PA-2FEISL 100BaseT Fast Ethernet/ISL Port Adapter Installation and Configuration

Product Numbers: PA-2FEISL-TX(=) and PA-2FEISL-FX(=)

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

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

Objectives

This document describes how to install and configure the Dual Port 100BaseT Fast Ethernet/Inter-Switch Link (ISL) port adapters (PA-2FEISL-TX[=] and PA-2-FEISL-FX[=]), hereafter referred to as the PA-2FEISL, which is used in the following platforms:

- Cisco 7100 series routers—which consist of the Cisco 7120 series and the Cisco 7140 series
- 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
- Second-generation Versatile Interface Processor (VIP2-15, VIP2-20, or VIP2-40) 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)

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.

For more information on these routers, see the “Software and Hardware Requirements” section on page 2-2.

For complete descriptions of interface subcommands and the configuration options available for interfaces, and which ones support 100BaseTX and 100BaseFX port adapter functionality, refer to the appropriate software configuration publication listed in the "Related Documentation" section on page vi.

Organization

This document contains the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the PA-2FEISL and its LED displays, location in the supported hardware platforms, cables and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required and procedures you should perform before the actual installation.
Chapter 3	Cisco 7100 Series and the PA-2FEISL	Provides instructions for installing the PA-2FEISL in a Cisco 7100 series router.
Chapter 4	Cisco 7200 Series and the PA-2FEISL	Provides instructions for installing the PA-2FEISL in a Cisco 7200 series router.
Chapter 5	Cisco uBR7200 Series and the PA-2FEISL	Provides instructions for installing the PA-2FEISL in a Cisco uBR7200 series universal broadband router.
Chapter 6	VIP2 and the PA-2FEISL	Provides instructions for installing the PA-2FEISL on a VIP2 installed in a Cisco 7500 series or Cisco 7000 series router.
Chapter 7	Attaching the PA-2FEISL Interface Cables	Provides instructions for installing the PA-2FEISL cables on the supported platforms.
Chapter 8	Configuring the PA-2FEISL	Provides instructions for configuring your port adapter on the supported platforms. The instructions given in this chapter apply to all supported platforms described in this document.

Related Documentation

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

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

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

- For hardware installation and maintenance information on the Catalyst RSM/VIP2, refer to the *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note.*
- For hardware installation and maintenance information and software configuration information on the Cisco AS5800 Universal Access Server, refer to the following publications:
  - *Cisco AS5800 Universal Access Server Hardware Installation and Configuration Guide*
  - *Cisco AS5800 Universal Access Server Software Installation and Configuration Guide*

- For hardware installation and maintenance information on Cisco 7100 series routers, refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide* 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 port adapter hardware and memory configuration guidelines for Cisco 7200 series routers (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
- For hardware installation and maintenance information on Cisco 7200 series routers, refer to the Cisco 72xx series installation and configuration guide that shipped with your Cisco 7200 series router.
- For hardware installation and maintenance information on Cisco uBR7200 series routers, refer to the *Cisco uBR7200 Series Universal Broadband Router Installation and Configuration Guide* that shipped with your Cisco uBR7200 series router.
- For hardware installation and maintenance information on Cisco 7200 VXR routers, refer to the *Cisco 7200 VXR Installation and Configuration Guide* that shipped with your Cisco 7200 VXR router.
- For international agency compliance, safety, and statutory information for WAN interfaces for Cisco 7000 series, Cisco 7100 series, Cisco 7200 series, Cisco uBR7200 series, and Cisco 7500 series routers, refer to the following publications:
  - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
  - *Regulatory Compliance and Safety Information for the Cisco 7100 Series VPN Routers*
  - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
  - *Regulatory Compliance and Safety Information for the Cisco uBR7200 Series Universal Broadband Router*
  - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*

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

- For hardware installation and maintenance information on Cisco 7000 and Cisco 7500 series routers, and the VIP2, refer to the following publications:
  - The installation and configuration guide that shipped with your Cisco 7000 or Cisco 7500 series router
  - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* (for VIP2 users only)
- To view Cisco documentation or obtain general information about the documentation, see the "Documentation CD-ROM" section on page viii, the "Cisco Connection Online" 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 Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com.

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

WWW: http://www.cisco.com

WWW: http://www-europe.cisco.com

WWW: http://www-china.cisco.com

Telnet: cco.cisco.com

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.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

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.

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

Overview

This chapter describes the PA-2FEISL port adapter and contains the following sections:

Port Adapter Overview

The PA-2FEISL provides two 100-Mbps, 100BaseT Fast Ethernet/ISL interfaces for VLAN transport over switch-to-switch backbone connections or switch-to-server data center attachments. These port adapters provide an inter-VLAN bridging and routing functionality that network administrators can use to deploy 100-Mbps Token Ring VLAN transport, 100-Mbps Ethernet VLAN transport, and bridging or routing between the mixed LAN types using the same physical ISL trunk links. Both full-duplex and half-duplex operation are supported for the PA-2FEISL. See the "Fast Ethernet Overview" section on page 1-2 for additional information.

Both models of the PA-2FEISL (PA-2FEISL-TX and PA-2FEISL-FX) are shown in Figure 1-1 and Figure 1-2.

Note Although 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.

The Cisco 7100 series, Cisco 7200 series, and Cisco uBR7200 series routers support OIR of all port adapter types.

Figure 1-1 PA-2FEISL-TX—Faceplate View

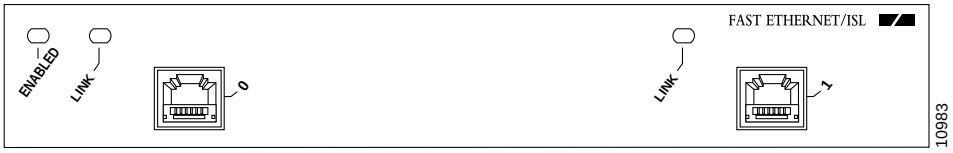


Figure 1-2 PA-2FEISL-FX Port—Faceplate View

You can install the PA-2FEISL in the following slots on the hardware platforms described in this document:

- Cisco 7100 series routers—Port adapter slot 3 for the Cisco 7120 series and port adapter slot 4 for the Cisco 7140 series
- VIP2-15, VIP2-20, and VIP2-40—Port adapter slot 0 and port adapter slot 1
- Cisco 7200 series routers—Any of the port adapter slots; 1 through 6 for the Cisco 7206 and the Cisco 7206VXR, or 1 through 4 for the Cisco 7204
- Cisco uBR7200 series routers—Any of the port adapter slots; 1 and 2 for the Cisco uBR7246, or 1 for the Cisco uBR7223

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.

Fast Ethernet Overview

Each Fast Ethernet port on the PA-2FEISL-TX has an RJ-45 connector to attach to Category 5 unshielded twisted-pair (UTP) cable for 100BaseTX. Each Fast Ethernet port on the PA-2FEISL-FX has an SC-type fiber-optic connector for 100BaseFX.

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

Note 100BaseTX is intended for Environment A, and 100BaseFX is intended for Environment B. Both are described in the IEEE 802.3u standard.

IEEE 802.3u is well suited to applications where a local communication medium must carry sporadic, occasionally heavy traffic at 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 in use, the station waits until the network is not in use, then transmits. This process is known as half-duplex operation. A collision occurs when two stations listen for network traffic, hear

none, and transmit almost simultaneously. When simultaneous transmission occurs, 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 UTP, Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)–568-compliant cable
- 100BaseFX—100BaseT, half- and full-duplex over optical fiber

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 megabits per second (Mbps), signaling method is the signaling method used (either *baseband* or *broadband*), and segment length is 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

This section provides specifications for IEEE 802.3u 100BaseT. Table 1-1 lists the cabling specifications for 100-Mbps Fast Ethernet transmission over UTP, foil twisted-pair (FTP), and fiber-optic cables. Table 1-2 summarizes IEEE 802.3u 100BaseT physical characteristics.

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

Parameter	RJ-45	SC-Type
Cable specification	Category 5[1] UTP[2], 22 to 24 AWG	62.5/125 multimode optical fiber
Maximum cable length	–	–
Maximum segment length	328 ft (100 m) for 100BaseTX	328 ft (100 m)
Maximum network length	656 ft (200 m)[3] (with 1 repeater)	656 ft (200 m) [3](with 1 repeater)

1 EIA/TIA-568 or EIA-TIA-568 TSB-36 compliant.
2 Cisco does not supply Category 5 UTP RJ-45 cables. However, they are available commercially.
3 This length is specifically between any two stations on a repeated segment.

Table 1-2 IEEE 802.3u Physical Characteristics

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

1 DTE = data terminal equipment.

LEDs

The PA-2FEISL contains an enabled LED, which is standard on all port adapters, and a link LED for each of the ports. The LEDs are shown in Figure 1-3.

Figure 1-3 LEDs on the PA-2FEISL—Faceplate View of PA-2FEISL-TX

After system initialization, the enabled LED goes on to indicate that the PA-2FEISL has been enabled for operation. The following conditions must be met before the enabled LED goes on:

- PA-2FEISL is correctly connected and receiving power.
- PA-2FEISL-equipped card or chassis contains a valid microcode version that has been successfully downloaded.
- Bus recognizes the PA-2FEISL or PA-2FEISL-equipped VIP2.

If any of these conditions are not met, or if the initialization fails for other reasons, the enabled LED does not go on. Table 1-3 lists port LED colors and indications

Table 1-3 PA-2FEISL LEDs

LED Label	Color	State	Function
Enabled	Green	On	Port adapter is enabled for operation
Link	Green	Blinking	Port adapter is receiving a carrier signal from the network[1]

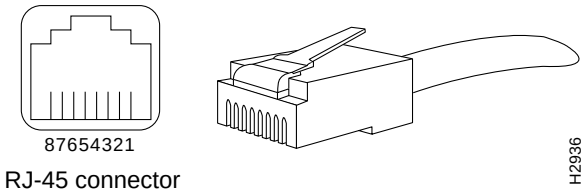
1 When an RJ-45 or SC port is active.

Receptacles, Cables, and Pinouts

The two interface receptacles on the PA-2FEISL are a single RJ-45 connection (on the PA-2FEISL-TX) or a SC-type optical-fiber connection (on the PA-2FEISL-FX). Each connection supports IEEE 802.3u interfaces compliant with the 100BaseX and 100BaseT standards. The RJ-45 connection does not require an external transceiver.

Figure 1-4 shows the RJ-45 cable connectors. Cisco does not supply Category 5 UTP RJ-45 cables; these cables are available commercially. Table 1-4 lists the pinouts and signals for the 2FEISL-TX RJ-45 connectors.

