



PA-E3 Serial Port Adapter Installation and Configuration

Product Number: PA-E3(=), PA-2E3(=)

Platforms Supported: Catalyst 5000 Family Switches with RSM/VIP2, Catalyst 6000 Family Switches with FlexWAN Module, Cisco 7100 Series Routers, Cisco 7200 Series Routers, Cisco 7200 VXR Routers, Cisco uBR7200 Series Routers, Cisco 7201 Router, Cisco 7301 Router, Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 Router, Cisco 7401ASR Router, and VIP in the Cisco 7000 and Cisco 7500 Series Routers

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Text Part Number: OL-3502-04

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PA-E3 Serial Port Adapter Installation and Configuration

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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:

- [Document Revision History, page vii](#)
- [Objectives, page vii](#)
- [Organization, page viii](#)
- [Related Documentation, page viii](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page xi](#)

Document Revision History

The Document Revision History table below, beginning with version OL-3502-04, records technical changes to this document.

Document Version	Date	Change Summary
OL-3502-04	April, 2007	Adds Cisco 7201 router information.

Objectives

This document describes how to install and configure the PA-E3 serial port adapters (PA-E3 and PA-2E3), hereafter referred to as the PA-E3 which are used in the following platforms:

- Catalyst 5000 family switches with the Route Switch Module (RSM)/second-generation Versatile Interface Processor (VIP2)
- Catalyst 6000 family FlexWAN module in the Catalyst 6000 family switches
- Cisco 7100 series routers, consisting of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers and Cisco 7200 VXR routers, consisting of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and the Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers, consisting of the three-slot Cisco uBR7223 and the six-slot Cisco uBR7246 and Cisco uBR7246VXR.
- Cisco 7201 router
- Cisco 7301 router

- Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router
- Cisco 7401ASR router
- VIP in Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

Organization

This document contains the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the PA-E3 and its LED displays, cables, and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform before the actual installation.
Chapter 3	Removing and Installing Port Adapters	Describes the procedures for installing and removing PA-E3 port adapters in the supported platforms.
Chapter 4	Configuring the PA-E3	Provides instructions for configuring the PA-E3 on the supported platforms.

Related Documentation

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

- Cisco IOS software:

For 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>.

- Catalyst 5000 family switches with RSM/VIP2:
 - For an online directory to quickly access documents for Cisco Catalyst 5000 series switches, refer to the *Cisco Catalyst 5000 Series Switches Install and Upgrade Guides* index at the following URL:
http://www.cisco.com/en/US/products/hw/switches/ps679/prod_installation_guides_list.html

- For hardware installation and maintenance information, refer to the following documents:
 - *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note*
 - *Catalyst 5000 Series Route Switch Module Installation and Configuration Note*
 - The installation and configuration guide and quick start for your Cisco Catalyst 5000 series switch
- Catalyst 6000 family switches with FlexWAN module:
 - For an online directory to quickly access documents for Cisco Catalyst 6000 family switches, refer to the *Cisco Catalyst 6500 Series Switches Documentation Roadmaps* index at the following URL:
http://www.cisco.com/en/US/products/hw/switches/ps708/products_documentation_roadmaps_list.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Catalyst 6000 Family FlexWAN Module Installation and Configuration Note*
 - The hardware and software publications for your Catalyst 6000 family switch
- Cisco 7000 series routers:
 - For an online directory to quickly access documents for Cisco 7000 series routers, refer to the *Cisco 7000 Series Routers Introduction* index at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps332/tsd_products_support_eol_series_home.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Cisco 7000 Hardware Installation and Maintenance* for your router.
 - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
 - *Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration*
 - *Versatile Interface Processor (VIP6-80) Installation and Configuration Guide*
- Cisco 7100 series routers:
 - For an online directory to quickly access documents for Cisco 7100 series routers, refer to the *Cisco 7100 Series Documentation* roadmap at the following URL:
http://www.cisco.com/en/US/products/hw/vpndevc/ps333/products_product_index09186a00800fa142.html
 - For hardware installation and configuration information refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide*.
 - For information on setting up a Virtual Private Network, refer to the *Cisco 7100 Series VPN Configuration Guide*.
- Cisco 7200 series routers:
 - For an online directory to quickly access documents for Cisco 7200 series routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
 - For hardware installation and configuration information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the online installation and configuration guide and quick start for your Cisco 7200 series router.

