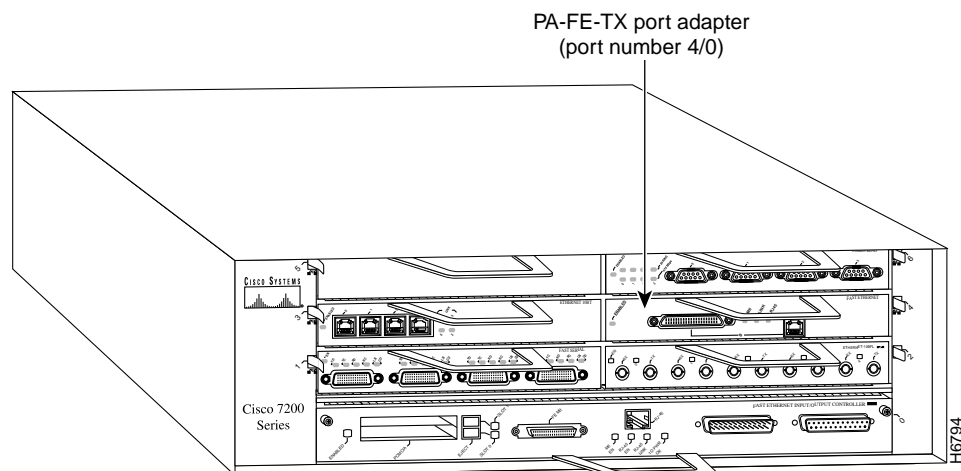
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You can identify interface ports by physically checking the slot/interface port location on the front of the router or by using **show** commands to display information about a specific interface or all interfaces in the router.

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 slot number.

In Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204 and Cisco 7204VXR, and slot 6 for the Cisco 7206 and Cisco 7206VXR. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present. Figure 8-1 shows the interface port of a PA-FE-TX installed in slot 4 of a Cisco 7206.

**Figure 8-1 Cisco 7206 Fast Ethernet Interface Port Number Example**



**Note:** The MII and RJ-45 interface ports on the port adapter are both numbered as interface port 0. Only one interface can be used on each port adapter at a time.

---

**Note** The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

---

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, if the PA-FE in slot 4 (with the interface address 4/0 [port adapter slot 4, and interface port 0]) were in slot 2, the port adapter's interface would be numbered 2/0.

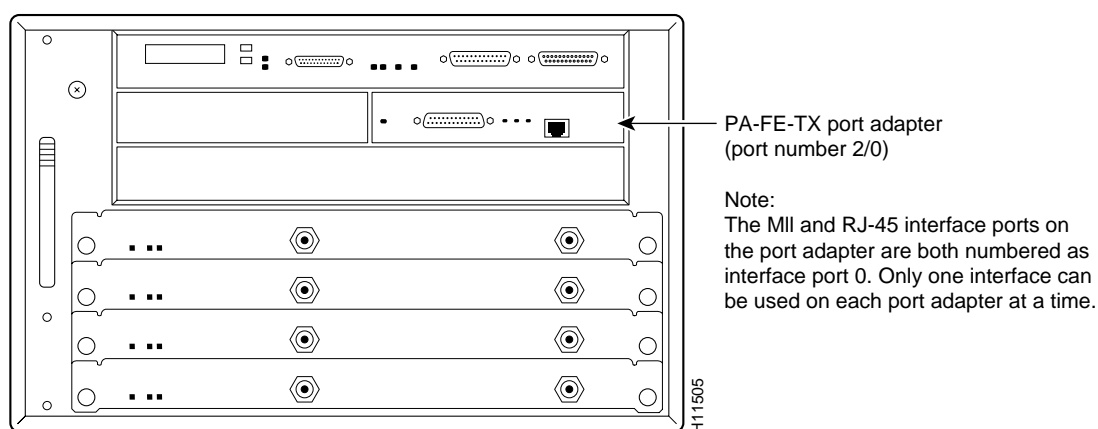
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**Note** For the Cisco 7206VXR and Cisco 7206 router shelves, the PA-FE in port adapter slot 4 would have the address  $x/4/0$ , where  $x$  is the number assigned to the router shelf during the initial configuration of the Cisco AS5800 Universal Access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

---

Figure 8-2 shows the port adapter slots and interface ports of a Cisco uBR7200 series router. For a Cisco uBR7246, the port adapter slots are numbered 1 and 2 and for a Cisco uBR7223, the port adapter slot is numbered 1. (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.