Figure 1-4 PA-2FEISL-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 Basic Rate Interface (BRI) circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage circuits.

Table 1-4 FE-TX RJ-45 Connector Pinouts

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

Note Referring to the RJ-45 pinout in Table 1-4, proper common-mode line terminations should be used for the unused Category 5, unshielded twisted-pair (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-2FEISL-TX.

Depending on your RJ-45 interface cabling requirements, use the pinouts in Figure 1-5 and Figure 1-6.

Figure 1-5 Straight-Through Cable Pinout—PA-2FEISL-TX RJ-45 Connection to a Hub or Repeater

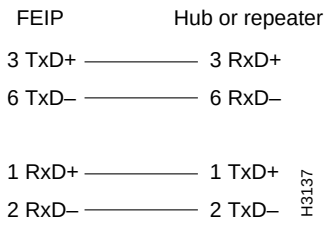


Figure 1-6 Crossover Cable Pinout—PA-2FEISL-TX RJ-45 Connections Between Hubs and Repeaters

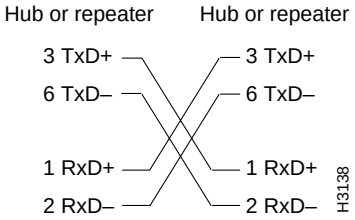


Figure 1-7 shows the duplex SC connector (one required for both transmit and receive), and Figure 1-8 shows the simplex SC connector (two required, one for each transmit and receive) used for PA-2FEISL-FX optical-fiber connections. These multimode optical-fiber cables are commercially available, and are not available from Cisco.

Figure 1-7 PA-2FEISL-FX Duplex SC Connector

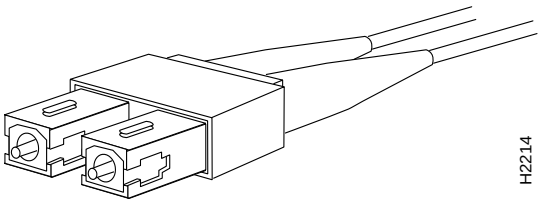
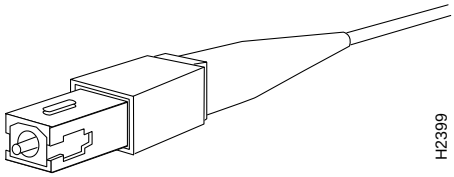


Figure 1-8 PA-2FEISL-FX Simplex SC Connector



Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-2FEISL adapter. The chapter contains the following sections:

Required Tools and Equipment

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

- PA-2FEISL-TX(=) or PA-2FEISL-FX(=) port adapter.
- VIP2 (for installation in the Cisco 7000 series or Cisco 7500 series chassis only). (For information about the specific VIP model that supports the PA-2FEISL, see the "Software and Hardware Requirements" section on page 2-2.)

Note Inter-Switch Link (ISL) features are not currently supported on the Cisco uBR7200 series. This restriction is subject to change without notice.

- Cables appropriate for the port adapter's interfaces (RJ-45 and multimode optical-fiber cables are not available from Cisco; they are available from commercial cable vendors).
- Number 1 Phillips and a 3/16-inch, flat-blade screwdriver (for VIP2 installation only).
- Number 2 Phillips screwdriver.
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares.
- Antistatic mat.
- Antistatic container.

Software and Hardware Requirements

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

Table 2-1 PA-2FEISL Software Requirements

Router Platform	Recommended Minimum Cisco IOS Release
Cisco 7000 series and Cisco 7500 series	
• With VIP2-15(=), VIP2-20, or VIP2-40(=)	Cisco IOS Release 11.3(4)T or a later release of Cisco IOS Release 11.3 T
Cisco 7100 series	
• 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
Cisco 7200 series	
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 11.3(4)T or a later release of Cisco IOS Release 11.3 T
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.3(4)T or a later release of Cisco IOS Release 11.3 T
• Cisco 7202	Cisco IOS Release 11.3(4)T or a later release of Cisco IOS Release 11.3 T
• Cisco 7206 router shelf	Cisco IOS Release 11.3(2)AA or a later release of Cisco IOS Release 11.3AA
Cisco uBR7200 series	
• Cisco uBR7246 and Cisco uBR7223	Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0 T

For release note information on the PA-2FEISL, refer to the Cisco IOS software release note for the version of Cisco IOS software that you are running.

Ensure that the following hardware requirements are met for your PA-2FEISL:

The PA-2FEISL-FX requires the following Network Processing Engine (NPE) models:

- NPE-150 (150-MHz network processor)—up to 128 MB of DRAM
- NPE-175 (200-MHz network processor)—up to 128 MB of DRAM
- NPE-200 (200-MHz network processor)—up to 128 MB of DRAM
- NPE-225 (262-MHz network processor)—up to 128 MB of DRAM

Note The NPE-100 *does not* support the PA-2FEISL in Cisco 7200 series routers.

- In Cisco 7000 series or Cisco 7500 series routers, the PA-2FEISL requires the following VIP2 models:
  - VIP2-15 (1 MB of SRAM, 8 MB of DRAM)
  - VIP2-20 (1 MB of SRAM, 16 MB of DRAM)
  - VIP2-40 (2 MB of SRAM, 32 MB of DRAM)

Note This release of the PA-2FEISL is not supported on the VIP2-50. (This restriction is subject to change without notice.)

Note The minimum recommended VIP2 model is a VIP2-15. The maximum transmission unit (MTU) sizes available for two PA-2FEISL 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 the Cisco 7000 series routers.

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 vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

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

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

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

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

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

FCC Class A Compliance

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

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

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.

Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Cisco 7100 Series and the PA-2FEISL

This chapter provides information on the PA-2FEISL port adapter and its use in the Cisco 7100 series routers. This chapter contains the following sections:

Installation Overview

The PA-2FEISL 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 3-1 shows port adapter slot 3 of a Cisco 7120 series router. Figure 3-2 shows port adapter slot 4 of a Cisco 7140 series router.

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

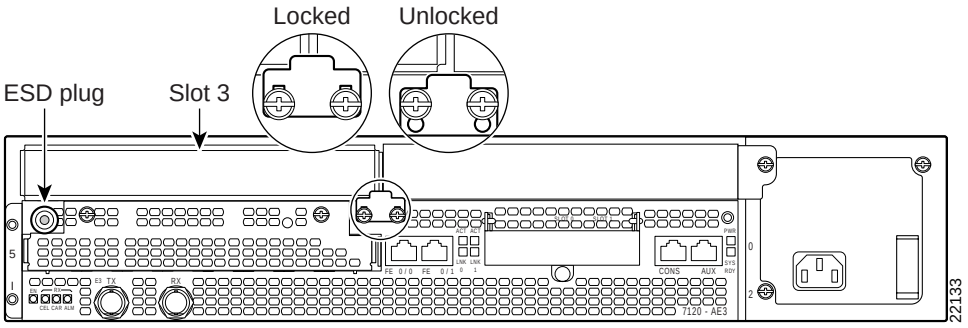
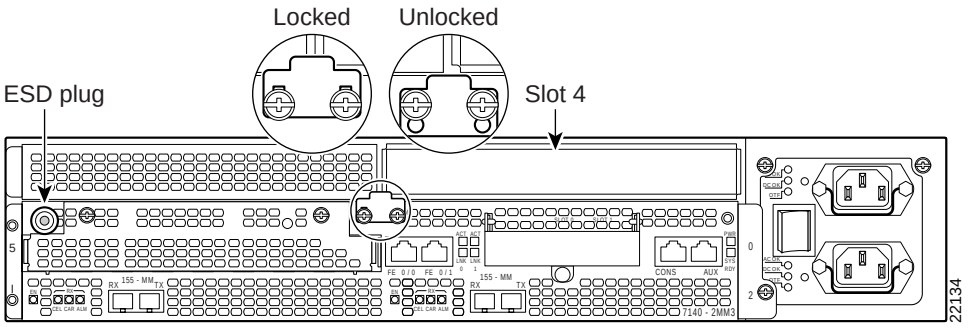


Figure 3-2 Cisco 7140 Series Router—Port Adapter Slot 4 Location



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 3-1 or Figure 3-2.) 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 electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove a blank port adapter.

Removing a Port Adapter

Follow these steps to remove a port adapter from a Cisco 7100 series router:

Step 1 Attach an electrostatic discharge (ESD)-preventive wrist strap between you and the chassis. (See Figure 3-1 or Figure 3-2 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 3-1 or Figure 3-2.)

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.

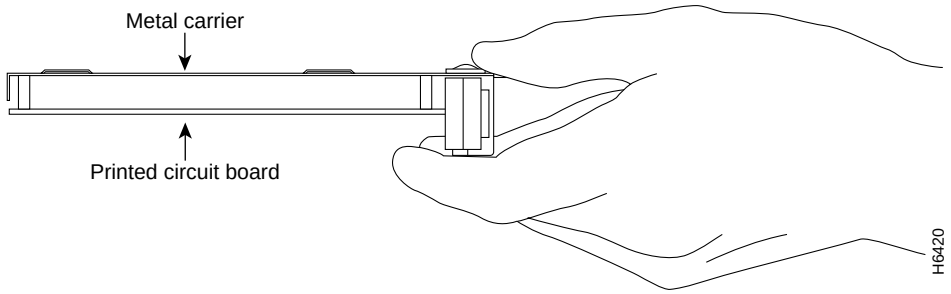
Note As you disengage the port adapter from the router, OIR administratively shuts down all active interfaces on the port adapter.

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 3-3.)

Figure 3-3 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. 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

Follow these steps 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 3-1 or Figure 3-2 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 screwdriver to loosen the screws; then slide the tab down to the unlocked position. (See Figure 3-1 or Figure 3-2.)

Step 3 Remove the new port adapter from its antistatic container and position it at the opening of the slot.

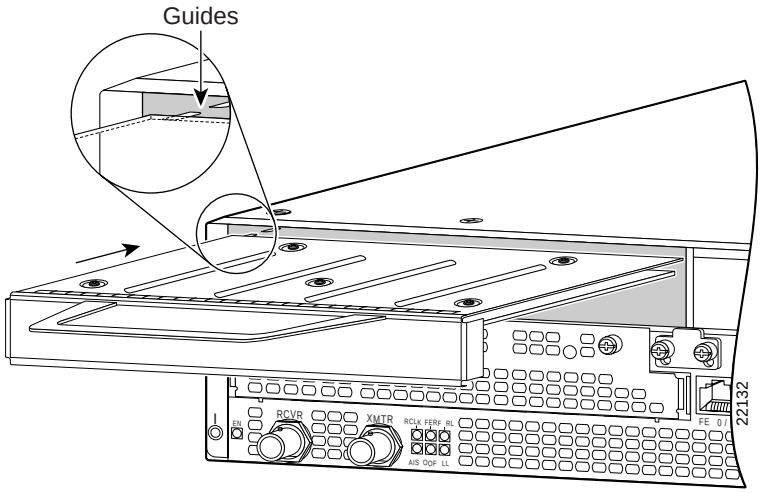
Step 4 Use both hands to grasp the port adapter by its metal carrier edges, and position the port adapter so that its components face downward. (See Figure 3-3.)