- For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
- For information on network processing engines or network services engines, refer to the *Network Processing Engine and Network Services Engine Installation and Configuration* document.
- Cisco 7200 VXR routers:
 - For an online directory to quickly access documents for Cisco 7200 VXR routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
 - For hardware installation and maintenance information, refer to the *Cisco 7200 VXR Installation and Configuration Guide* or the *Cisco 7200 VXR Routers Quick Start Guide*.
- Cisco uBR7200 series routers:
 - For an online directory to quickly access documents for Cisco uBR7200 Universal Broadband routers, refer to the *Cisco uBR7200 Universal Broadband Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/cable/ps2217/products_documentation_roadmap09186a00805e0d0c.html
- Cisco 7201 router:
 - For an online directory to quickly access documents for the Cisco 7201 router, refer to the *Cisco 7201 Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/customer/products/hw/routers/ps341/products_documentation_roadmap09186a00807f635a.html
 - For hardware installation and maintenance information, refer to the *Cisco 7201 Installation and Configuration Guide* or the *Cisco 7201 Router Quick Start Guide*.
- Cisco 7301 router:
 - For an online directory to quickly access documents for the Cisco 7301 router, refer to the *Cisco 7301 Internet Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps352/products_documentation_roadmap09186a00801c0f21.html
 - For hardware installation and maintenance information, refer to the *Cisco 7301 Installation and Configuration Guide* or the *Cisco 7301 Router Quick Start Guide*.
- Cisco 7304 PCI port adapter carrier card in Cisco 7304 router:
 - For an online directory to quickly access documents for the Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7301 router, refer to the *Cisco 7304 Router Line Card, Carrier Card, Port Adapter, Modular Services Card, and Shared Port Adapter Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps352/products_documentation_roadmap09186a00801c0f5e.html
 - For hardware installation and maintenance information, refer to the *Cisco 7304 PCI Port Adapter Carrier Card Installation and Configuration Guide*.

- Cisco 7401ASR router:
 - For an online directory to quickly access documents for the Cisco 7401ASR router, refer to the *Cisco 7401ASR Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps354/products_documentation_roadmap09186a00801c0fd5.html
 - For hardware installation and maintenance information, refer to the *Cisco 7401ASR Installation and Configuration Guide* or the *Cisco 7401ASR Router Quick Start Guide*.
- Cisco 7500 series routers:
 - For an online directory to quickly access documents for the Cisco 7500 series routers, refer to the *Cisco 7500 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps359/products_documentation_roadmap09186a00801c0f9b.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Cisco 7500 Series Installation and Configuration Guide* or the quick start for your Cisco 7500 series router.
 - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
 - *Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration*
 - *Versatile Interface Processor (VIP6-80) Installation and Configuration Guide*
- For international agency compliance, safety, and statutory information for WAN interfaces, refer to the following documents. Use the documentation roadmap for your particular router to link to the appropriate documents for your router:
 - *Regulatory Compliance and Safety Information for the Catalyst 5000 Family Switches*
 - *Regulatory Compliance and Safety Information for the Catalyst 6000 Family Switches*
 - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
 - *Regulatory Compliance and Safety Information for 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 Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7301 Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7304 Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7401ASR Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly What's New in Cisco Product Documentation, which also lists all new and revised technical documentation at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>



CHAPTER 1

Overview

This chapter describes the one-port PA-E3 and two-port PA-2E3 serial port adapters. This chapter contains the following sections:

- [Port Adapter Overview, page 1-1](#)
- [LEDs, page 1-3](#)
- [Cables, Connectors, and Pinouts, page 1-4](#)
- [Management Information Base, page 1-5](#)
- [Port Adapter Slot Locations on the Supported Platforms, page 1-5](#)
- [Identifying Interface Addresses, page 1-15](#)
- [Interoperability Guidelines for PA-E3 DSUs, page 1-20](#)

Port Adapter Overview

The PA-E3 is a single-width, one-port or two-port port adapter that integrates data service unit (DSU) functionality into the Cisco router (see [Figure 1-1](#) and [Figure 1-2](#)). The port adapters provides one or two high-speed serial E3 interfaces.