**Figure 8-2 Cisco uBR7200 Series Fast Ethernet Interface Port Number Example—Cisco uBR7246**



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.

## VIP2 Ports

On the VIP2 installed in Cisco 7500 series or Cisco 7000 series routers, physical port addresses specify the actual physical location of each interface port on the router interface processor end. (See Figure 8-3.) However, when you move a VIP2 to a different slot, the first number in the address changes to reflect the new chassis slot number. This address is composed of a three-part number in the format *chassis slot number/port adapter number/interface port number*, as follows:

- The first number identifies the chassis slot in which the VIP2 is installed (as shown in the example system in Figure 8-3).
- The second number identifies the physical port adapter number on the VIP2, either 0 or 1.
- The third number identifies the interface port on the PA-FE, which is always numbered as interface 0.

---

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

---

Interface ports on the VIP2 maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP2 to a different slot, the first number in the address changes to reflect the new slot number.

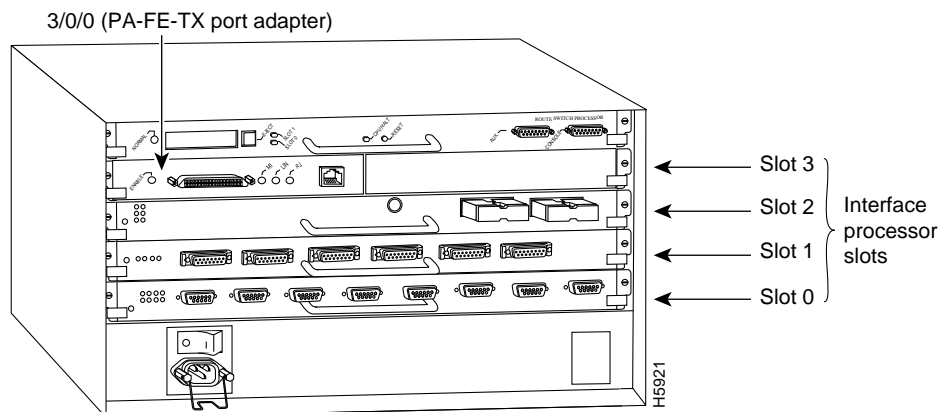
Figure 8-3 shows some of the slot port adapter and interface ports of a sample Cisco 7505 router. The first port adapter slot number is 0, and the second port adapter slot number is 1. The individual FE interface numbers are always 0. For example, on the FE-equipped VIP2 in slot 3 (see Figure 8-3), the address of the FE interface is 3/0/0 (interface processor slot 3, port adapter slot 0, and interface port 0). If a second PA-FE were installed in port adapter slot 1 on this VIP2, its address would be 3/1/0.

---

**Note** If you remove the PA-FE-equipped VIP2 (see Figure 8-3) from slot 3 and install it in interface processor slot 2, the address of this FE port becomes 2/0/0.

---

**Figure 8-3 Fast Ethernet Interface Port Number Example—Cisco 7505**



**Note:** The BNC and RJ-45 interface ports on the first port adapter are both numbered as interface port 0. Only one interface can be used on each port adapter at a time.