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

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 3-4 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 3-1 and Figure 3-2 show the locking tab in the locked position.)

This completes the procedure for installing a new port adapter in a Cisco 7100 series router. Proceed to Chapter 7, “Attaching the PA-2FEISL Interface Cables,” for information on how to configure your port adapter.

Cisco 7200 Series and the PA-2FEISL

This chapter provides information on the PA-2FEISL port adapter and its use in Cisco 7200 series routers. This chapter contains the following sections:

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.

Installation Overview

The PA-2FEISL can be installed in any available port adapter slot in Cisco 7200 series routers. Figure 4-1 shows a Cisco 7206 with a PA-2FEISL-TX installed in slot 4. Figure 4-2 shows a Cisco 7206 with a PA-2FEISL-FX installed in slot 4.

Figure 4-1 Cisco 7206 with a PA-2FEISL-TX in Port Adapter Slot 4

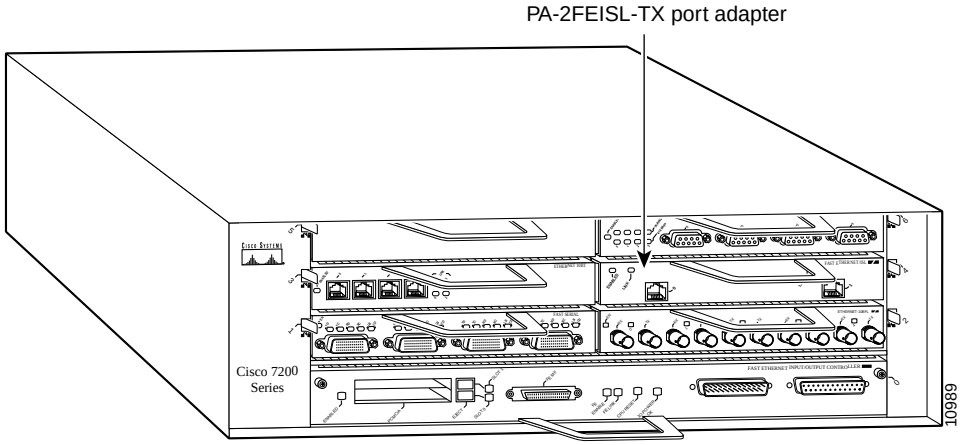
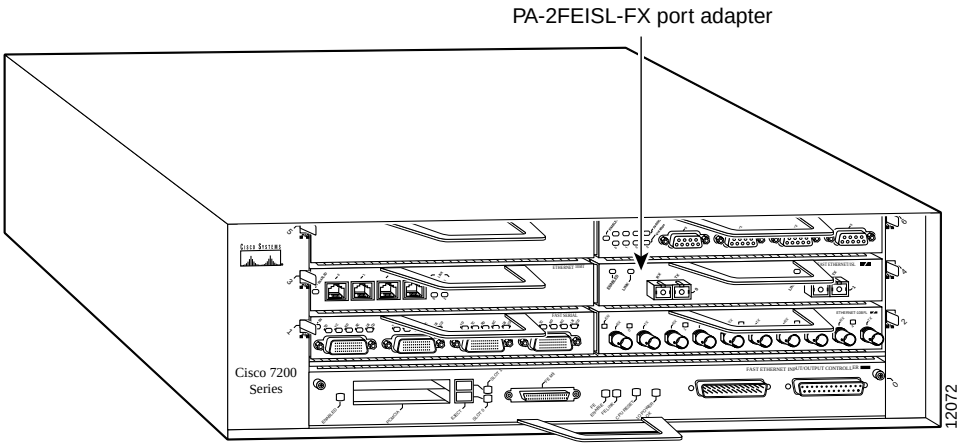


Figure 4-2 Cisco 7206 with a PA-2FEISL-FX in Port Adapter Slot 4



Depending on your circumstances, 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 will 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 Cisco Systems.

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-2FEISL.

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 electromagnetic interference (EMI) emissions requirements and to allow proper air flow 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.

Note The 2FEISL-FX port adapter has SC-type fiber-optic connectors in place of the RJ-45 connectors.

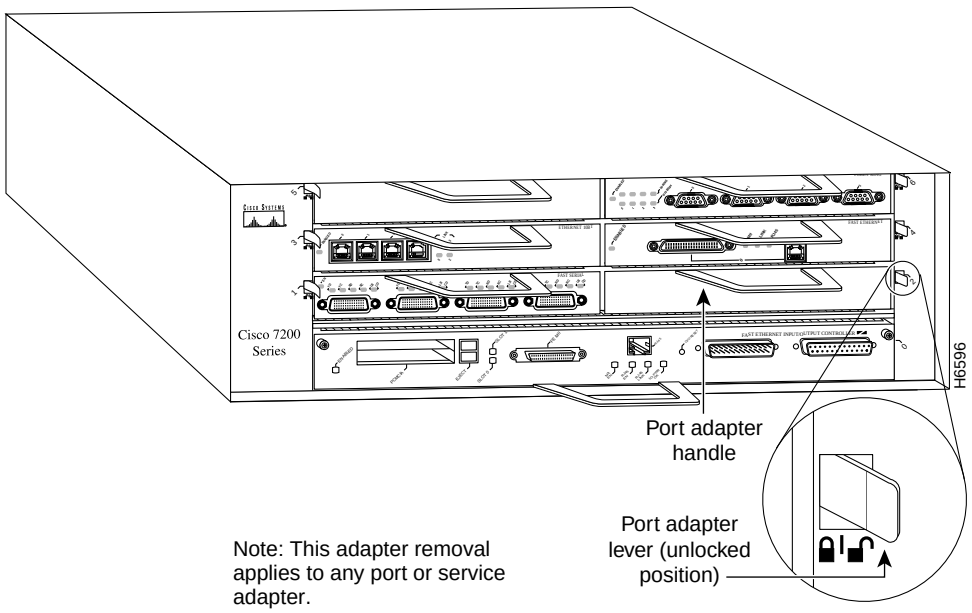
Removing a Port Adapter

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

Step 1 Attach an electrostatic discharge (ESD)-preventive wrist strap between you and an unfinished chassis surface.

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



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 chassis slot.

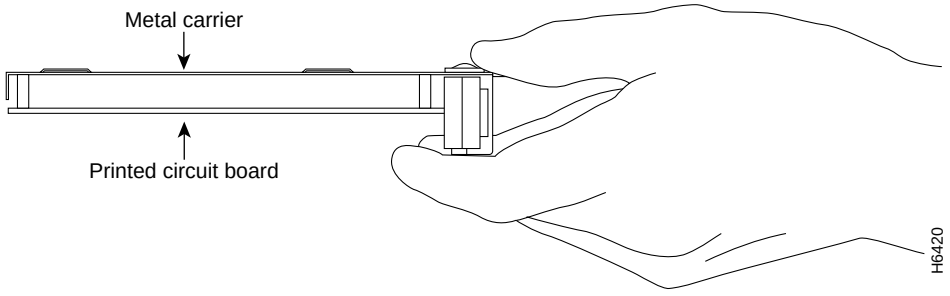
Note As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

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 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 Cisco Systems, 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

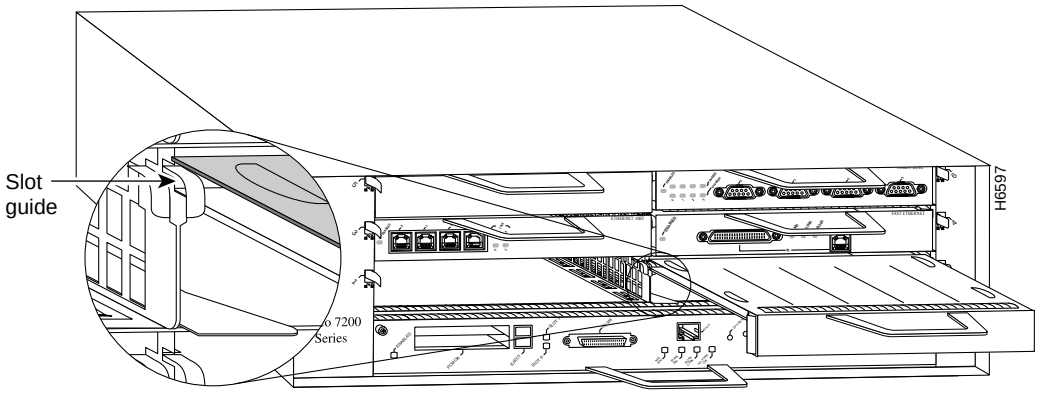
Use the following procedure to install a new port adapter in a Cisco 7200 series router:

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

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 4-4.)

Step 3 Align the left and right edges 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 will disrupt normal operation of the router.

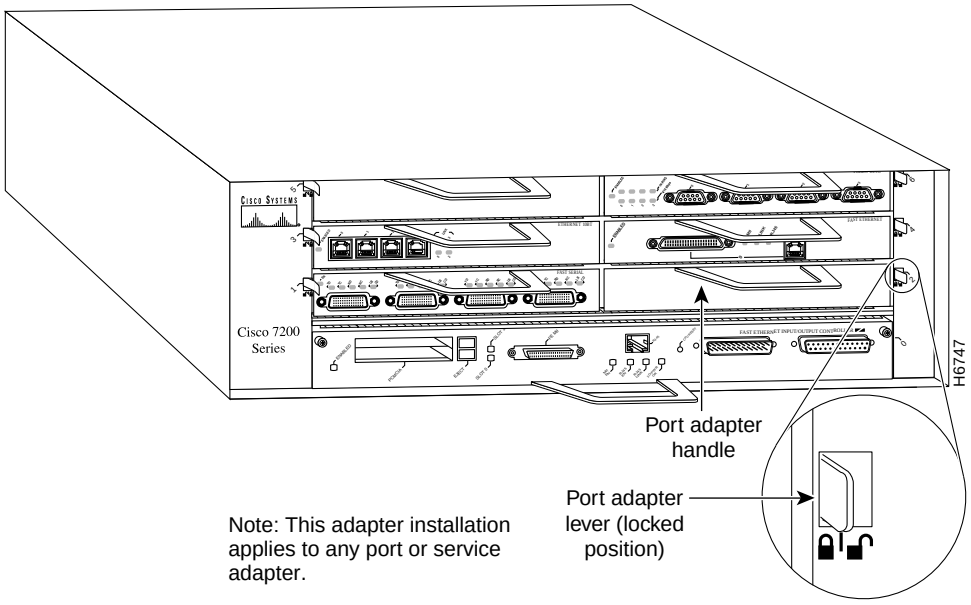
Step 5 With the port adapter halfway in the slot, connect all required cables to the port adapter.