Note

Port adapters have a handle attached, but this handle is occasionally not shown in figures in this publication to allow a full view of detail on the port adapter's faceplate.

Figure 1-1 One-Port PA-E3 Serial Port Adapter

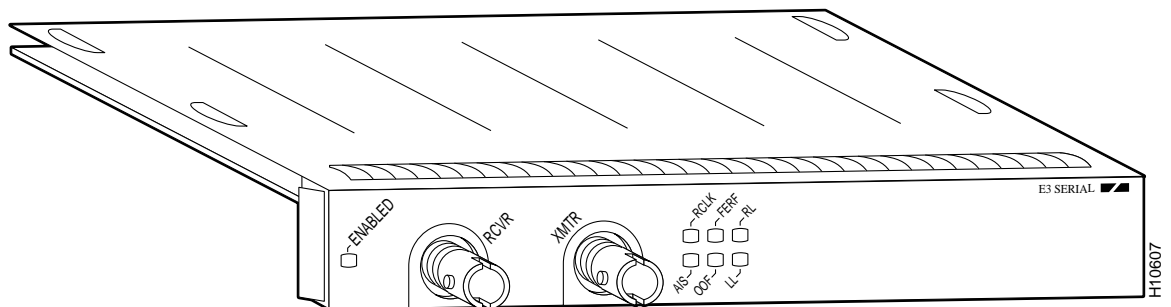
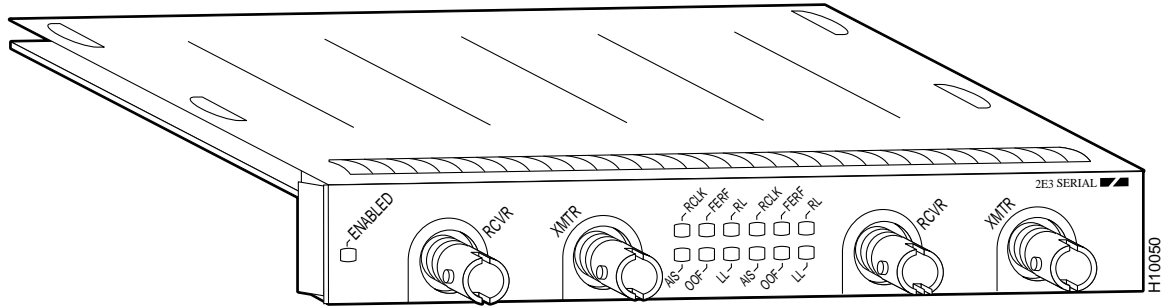


Figure 1-2 Two-Port PA-2E3 Serial Port Adapter



The one-port PA-E3 provides up to two network interfaces per Catalyst RSM/VIP2 for the Catalyst 5000 family switches, Catalyst 6000 family FlexWAN module in the Catalyst 6000 family switches, and VIP for Cisco 7000 series and Cisco 7500 series routers, and one high-speed interface on the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, the Cisco 7201 router, the Cisco 7301 router, the Cisco 7401ASR router, and the Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router.

The two-port PA-2E3 provides up to four network interfaces per Catalyst RSM/VIP2 for the Catalyst 5000 family switches, Catalyst 6000 family FlexWAN module in the Catalyst 6000 family switches, and VIP for Cisco 7000 series and Cisco 7500 series routers, and two high-speed interfaces on the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, Cisco 7401ASR router, and Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router.

Serial network interfaces reside on modular port adapters, which provide a direct connection between the high-speed bus in the router and the external networks. The PA-E3 provides a full-duplex synchronous serial E3 interface for transmitting and receiving data at rates of up to 34 megabits per second (Mbps).