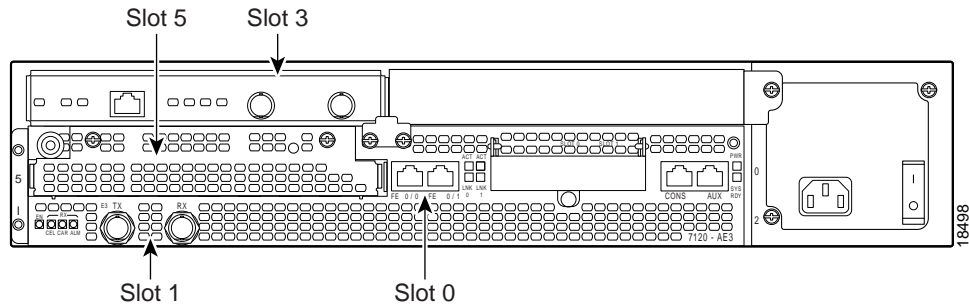
You can also identify interface ports by physically checking the slot/port adapter/interface port location on the back of the router or by using software commands to display information about a specific interface or all interfaces in the router.

## Cisco 7100 Series Ports

In Cisco 7100 series routers, the *slot number* is the location in the chassis where the interface resides and the *port number* is the physical port. Interfaces in the Cisco IOS software are identified by a type, slot number, and port number. For example, serial 3/1 indicates port 1 on the serial port adapter in slot 3.

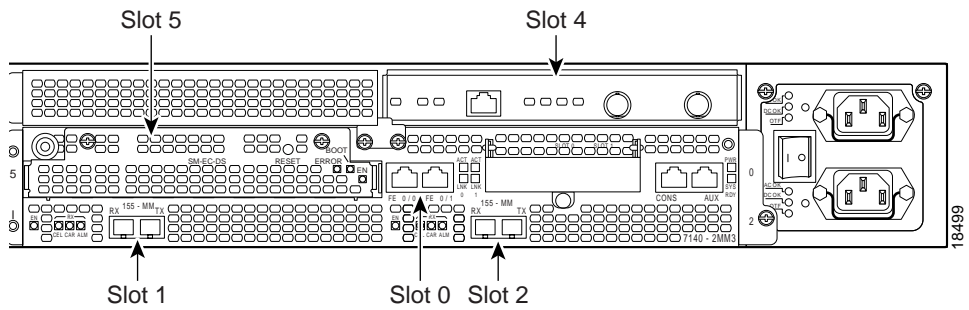
Slots in the Cisco 7120 series routers are numbered as shown in Figure 8-4. The fixed LAN interface is slot 0, the fixed WAN interface is slot 1, and the modular port adapter interface is slot 3. On the Cisco 7120 series slots 2 and 4 are not used. Slot 5 is the service adapter.

**Figure 8-4 Port Adapter Slot Numbering—Cisco 7120 Series**



Slots in the Cisco 7140 series are numbered as shown Figure 8-5. The fixed LAN interface is slot 0, the fixed WAN interfaces are slots 1 and 2, and the modular port adapter interface is slot 4. Slot 3 is not used. Slot 5 is the service adapter.

**Figure 8-5 Port Adapter Slot Numbering—Cisco 7140 Series**



## Performing a Basic Configuration

Following are instructions for a basic configuration enabling an interface and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For more information on FE interface configurations on supported platforms, 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.

In the following procedure, 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 sample basic configuration procedure:

**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** The following examples explain how to configure the fastethernet interface:

- For the Cisco 7100 series, Cisco 7200 series, and the Cisco uBR7200 series, at the prompt specify the first interface to configure by entering the subcommand **interface**, followed by the *type (fastethernet) and slot/interface* (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 fastethernet 4/0
```

---

**Note** For the Cisco 7206VXR and Cisco 7206 router shelves, the interface specified in the above example would include a shelf number. For example, the command **interface fastethernet 5/4/0** would specify the first FE interface of the port adapter in slot 4 of router shelf 5.

---

- For the VIP2, at the prompt specify the first interface to configure by entering the subcommand **interface**, followed by the *type (fastethernet) and slot/port-adapter/interface*. The example that follows is for the first interface of the first port adapter, on a VIP2 in interface processor slot 1:

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

**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 10.0.0.0 10.255.255.255
```