Step 6 After connecting all required cables, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane.

Step 7 After seating the port adapter in the router midplane, 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, “Attaching the PA-2FEISL Interface Cables,” to connect the necessary cables to your port adapter.

Cisco uBR7200 Series and the PA-2FEISL

This chapter provides information on the PA-2FEISL port adapter and its use in Cisco uBR7200 series universal broadband routers. This chapter contains the following sections:

Installation Overview

The PA-2FEISL 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-2FEISL-TX installed in port adapter slot 2 of a Cisco uBR7200 series router. Figure 5-2 shows a PA-2FEISL-FX installed in slot 2 of a Cisco uBR7200 series router.

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

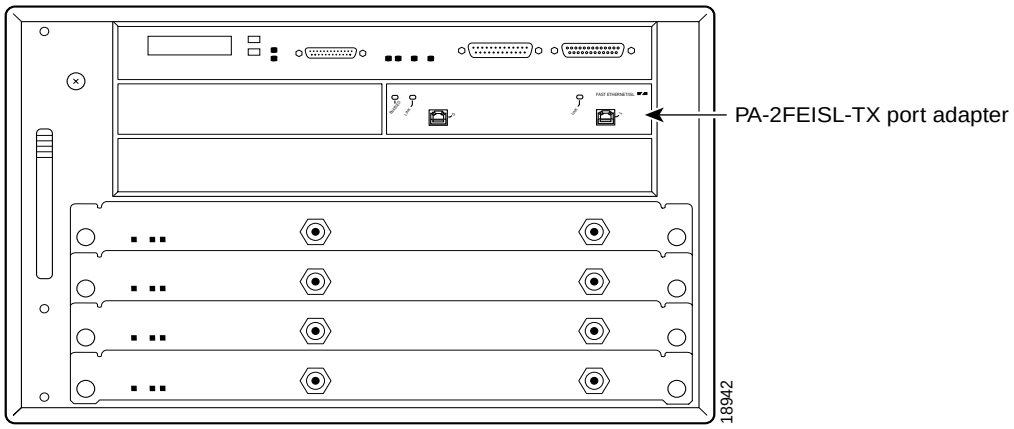
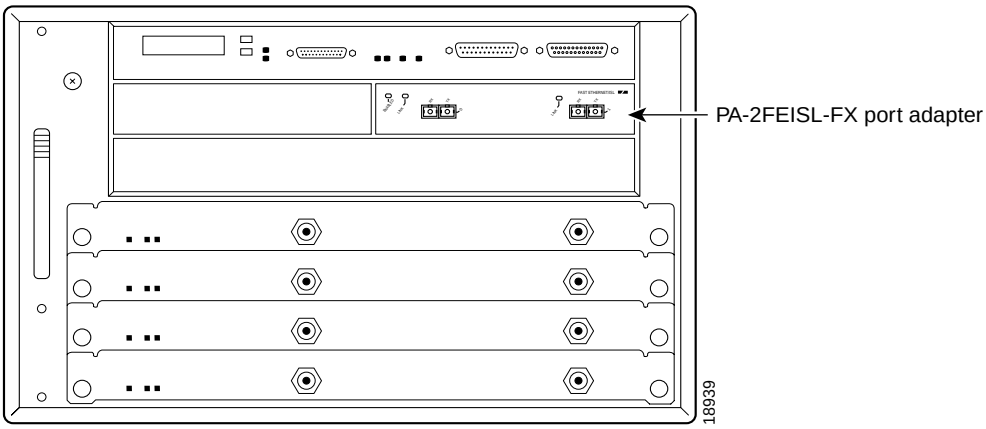


Figure 5-2 Cisco uBR7200 Series with a PA-2FEISL-FX in Slot 2—Cisco uBR7246



Depending on your circumstances, you might need to install a new port adapter or replace a failed port adapter in a Cisco uBR7200 series universal broadband router. 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 retention clip (Cisco uBR7246) or lever (Cisco uBR7223). When removing and replacing a port adapter, you will 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 Cisco Systems.

Note Cisco uBR7200 series routers support online insertion and removal (OIR); therefore, you do not have to power down the routers when removing and replacing a PA-2FEISL.

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

Removing a Port Adapter

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

Step 1 Attach an electrostatic discharge (ESD)-preventive wrist strap between you and an unfinished chassis surface.

Step 2 Unlock the retaining mechanism of the port adapter:

- For a Cisco uBR7246, place the port adapter retention clip for the desired port adapter slot in the unlocked position. The retention clip remains in the unlocked position. (See Figure 5-3.)
- For a Cisco uBR7223, place the port adapter lever in the unlocked position. (See Figure 5-4.)

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

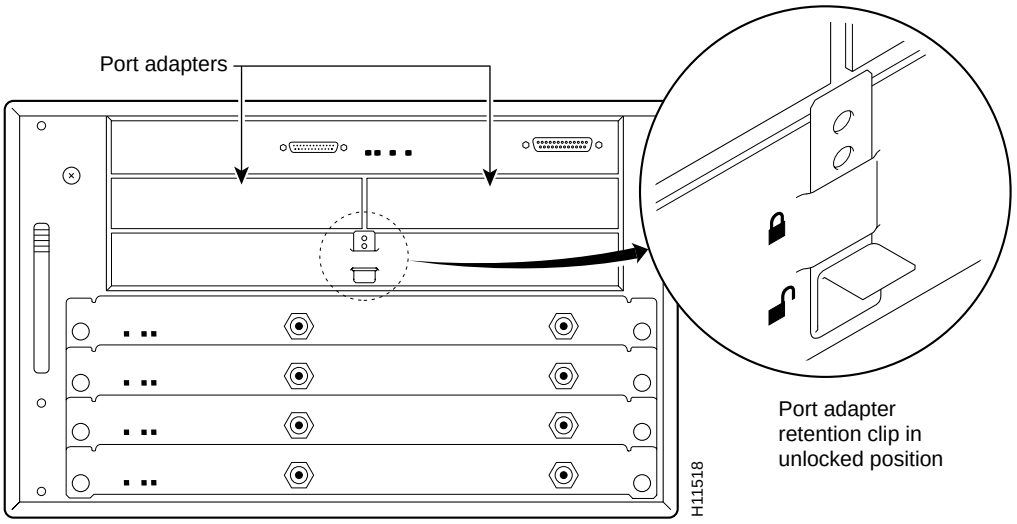
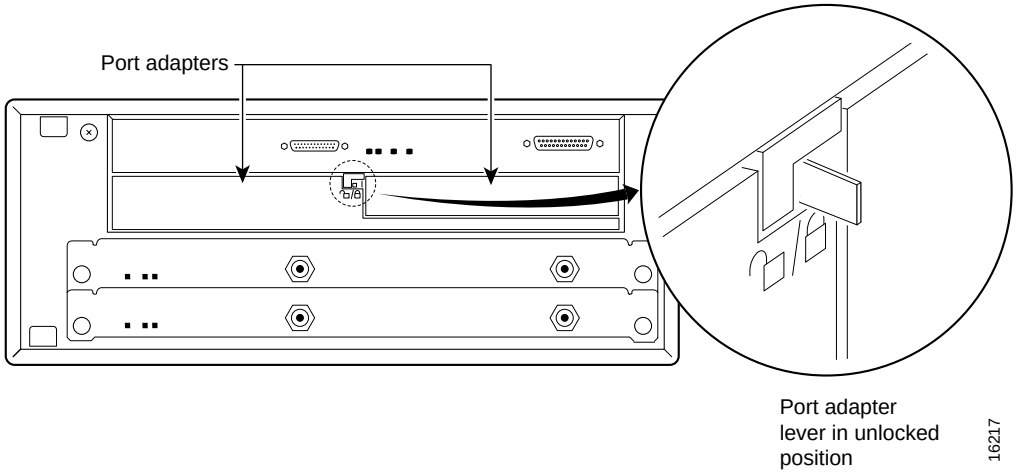


Figure 5-4 Placing the Port Adapter Lever in the Unlocked Position—Cisco uBR7223



Step 3 Grasp the handle on the port adapter and pull the port adapter from the 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.

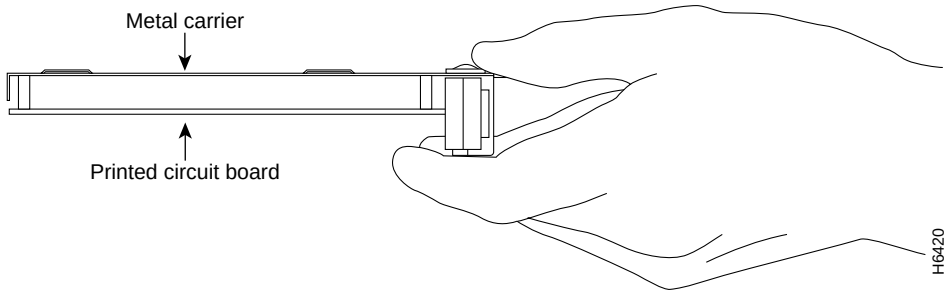
Note As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

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 router.

Installing a Port Adapter

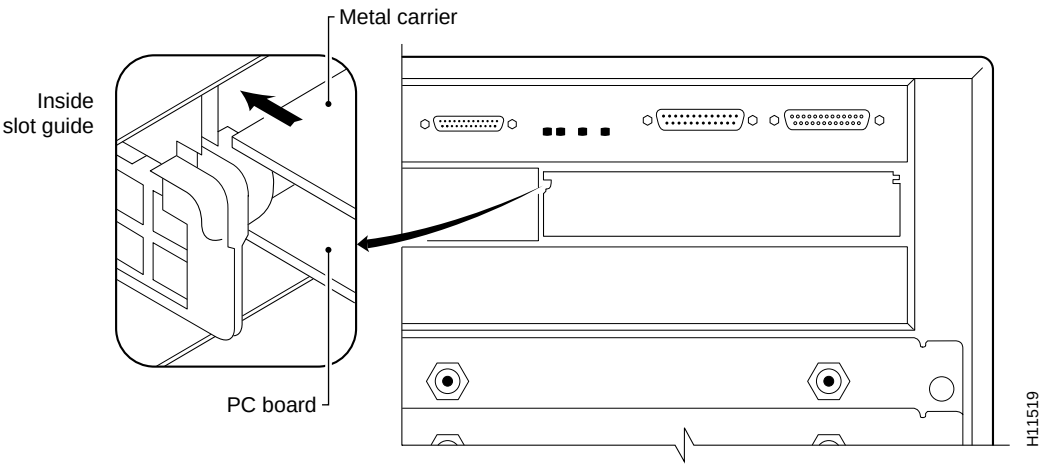
Use the following procedure to install a new port adapter in a Cisco uBR7200 series router:

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

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 5-5.)