The port adapters both supports both 16- and 32-bit cyclic redundancy checks (CRCs). The default is 16-bit CRCs; to enable 32-bit CRCs, you use a configuration command. For a description of the CRC function, see the [“Configuring Cyclic Redundancy Checks”](#) section on page 4-10.



Note

The Catalyst RSM/VIP2, the Catalyst 6000 family FlexWAN module, the VIP, and the Cisco 7304 PCI Port Adapter Carrier Card support online insertion and removal (OIR), but individual port adapters do not. To replace port adapters, you must first remove the Catalyst RSM/VIP2, the Catalyst 6000 family FlexWAN module, the VIP, or the Cisco 7304 PCI Port Adapter Carrier Card from the chassis and then replace port adapters as required.

OIR is supported for port adapters in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router.

Features

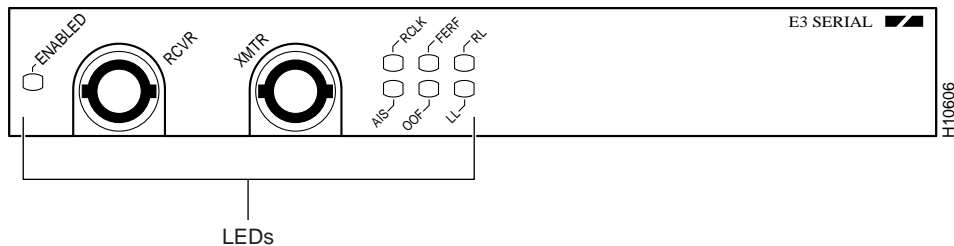
The PA-E3 serial port adapter has the following features:

- Single- or double-port E3 rate (34 Mbps) connectivity
- Full-duplex synchronous serial E3 interface
- High-speed High-Level Data Link Control (HDLC) data
- Integrated data service unit (DSU) functionality
- Support for 16- and 32-bit cyclic redundancy checks (CRCs)
- Support for G.751 framing or bypass framing
- Support for ATM-DXI, Frame Relay, HDLC, Switched Multimegabit Data Service (SMDS), and PPP serial encapsulations
- Support for national service bits
- Support for E3 MIB (RFC 1407)
- Support for remote and local loopback
- HDB3 line coding
- Scrambling and bandwidth reduction
- Online insertion and removal (OIR)

LEDs

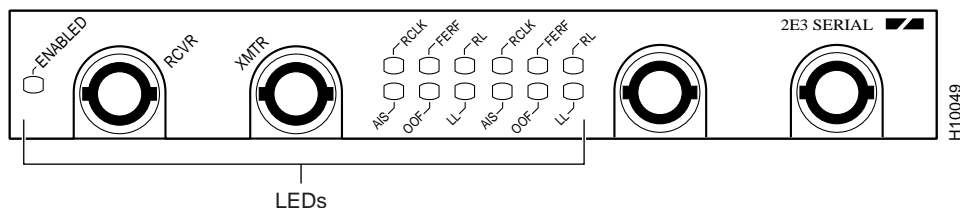
The one-port PA-E3 has one status LED and six uplink port status LEDs (RCLK, FERF, OOF, AIS, RL, and LL) for the serial E3 port. (See [Figure 1-3](#).)

Figure 1-3 One-Port PA-E3 LEDs—Partial Front View Shown



The two-port PA-2E3 has one status LED and six uplink port status LEDs (RCLK, FERF, OOF, AIS, RL, and LL) for each serial E3 port. (See [Figure 1-4](#).)

Figure 1-4 Two-Port PA-2E3 LEDs—Partial Front View Shown



After system initialization, the ENABLED LED goes on, indicating that the port adapter has been enabled for operation.

The following conditions must be met before the PA-E3 is enabled:

- The port adapter contains a valid microcode version that has been downloaded successfully.
- The port adapter is correctly connected to and receiving power from the Catalyst RSM/VIP2 motherboard, the Catalyst 6000 family FlexWAN module, the VIP, or the Cisco 7304 PCI Port Adapter Carrier Card.
- The bus recognizes the port adapter.