**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#
```

This completes the procedure for creating a basic configuration. To check the interface configuration using **show** commands, proceed to the “Checking the Configuration” section on page 8-9.

## Configuring PA-FE Transmission Mode

Half-duplex operation is the default transmission mode for the PA-FE. Use the **full-duplex** command to configure full-duplex operation for the PA-FE as follows:

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

Use the **show interfaces fastethernet** command to verify that the 4/0 Fast Ethernet interface is now configured for full-duplex operation as follows:

```
Router# show interfaces fastethernet 4/0
FastEthernet 4/0 is administratively up, line protocol is up
(display text omitted)
Encapsulation ARPA, loopback not set, keepalive not set, fdx, 100BaseTX
```

Use the **no full-duplex** command to return the interface to half-duplex operation as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface fastethernet 4/0
Router(config-if)# no full-duplex
Ctrl-z
Router#
```

Use the **show interfaces fastethernet** command to verify that the 4/0 Fast Ethernet interface is now configured for half-duplex operation as follows:

```
Router# show interfaces fastethernet 4/0
FastEthernet2/0 is administratively up, line protocol is up
(display text omitted)
Encapsulation ARPA, loopback not set, keepalive not set, hdx, 100BaseTX
(display text omitted)To check the interface configuration using show commands,
proceed to the "Checking the Configuration" section on page 8-9.
```

To check the interface configuration using **show** commands, proceed to the "Checking the Configuration" section on page 8-9.

## Configuring PA-FE Media Type

The RJ-45 receptacle is the default media type for PA-FE-TX and the SC receptacle (for fiber-optic connections) is the default media type for the PA-FE-FX. Use the **media-type mii** command to configure the MII receptacle as the media type for the PA-FE as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface fastethernet 4/0
Router(config-if)# media-type mii
Ctrl-z
Router# show interface fastethernet 4/0
FastEthernet3/0/0 is administratively up, line protocol is up
(display text omitted)
Encapsulation ARPA, loopback not set, keepalive not set, hdx, MII
(display text omitted)
```

Use the **media-type 100** command to return the media type for the PA-FE's to the RJ-45 receptacle or SC receptacle.

---

To check the interface configuration using **show** commands, proceed to the “Checking the Configuration” section on page 8-9.

## Checking the Configuration

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

## Using show Commands to Verify the New Interface Status

The following steps use **show** commands to verify that the new interfaces are configured and operating correctly.

- Step 1** Use the **show version** command to display the system hardware configuration. Ensure that the list includes the new interfaces.
- Step 2** Display the current port adapters and interfaces as follows:
- For the Cisco 7100 series, Cisco 7200 series, and the Cisco uBR7200 series, display all the current port adapters and their interfaces with the **show controllers** command. Verify that the new PA-FE appears in the correct slot.
  - For the VIP2, display all the current interface processors and their interfaces with the **show controllers cbus** command. Verify that the new VIP2 appears in the correct slot.
- Step 3** Specify the new interfaces as follows:
- For the Cisco 7100, Cisco 7200 series and the Cisco uBR7200 series, specify one of the new interfaces with the **show interfaces port adapter type slot/interface** 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 7206VXR and Cisco 7206 router shelves, the **show interfaces** command requires a shelf number in the format **show interfaces type shelf number/port adapter slot/interface**.
- 
- For the VIP2, specify one of the new interfaces with the **show interfaces type slot/port-adapter/interface** 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.

---

**Note** For complete command descriptions and examples for all of the supported platforms, refer to the documentation resources listed in the “Related Documentation” section on page vi.

---

### Cisco 7200 Series, Cisco 7100 Series, and Cisco uBR7200 Series show Commands

With the **show interfaces type slot/port** command, use arguments such as the interface type (fastethernet, and so forth) and the port number (slot/port) to display information about a specific interface only. The following example of the **show interfaces fastethernet** command shows information specific to the Fast Ethernet interface on the first PA-FE in slot 4:

```
Router# show interfaces fastethernet 4/0
FastEthernet4/0 is administratively down, line protocol is down
  Hardware is DEC21140, address is 10.0.0.0 (bia 0000)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive not set, fdx, 100BaseTX
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 3:08:43, output 3:08:42, output hang never
  Last clearing of "show interfaces" counters 2:58:36
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets, 0 restarts
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

---

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

---

Use the **show version** 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(6)CA
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(6)CA

Router uptime is 4 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.
4 Ethernet/IEEE 802.3 interfaces.
2 FastEthernet/IEEE 802.3 interfaces.
125K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K 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 example of a PA-FE-FX in port adapter slot 2:

```
Router# show diag 2

Slot 2:
Fast-ethernet port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 2d09h ago
Hardware revision 255.255 Board revision A0
Serial number      4294967295      Part number      73-1556-04
Test history       0x0              RMA number       00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 02 01 01 FF FF FF FF 49 06 14 04 00 00 00 00
0x30: 50 00 00 00 FF FF FF FF FF FF FF FF FF FF FF
```

Proceed to the “Using the ping Command” section on page 8-13 to verify that each interface port is functioning properly.

### VIP2 Show Commands

Use the **show interfaces** *type slot/port-adapter/port* command, with arguments such as the interface type (fastethernet, and so forth) and the port number (slot/port), to display information about a specific interface only. The following example of the **show interfaces fastethernet** command shows information specific to the Fast Ethernet interface on the first PA-FE in slot 3:

```
Router# show interfaces fastethernet 3/0/0
FastEthernet3/0/0 is administratively down, line protocol is down
  Hardware is cyBus FastEthernet Interface, address is 0000.0ca5.2380 (bia 0000)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec), hdx, 100BaseTX
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 3:08:43, output 3:08:42, output hang never
  Last clearing of "show interface" counters 2:58:36
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets, 0 restarts
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

Use the **show version** 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 router:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-A), Version 11.1(6)CA
Copyright (c) 1986-1995 by cisco Systems, Inc.
Compiled Fri 06-Oct-95 12:22 by mpo
Image text-base: 0x600088A0, data-base: 0x605A4000
ROM: System Bootstrap, Version 5.3(16645) RELEASED SOFTWARE
ROM: GS Bootstrap Software (RSP-BOOT-M), Version 11.1(6)CA, RELEASED SOFTWARE
honda uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "slot0:rsp-a111-1", booted via slot0

cisco RSP2 (R4600) processor with 32768K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
1 VIP2 controllers (1 FastEthernet).
1 FastEthernet/IEEE 802.3 interfaces.
125K bytes of non-volatile configuration memory.

20480K 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 0x2
```

---

Use the **show diagbus slot** command to determine which type of port adapter is installed on a VIP2 in your system. Specific port adapter information is displayed, as shown in the following example of a PA-FE-FX in interface processor slot 1:

```
Router# show diagbus 1
Slot 1:
Physical slot 1, ~physical slot 0xE, logical slot 1, 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: 03508056 Part number: 73-1554-02
Test history: 0x00 RMA number: 43-27-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
 0x20: 01 15 02 02 00 35 87 58 49 06 12 02 00 2B 1B 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: 0x10DC (00:01:17 ago)

Controller Memory Size: 8 MBytes

PA Bay 0 Information:
Fast-Ethernet PA, 1 ports, 100BaseFX-ISL
EEPROM format version 1
HW rev 1.0, Board revision 43
Serial number: 02826254 Part number: 73-1690-02
```

Proceed to the next section, “Using the ping Command”, to verify that each interface port is functioning properly.

## 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. 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 echo request packets out to a remote device at an IP address that you specify. After sending an echo request, the command waits a specified time for the remote device to reply. Each echo reply appears as an exclamation point (!) on the console terminal; each request that is not returned before the specified timeout appears 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.

## Checking the Configuration

---

Following is an example of a successful **ping** command to a remote server with the address 172.16.0.0:

```
Router# ping 172.16.0.0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.0.0.0, 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 destination and that the device is active (powered on), and repeat the **ping** command.