Step 3 Align the left and right edges 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 will disrupt 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 the port adapter is seated in the router midplane.

Step 7 Lock the retaining mechanism of the port adapter:

- For a Cisco uBR7246, place the port adapter retention clip for the desired port adapter in the locked position. The retention clip remains in the locked position (See Figure 5-7 .)
- For a Cisco uBR7223, place the port adapter lever in the locked position. (See Figure 5-8.)

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.

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

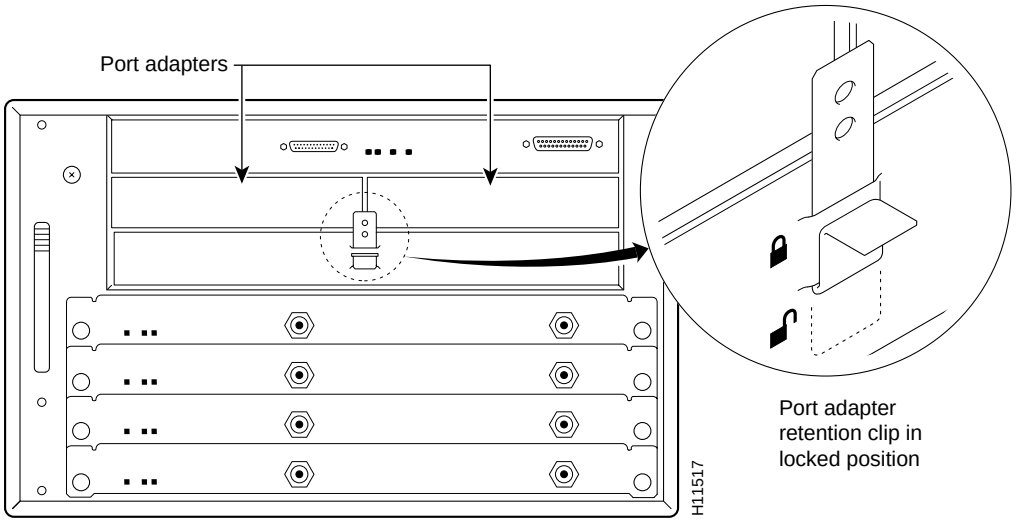
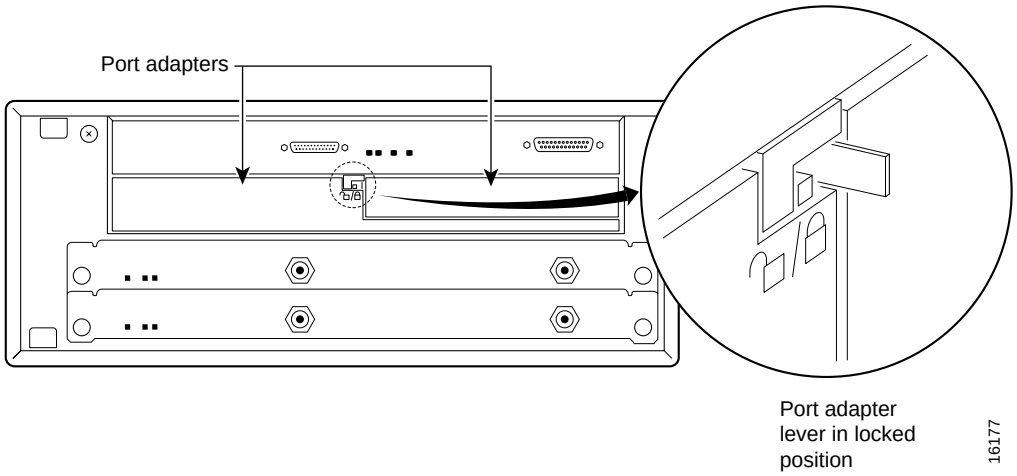


Figure 5-8 Placing the Port Adapter Lever in the Locked Position—Cisco uBR7223



This completes the procedure for installing a port adapter in a Cisco uBR7200 series router. Proceed to Chapter 7, “Attaching the PA-2FEISL Interface Cables,” to connect the necessary cables to your port adapter.

VIP2 and the PA-2FEISL

This chapter provides information on the PA-2FEISL port adapter and its use on the VIP2-15, VIP2-20, and VIP2-40 in Cisco 7000 series and Cisco 7500 series routers. This chapter contains the following sections:

Note This release of the PA-2FEISL is not supported on the VIP2-50. (This restriction is subject to change without notice.)

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 Cisco Systems.

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.

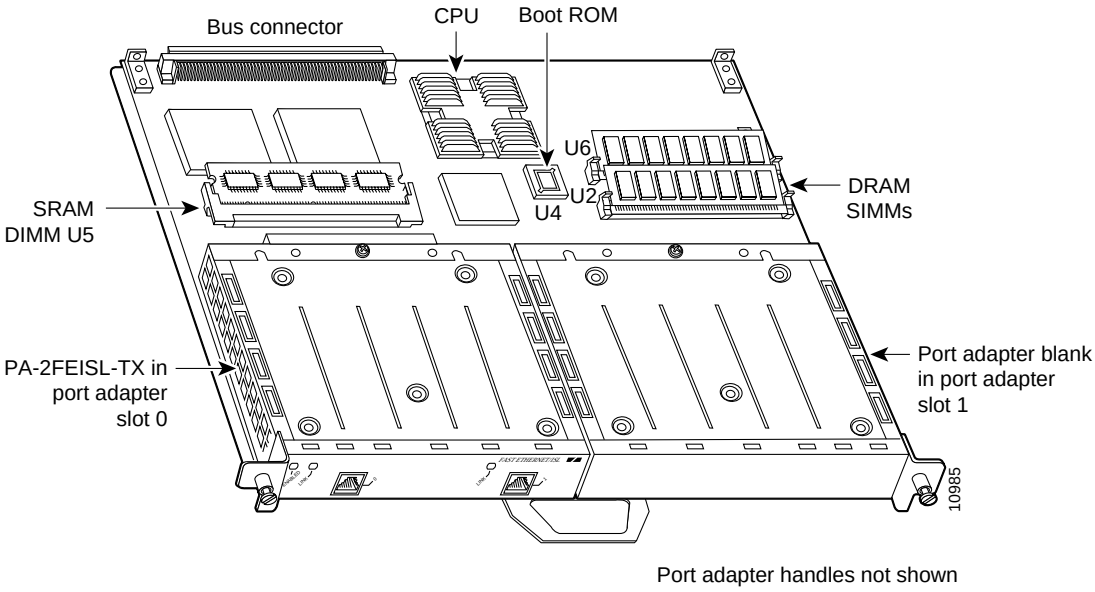
Note Each port adapter circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage. Each port adapter has one Phillips-head screw that secures it to its port adapter slot. We strongly recommend that the following procedures be performed by a Cisco-certified service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

Although 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 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 and 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 airflow through the chassis. If you plan to install a new port adapter, you must first remove the blank port adapter.

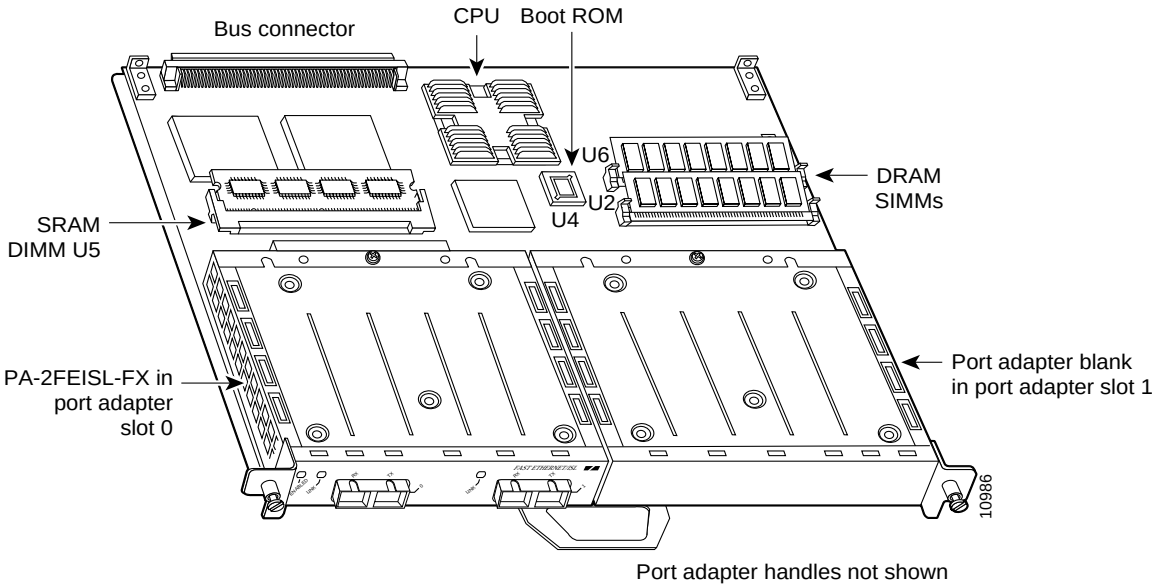
The PA-2FEISL can be installed in either port adapter slot 0 or port adapter slot 1 on the VIP2. Figure 6-1 shows a PA-2FEISL-TX installed in port adapter slot 0 on a VIP2-15 or VIP2-40. Figure 6-2 shows a PA-2FEISL-FX installed in port adapter slot 0 on a VIP2-15 or VIP2-40.

Figure 6-1 VIP2-15 or VIP2-40 with a PA-2FEISL-TX in Port Adapter Slot 0



Note The PA-2FEISL-FX has SC-type fiber-optic connectors in place of RJ-45 connectors.

Figure 6-2 VIP2-15 or VIP2-40 with a PA-2FEISL-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.