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

Table 1-1 describes the PA-E3 LEDs.

Table 1-1 PA-E3 LEDs

Name	Color	State	Meaning
ENABLED	Green	On	Indicates that the port adapter is ready.
Uplink port status			
RCLK	Green	On	Indicates that a receive clock has been detected.
FERF	Yellow	On	Indicates that Framer detected Far End Receive Failure.
OOF	Yellow	On	Indicates that Framer detected Out of Frame.
AIS	Yellow	On	Indicates that Framer detected Alarm Indication Signal.
RL	Yellow	On	Indicates that port is in remote loopback mode.
LL	Yellow	On	Indicates that port is in local loopback mode.

Cables, Connectors, and Pinouts

The serial interface cable for the PA-E3, which is a 75-ohm coaxial cable, is used to connect your router to a serial E3 network. Serial cables conform to EIA/TIA-612 and EIA/TIA-613 specifications. The serial ports on the PA-E3 are considered to be DTE devices.

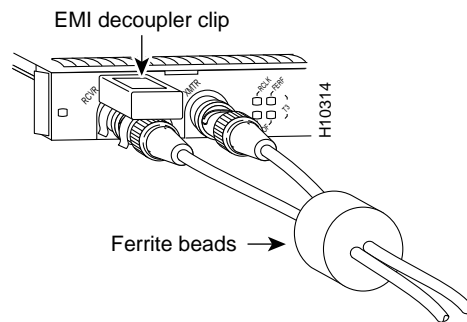
On a single PA-E3, there are one or two serial E3 ports, each with two connectors (receive and transmit), where you connect the Cisco 75-ohm coaxial cable. The 75-ohm coaxial cable (Cisco part number CAB-ATM-DS3/E3) for the PA-E3 is available only from Cisco Systems; it is *not* available from outside commercial cable vendors.

The Cisco E3 75-ohm coaxial cable, which comes with an attached ferrite sleeve (see [Figure 1-5](#)), is available only in 10-foot (3.05-meter) lengths. Line build-out is programmable for up to 450 feet of 734A or equivalent coaxial cable or up to 225 feet for 728A or equivalent coaxial cable.

**Note**

For E3 (75-ohm) connections, you must have ferrite beads on the 75-ohm coaxial cable and EMI decoupling clips on the receive end of the cable (see [Figure 1-5](#)) if compliance with European certification standards for emission control is required (EN55022/CISPR22 Class B for radiated emission levels).

Figure 1-5 PA-E3 Cables



You can test the DTE-to-DCE cable connection by using the **loopback dte** command. See the [“Using loopback Commands”](#) section on [page 4-29](#) for more information.

Management Information Base

Management Information Base (MIB) attributes are readable and writable across the ILMI through use of SNMP.

The one-port PA-E3 supports MIB-II (RFC 1213) and the E3 interface MIB (RFC 1407).

The two-port PA-2E3 supports MIB-II (RFC 1213) and the E3 interface MIB (RFC 1407).

Port Adapter Slot Locations on the Supported Platforms

The following sections provide port adapter slot locations and related information:

- [Catalyst RSM/VIP2 Slot Numbering, page 1-6](#)
- [Catalyst 6000 Family FlexWAN Module Slot Numbering, page 1-7](#)
- [Cisco 7100 Series Routers Slot Numbering, page 1-8](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering, page 1-9](#)
- [Cisco uBR7200 Series Router Slot Numbering, page 1-10](#)
- [Cisco 7201 Router Slot Numbering, page 1-11](#)
- [Cisco 7301 Router Slot Numbering, page 1-11](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering, page 1-12](#)
- [Cisco 7401ASR Router Slot Numbering, page 1-13](#)
- [Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Slot Numbering, page 1-13](#)

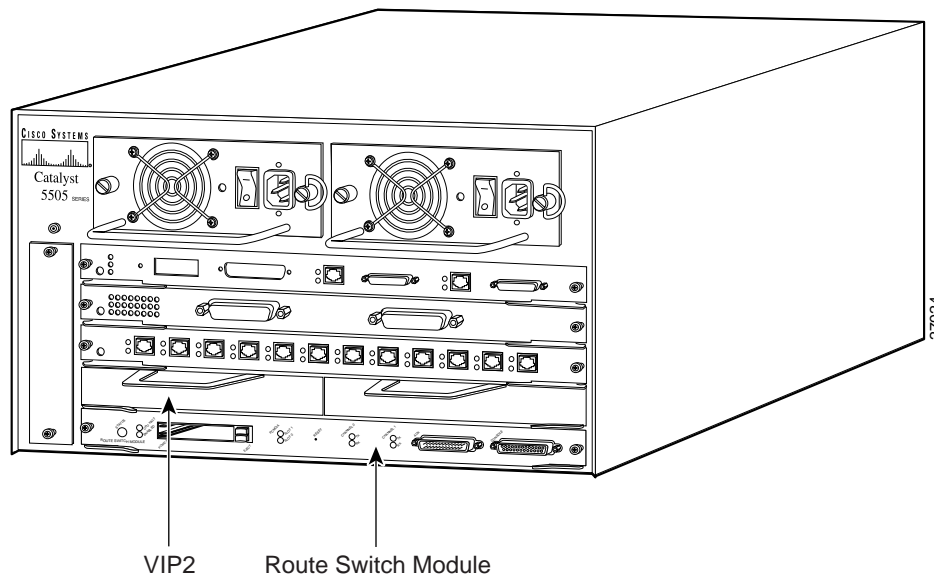
Catalyst RSM/VIP2 Slot Numbering

The Catalyst RSM/VIP2 can be installed in any slot in a Catalyst 5000 family switch except the top slots, which contain the supervisor engine modules. The Catalyst RSM/VIP2 does not use interface processor slot numbering; therefore, the slots in which it is installed are not numbered. The PA-E3 can be installed into either port adapter slot 0 or slot 1 on a Catalyst RSM/VIP2. [Figure 1-6](#) shows a Catalyst RSM/VIP2 with two port adapters installed.

**Note**

The Catalyst 5500 switch has 13 slots. Slot 1 is reserved for the supervisor engine module. If a redundant supervisor engine module is used, it would go in slot 2; otherwise, slot 2 can be used for other modules. Slot 13 is a dedicated slot, reserved for the ATM Switch Processor (ASP) module. Refer to the *Catalyst 5000 Series Route Switch Module Installation and Configuration Note* for any additional slot restrictions for the Catalyst RSM/VIP2.

Figure 1-6 Catalyst 5000 Family Switch with Port Adapters Installed on Catalyst RSM/VIP2