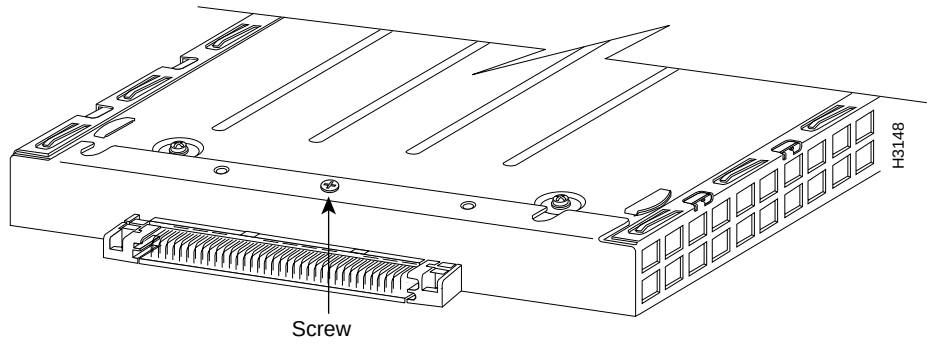
Note If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

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. 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 6-3.) This screw secures the port adapter (or blank port adapter) to its slot.

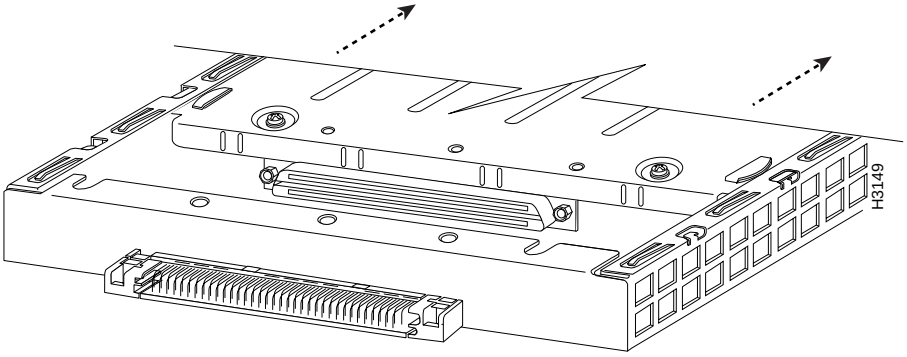
Figure 6-3 Location of Port Adapter Screw—Partial Port Adapter View



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 6-4.)

Figure 6-4 Pulling a Port Adapter Out of a Slot—Partial Port Adapter View



Step 7 If you removed a port adapter, place it in an antistatic container for safe storage or shipment back to Cisco Systems. 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 the VIP2.

Installing a Port Adapter

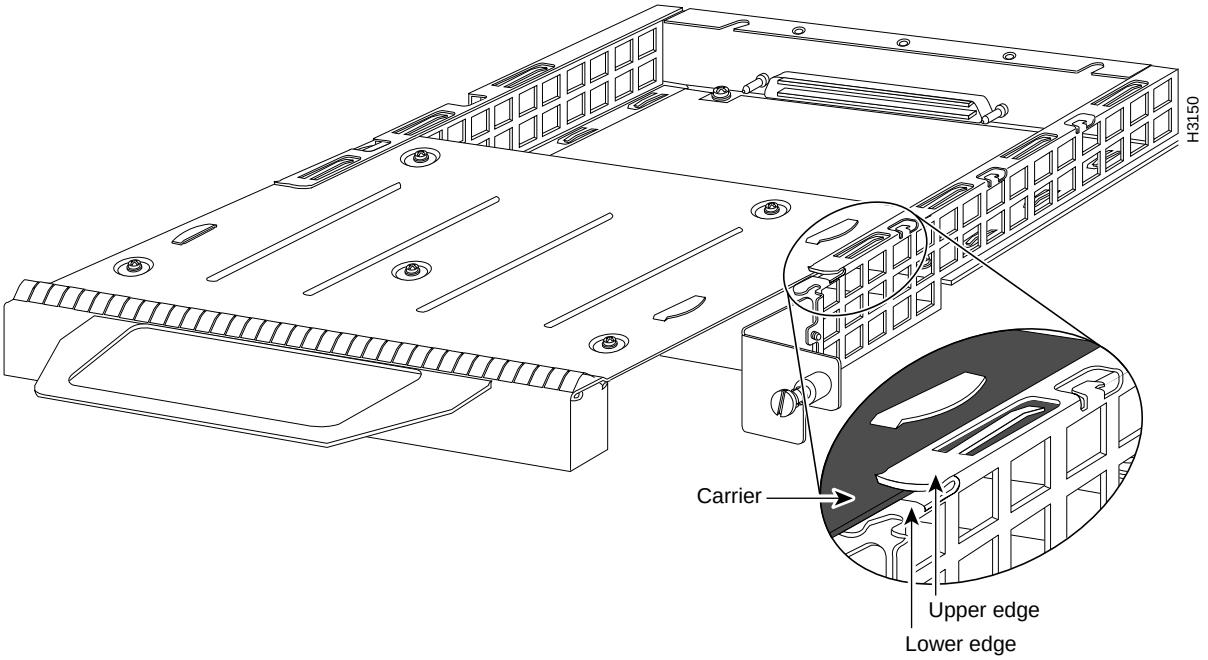
Use the following standard procedure to install a port adapter on a VIP2:

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

Step 2 Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See Figure 6-5.)

Step 3 Carefully align the port adapter carrier between the upper and lower edges of the port adapter slot, as shown in Figure 6-5.

Figure 6-5 Installing a New Port Adapter



Caution To prevent jamming the carrier between the upper and lower edges of the port adapter slot, and to assure that the edge connector at the rear of the port adapter mates with the connector at the rear of the port adapter slot, make certain that the carrier is positioned correctly, as shown in the cutaway in Figure 6-5.

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 Install the screw in the rear of the port adapter slot. (See Figure 6-3 for its location.) Do not overtighten this screw.

Step 6 Replace the VIP2 in the chassis. 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 they have been disconnected, reconnect the interface cables to the interface processor.

This completes the procedure for installing any type of port adapter on the VIP2. Proceed to Chapter 7, "Attaching the PA-2FEISL Interface Cables," to connect the necessary cables to your port adapter.

Attaching the PA-2FEISL Interface Cables

To continue your PA-2FEISL port adapter installation, you must install the port adapter's interface cables. The following instructions apply to all supported platforms.

Installing a PA-2FEISL RJ-45 or SC Cable

RJ-45 and SC-type fiber optic cables are not available from Cisco; they are available from commercial cable vendors.

Use the following procedure to connect RJ-45 or SC cables:

Step 1 If you have RJ-45 connections (PA-2FEISL-TX), attach the Category 5 unshielded twisted-pair (UTP) cable directly to an RJ-45 port on the PA-2FEISL-TX. See (Figure 7-1.) The PA-2FEISL is an end station device and not a repeater. You *must* connect the PA-2FEISL to a repeater, hub, or back-to-back to another 100-Mbps Fast Ethernet adapter.

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

Note Port adapters have a handle attached, but this handle is not shown to allow a full detailed view of each port adapter's faceplate.

Figure 7-1 Connecting a PA-2FEISL-TX RJ-45 Cable—Horizontal Orientation (Shown Without Handles)

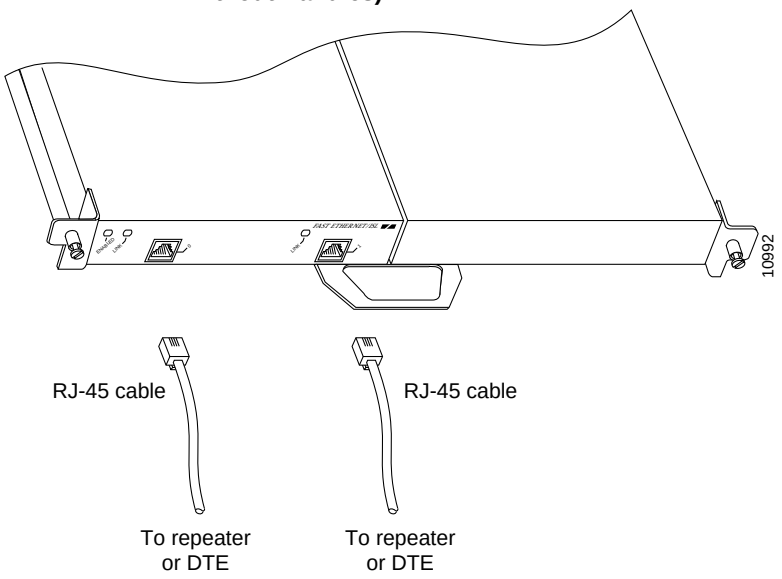
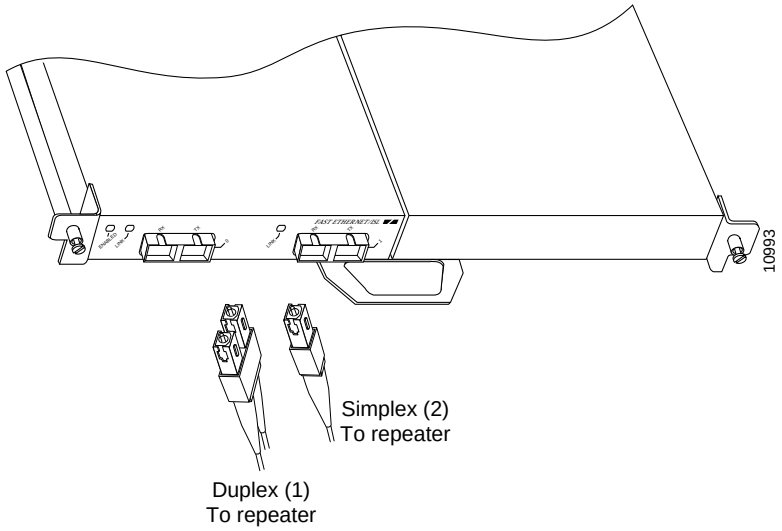


Figure 7-2 Connecting PA-2FEISL-FX SC Cables—Horizontal Orientation (Shown Without Handles)



Caution Only connect cables that comply with EIA/TIA-568 standards. (See Table 1-4 on page 1-5 for cable recommendations and specifications.)

Step 2 Attach the network end of your RJ-45 or SC-type cable to your 100BaseT transceiver, switch, hub, repeater, DTE, or other external 100BaseT equipment.

This completes the PA-2FEISL cable installation. Proceed to Chapter 8, “Configuring the PA-2FEISL,” to configure the PA-2FEISL and complete the installation.