Catalyst 6000 Family FlexWAN Module Slot Numbering

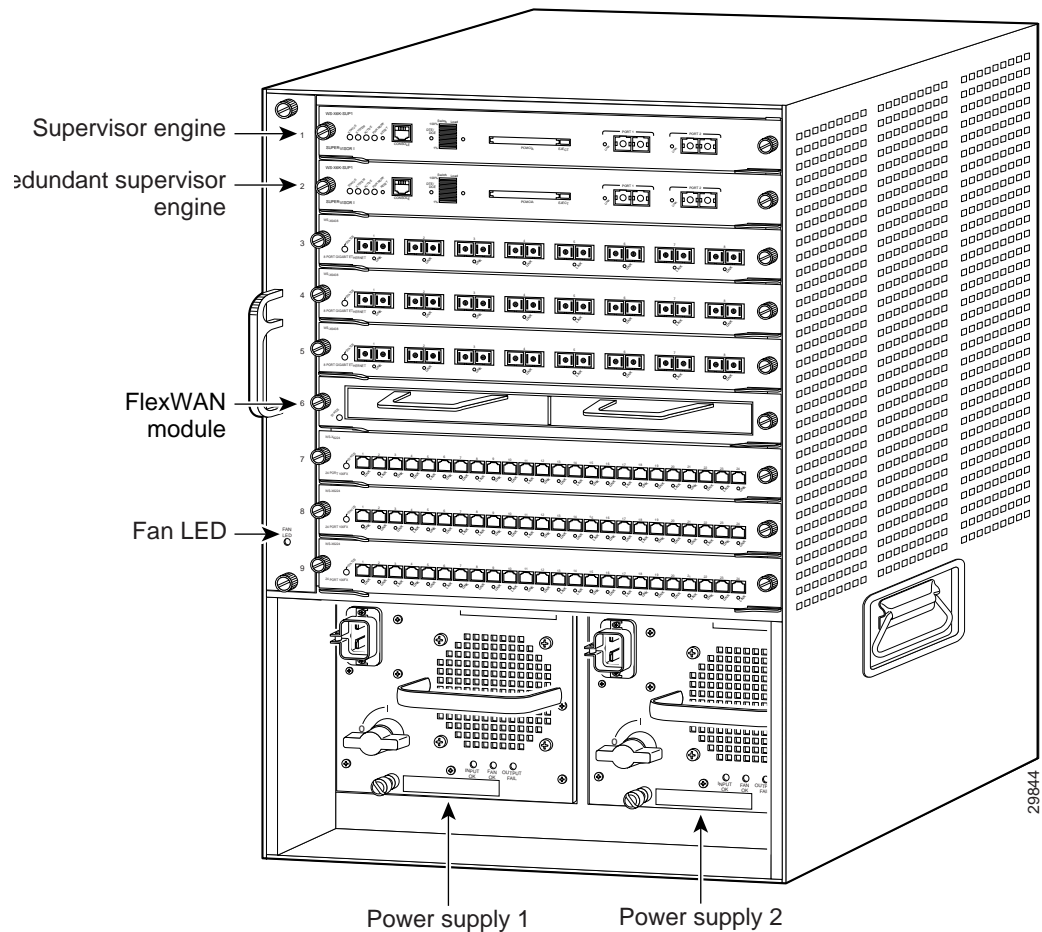
The Catalyst 6000 family FlexWAN module can be installed in any slot in a Catalyst 6000 family switch except slot 1, which is reserved for the supervisor engine. The PA-E3 can be installed into either port adapter bay 0 or bay 1 on a FlexWAN module. [Figure 1-7](#) shows a FlexWAN module with two blank port adapters installed.



Note

Slot 1 is reserved for the supervisor engine. If a redundant supervisor engine is used, it would go in slot 2; otherwise, slot 2 can be used for other modules.

Figure 1-7 Catalyst 6000 Family Switch with Port Adapters Installed on FlexWAN Module



Cisco 7100 Series Routers Slot Numbering

Port adapters can be installed in port adapter slot 3 in Cisco 7120 series routers, and in port adapter slot 4 in Cisco 7140 series routers. [Figure 1-8](#) shows the slot numbering on a Cisco 7120 series router. [Figure 1-9](#) shows the slot numbering on a Cisco 7140 series router.