Configuring the PA-2FEISL

To continue your PA-2FEISL port adapter installation, you must configure the PA-2FEISL interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms are noted. This chapter contains the following sections:

Using the EXEC Command Interpreter

To modify the configuration of your router use 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#
```

Configuring the Interfaces

If you installed a new PA-2FEISL 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 will recognize the new interface and bring it up in its existing configuration.

After you verify that the new PA-2FEISL is installed correctly (the enabled LED is on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you will need, such as the following:

- Protocols you plan to route on each new interface
- IP addresses if you plan to configure the interfaces for IP routing
- Whether the new interfaces will use bridging

The **configure** command requires privileged-level access to the EXEC command interpreter, which usually requires a password. If necessary, contact your system administrator 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 appropriate configuration publications listed in the "Related Documentation" section on page vi.

You can configure each of the interfaces on a PA- FEISL at:

- 100 Mbps, half duplex, for a maximum aggregate bandwidth of 200 Mbps per pair. Half-duplex operation is the default.
- 200 Mbps, full duplex, for a maximum aggregate bandwidth of 400 Mbps per pair.

You can also configure one PA-2FEISL interface at 100 Mbps, half duplex, and the second PA-2FEISL interface at 200 Mbps, full duplex, for a maximum aggregate bandwidth of 300 Mbps per pair.

The following sections describe how to identify the chassis slot, port adapter slot, and Ethernet 10Base-T interface port numbers for the Cisco 7100 series, Cisco 7200 series, , and the VIP2-15, VIP2-20, and VIP2-40.

Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-2FEISL in Cisco 7100 series, Cisco 7200 series, the Cisco uBR7200 series routers, and the VIP2.

Cisco 7100 Series Addresses

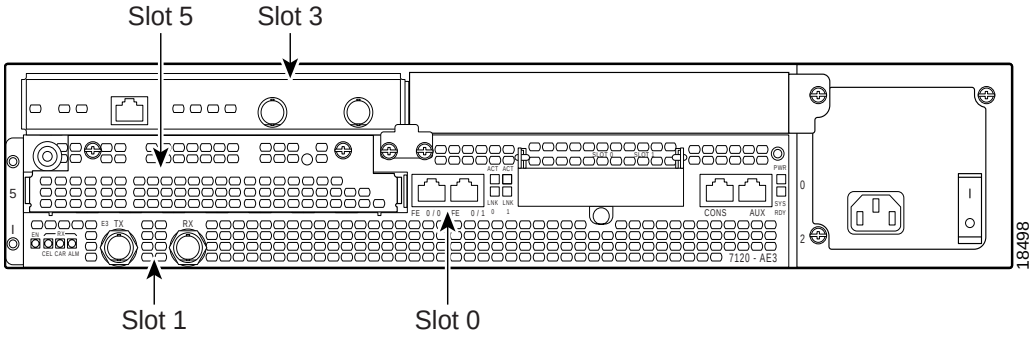
This section describes how to identify the interface addresses used for the PA-2FEISL in Cisco 7100 series routers.

Interface addresses specify the actual physical location of each interface on Cisco 7100 series routers. The interface address is composed of a two-part number in the format *port adapter slot number/interface port number*, as follows:

- The first number identifies the port adapter slot in the Cisco 7100 series router and is either 3 (Cisco 7120 series routers) or 4 (Cisco 7140 series routers)
- The second number identifies the interface port number on the PA-2FEISL and is always numbered in sequence as interfaces 0 and 1.

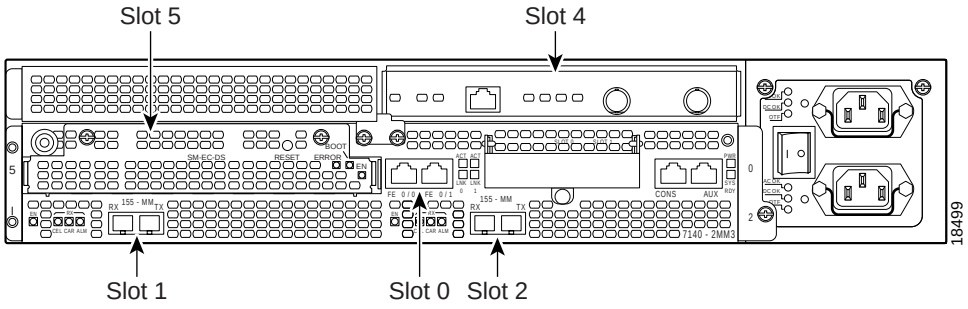
In Cisco 7120 series routers, slot 3 is the port adapter slot you can use for the PA-2FEISL. (See Figure 8-1.) On a PA-2FEISL installed in slot 3, the interface addresses of the eight serial interfaces are serial 3/0 through 3/7 (port adapter slot 3 and interfaces 0 through 7).

Figure 8-1 Port Adapter Slot Numbering—Cisco 7202 Series



In Cisco 7140 series routers, slot 4 is the port adapter slot you can use for the PA-2FEISL. (See Figure 8-2.) On a PA-2FEISL installed in slot 4, the interface addresses of the eight serial interfaces are serial 4/0 through 4/7 (port adapter slot 4 and interfaces 0 through 7).

Figure 8-2 Port Adapter Slot Numbering—Cisco 7140 Series



Cisco 7200 Series and Cisco uBR7200 Series Addresses

This section describes how to identify the interface addresses used for the PA-2FEISL in Cisco 7200 series and Cisco uBR7200 series routers.

Interface addresses specify the actual physical location of each interface on Cisco 7200 series (see Figure 8-3) or Cisco uBR7200 series routers (see Figure 8-4). The interface address is composed of a two-part number in the format *port adapter slot number/interface port number*, as follows:

- The first number identifies the port adapter slot of the router in which the PA-2FEISL is installed.
- The second number identifies the interface ports on the PA-2FEISL, which are always numbered in sequence as interfaces 0 through 7.

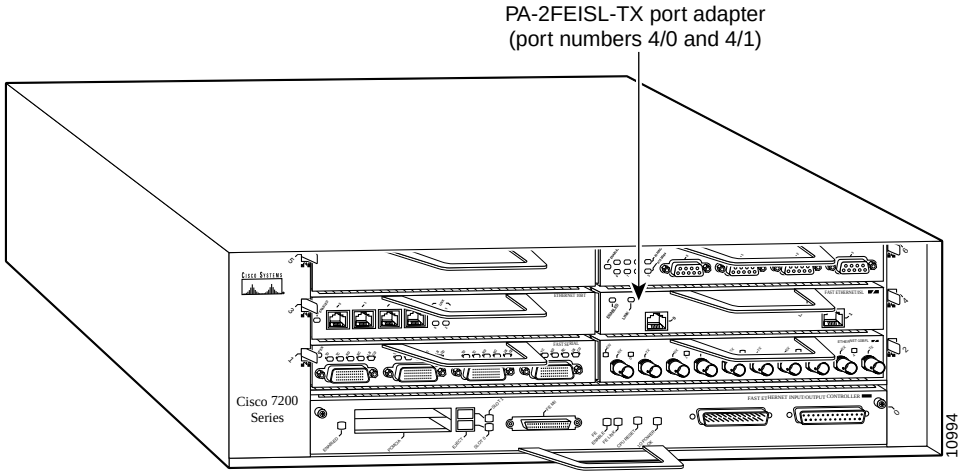
Note For the Cisco 7206 router shelves, physical port addresses are composed of a three-part number in the format *shelf number/port adapter slot number/interface port number*, where the *shelf number* is a number assigned to the router shelf during the initial configuration of the Cisco AS5800 Universal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

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.

Interfaces on the PA-2FEISL maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the interface address changes to reflect the new port adapter 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 8-3 shows the interfaces of a PA-2FEISL in port adapter slot 1 of the Cisco 7206 router.

Figure 8-3 Cisco 7206 Fast Ethernet Interface Port Number Example

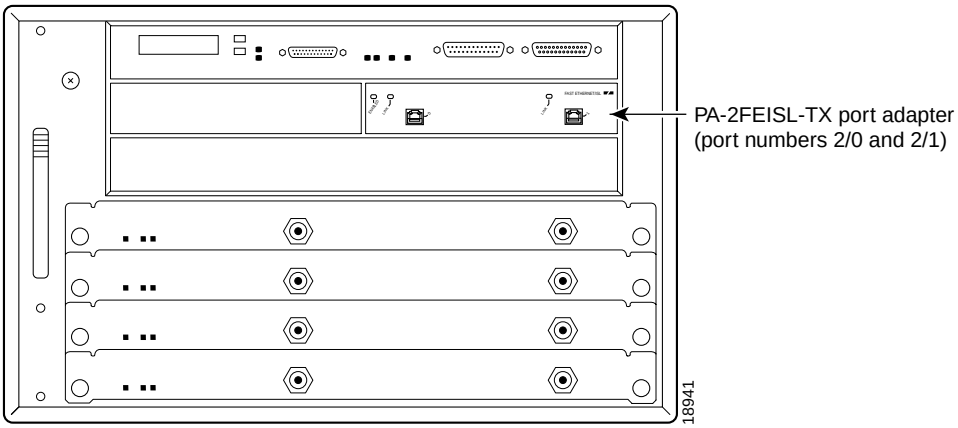


Note For the Cisco 7206VXR and Cisco 7206 router shelves, the PA-2FEISL in port adapter slot 4 would have the address *x*/4/0, where *x* is the number assigned to the router shelf during the initial configuration of the Cisco AS5800 Universal Access Server.

Figure 8-4 shows the interfaces of a PA-2FEISL in port adapter slot 2 of the Cisco uBR7246 router. The port adapter slots are numbered slot 1 and slot 2 for the Cisco uBR7246 and slot 1 for the Cisco uBR7223. (Slot 0 is always reserved for the Fast Ethernet port on the I/O controller—if present.) The individual interfaces always begin with 0. The number of additional interfaces depends on the number of interface ports on a port adapter. Port adapters can occupy any port adapter slot; there are no restrictions.

The interface addresses of the interfaces on a PA-2FEISL in port adapter slot 2 are 2/0 and 2/1 (port adapter slot 2 and interfaces 0 and 1). If the *PA-XXX* was in port adapter slot 1, these same interfaces would be numbered 1/0 and 1/1 (port adapter slot 1 and interfaces 0 and 1).

Figure 8-4 Cisco uBR7200 Series Fast Ethernet Interface Port Number Example—Cisco uBR7246



VIP2 Interface Addresses

This section describes how to identify the interface addresses used for the PA-2FEISL on a VIP2 in Cisco 7000 series and Cisco 7500 series routers.

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

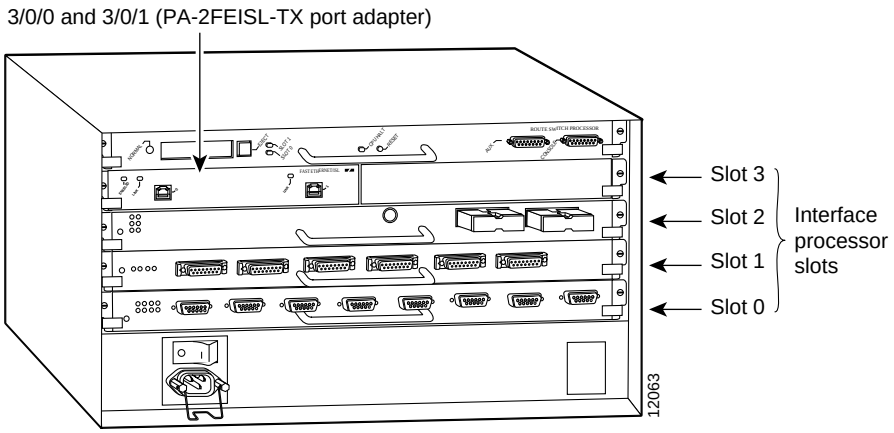
Interface addresses specify the actual physical location of each interface on Cisco 7000 series and Cisco 7500 series routers. The interface address is composed of a three-part number in the format *interface processor slot number/port adapter slot number/interface port number*, as follows:

- The first number identifies the interface processor slot in which the VIP2 is installed and varies with the Cisco 7000 series or Cisco 7500 series router in which the VIP2 is installed.
- The second number identifies the physical port adapter number on the VIP2 and is either 0 or 1.
- The third number identifies the interface port number on the PA-2FEISL and is always numbered as interfaces 0 and 1.

Interfaces on a PA-2FEISL installed in a 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 interface processor slot.

Figure 8-5 shows a sample Cisco 7505 system. The first port adapter slot number is 0, and the second port adapter slot number is 1. The interface processor addresses of the PA-2FEISL are 3/0/0 and 3/0/1 (interface processor slot 3, port adapter slot 0 and interfaces 0 and 1). If the port adapter was in port adapter slot 1on the VIP2, these same interface addresses would be numbered 3/1/0 and 3/1/1.

Figure 8-5 Fast Ethernet/ISL Interface Port Number Example—Cisco 7505



Note If you remove the PA-2FEISL-equipped VIP2 (shown in Figure 8-5) from interface processor slot 3 and install it in interface processor slot 2, the interface addresses become 2/1/0 through 2/1/1.

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>
```

Following is an example of a basic configuration procedure:

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

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

Step 2 Specify the first interface to configure by entering the **interface** subcommand, followed by the *type* and *slot/*.

Platform	Command	Example
Cisco 7100 series; Cisco 7200 series or Cisco uBR7200 series routers	**interface**, followed by *type* (**fastethernet**) and *slot/interface* (port adapter slot number/interface port number	The example is for the first interface of the port adapter in slot 4 `Router (config)# interface fastethernet 4/0`
VIP2	**interface**, followed by *type* (**fastethernet**) and *slot/port-adapter/port* (interface processor slot number/port adapter slot number and interface port number.	The example 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`

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.

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 10.0.0.0 255.255.255.0
```

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

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

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

Step 6 Configure additional interfaces as required.

Step 7 Complete the configuration by pressing **Ctrl-Z** (hold down the **Control** key while you press **Z**) or entering **end** to exit configuration mode and return to the EXEC command interpreter prompt.

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.

Configuring FE Port Adapter Transmission Mode

Depending on the requirements for your system configuration and the protocols you plan to route on the interface, you might also need to enter other configuration subcommands. For complete descriptions of configuration subcommands and the configuration options available for Fast Ethernet interfaces, refer to the publications listed in the “Related Documentation” section on page vi.

Note Following are descriptions and examples of the commands for configuring the PA-2FEISL interface 4/0 (slot 4, Fast Ethernet interface port 0). Descriptions are limited to fields that are relevant for establishing and verifying the configuration. After configuring a new PA-2FEISL interface, use **show** commands to display the status of the new interface or all interfaces, or to verify changes you have made.

Half-duplex operation is the default for the PA-2FEISL. To change to full-duplex operation, use the following series of commands:

```
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
  (display text omitted)
```

Use the **no full-duplex** configuration 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)
```

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

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.

This section contains the following subsections:

Using show Commands to Verify the New Interface Status

Table 8-1 demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the PA-2FEISL appears in them correctly. Sample displays of the output of these commands appear in the sections that follow.

Table 8-1 Using show Commands

Command	Function	Example
show version or **show hardware**	Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images	`Router# show version`
show controllers	Displays all the current interface processors and their interfaces for a Cisco 7100 series, Cisco 7200 series or a Cisco uBR7200 series router.	`Router# show controllers`
show controllers cbus	Displays all the current interface processors and their interfaces for the VIP2	`Router # show controllers cbus`
show interfaces *port adapter type slot/interface*	Displays status information about a specific interface on a Cisco 7100 series, Cisco 7200 series or Cisco uBR7200 series router.	`Router # show interfaces fastethernet 1/0`
show interfaces *type slot/port adapter slot/interface*	Displays status information about a specific interface on a VIP2.	`Router # show interfaces fastethernet 1/0/0`
show protocols	Displays protocols configured for the entire system and for specific interfaces	`Router# show protocols`
show running-config	Displays the running configuration file	`Router# show running-config`
show startup-config	Displays the configuration stored in NVRAM	`Router# show startup-config`

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

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.

If an interface is shut down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the interface is properly connected and terminated. If you still have problems bringing up the interface, contact a service representative for assistance. This section includes the following subsections:

- Cisco 7100 Series, Cisco 7200 Series, and Cisco uBR7200 Series show Commands, page 8-10
- VIP2 show Commands, page 8-12

Choose the subsection appropriate for your system.

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

With the **show interfaces** *type slot/por*t command, use arguments such as the interface type (for example, fastethernet) 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 a Fast Ethernet interface on a PA-2FEISL in slot 4:

```
Router# show interfaces fastethernet 4/0
FastEthernet4/0 is administratively down, line protocol is down
  Hardware is DEC21140, address is 1.1.1.11 (bia 0000)
Internet address is 10.0.0.0
  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 the Cisco 7206 router shelves, the **show interfaces** command requires a shelf number in the format **show interfaces** *type shelf number/port adapter slot/interface*.

The Fast Ethernet interface port adapter is numbered as port adapter 4. The Fast Ethernet ports on the PA-2FEISL are interfaces 0 and 1.

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

```
Router #show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-JS-M), Version 12.0(5)T
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Wed 30-Jun-99 13:56 by userid
Image text-base:0x60008900, data-base:0x6136A000

ROM:System Bootstrap, Version 11.1(13)CA, RELEASE SOFTWARE (f)

Router uptime is 27 minutes
System restarted by reload
System image file is "slot0:c7200-js-m.960421", booted via slot0

cisco 7206 (NPE200) processor with 57344K/8192K bytes of memory.
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
6 slot midplane, Version 1.3

Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
4 Ethernet/IEEE 802.3 interface(s)
2 FastEthernet/IEEE 802.3 interface(s)
4 Token Ring/IEEE 802.5 interface(s)
125K bytes of non-volatile configuration memory.
4096K bytes of packet SRAM memory.

4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2100
```

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-2FEISL-FX in port adapter slot 2:

```
Router# show diag 2

Fastethernet (TX-ISL) port adapter, 2 ports
        Port adapter is analyzed
        Port adapter insertion time 00:02:27 ago
        Hardware revision 1.0           Board revision A0
        Serial number     8500290       Part number    73-2618-01
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 6C 01 00 00 81 B4 42 49 0A 3A 01 00 00 00 00
          0x30: 50 00 00 00 98 04 00 00 00 00 FF FF FF FF FF 00
```

Note For complete command descriptions and examples for the Cisco 7100 series, Cisco 7200 series, and Cisco uBR7200 series routers, refer to the publications listed in the "Related Documentation" section on page vi.

VIP2 show Commands

Use the **show interfaces** *type slot/port adapter/por*t command, with arguments such as the interface type (for example, fastethernet) and the port number (slot/port), to display information about a specific interface. The following example of the **show interfaces fastethernet** command shows information specific to a Fast Ethernet interface on the PA-2FEISL in slot 3:

```
Router# show interfaces fastethernet 3/0/0
FastEthernet3/0/0 is up, line protocol is up
  Hardware is cyBus FastEthernet Interface, address is 0010.5493.9860 (bia 0010)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  Half-duplex, 100Mb/s, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:07, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 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 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 15654 ignored, 0 abort
     0 watchdog, 0 multicast
     0 input packets with dribble condition detected
     27784 packets output, 2742738 bytes, 0 underruns
     50 output errors, 0 collisions, 3 interface resets
     0 babbles, 50 late collision, 119 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

Use the **show version** (or **show hardware**) command to display the configuration of the system hardware (the number of each interface processor type installed), the software version, the names and sources of configuration files, and the boot images. The 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 [mpo 105]
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) [biff 571], RELEASED SOFTWARE
ROM: GS Bootstrap Software (RSP-BOOT-M), Version 11.0(1.2), MAINTENANCE
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 diag** *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-2FEISL-FX in interface processor slot 3:

```
Router# show diag 3
Slot 3:
        Physical slot 3, ~physical slot 0xC, logical slot 3, CBus 0
        Microcode Status 0xC
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: Console I/O
        EEPROM format version 1
        VIP2 controller, HW rev 2.04, board revision D0
        Serial number: 08224085  Part number: 73-1684-03
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 15 02 04 00 7D 7D 55 49 06 94 03 00 00 00 00
          0x30: 68 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x1068 (4d22h ago)

        Controller Memory Size: 8 MBytes DRAM, 1024 KBytes SRAM

        PA Bay 0 Information:
                Fast-Ethernet PA, 2 ports, 100BaseFX-ISL
                EEPROM format version 1
                HW rev 1.00, Board revision A0
                Serial number: 00000005  Part number: 73-2619-01

        PA Bay 1 Information:
                Fast-Ethernet PA, 2 ports, 100BaseTX-ISL
                EEPROM format version 1
                HW rev 1.00, Board revision A0
                Serial number: 00000027  Part number: 73-2618-01
```

Note For complete command descriptions and examples for the VIP2, refer to the publications listed in the "Related Documentation" section on page vi.

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.

Following is an example of a successful **ping** command to a remote server with the address 10.0.0.10:

```
Router# ping 10.0.0.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 1.1.1.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

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

This completes the PA-2FEISL interface installation and configuration.