Figure 1-8 Port Adapter Slots in the Cisco 7120 Series Router

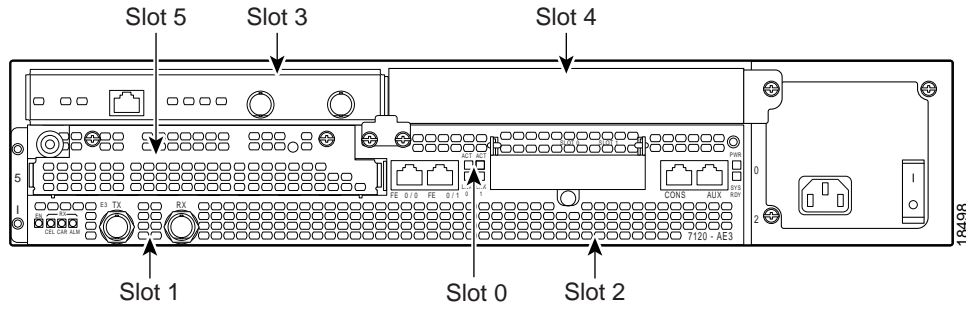
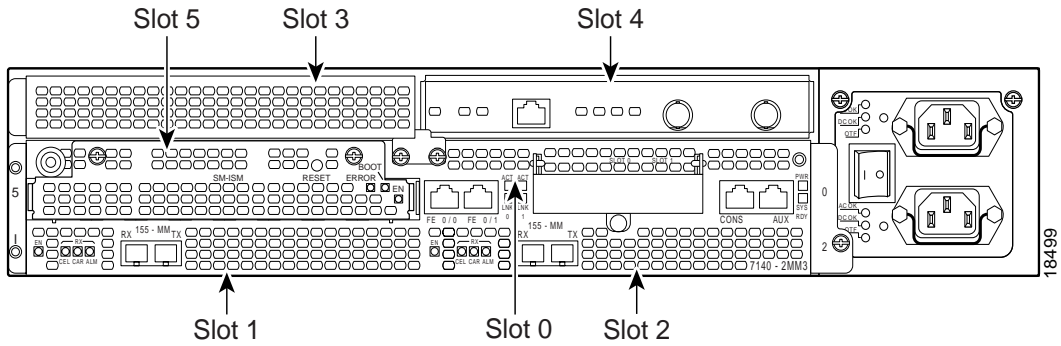


Figure 1-9 Port Adapter Slots in the Cisco 7140 Series Router



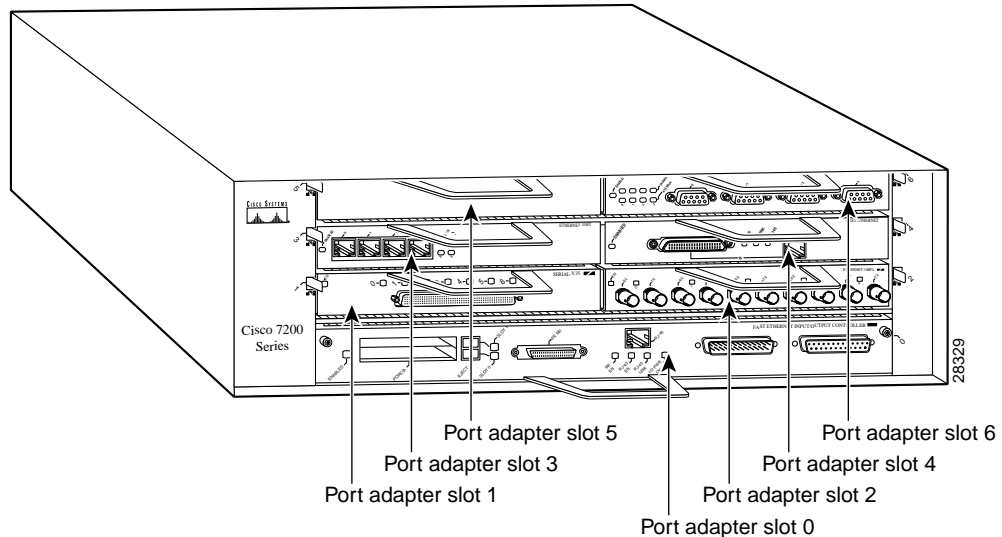
Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering

Cisco 7202 routers have two port adapter slots. The slots are numbered from left to right. You can place a port adapter in either of the slots (slot 1 or slot 2). The Cisco 7202 router is not shown.

Cisco 7204 routers and Cisco 7204VXR routers have four slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 4. You can place a port adapter in any of the slots (slot 1 through slot 4). Slot 0 is always reserved for the I/O controller. The Cisco 7204 router and Cisco 7204VXR are not shown.

Cisco 7206 routers and Cisco 7206VXR routers (including the Cisco 7206 and Cisco 7206VXR routers as router shelves in a Cisco AS5800 Universal Access Server) have six slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 6. You can place a port adapter in any of the six slots (slot 1 through slot 6). Slot 0 is always reserved for the I/O controller. [Figure 1-10](#) shows the slot numbering on a Cisco 7206 router. The Cisco 7206VXR router is not shown.

Figure 1-10 Port Adapter Slots in the Cisco 7206 Router

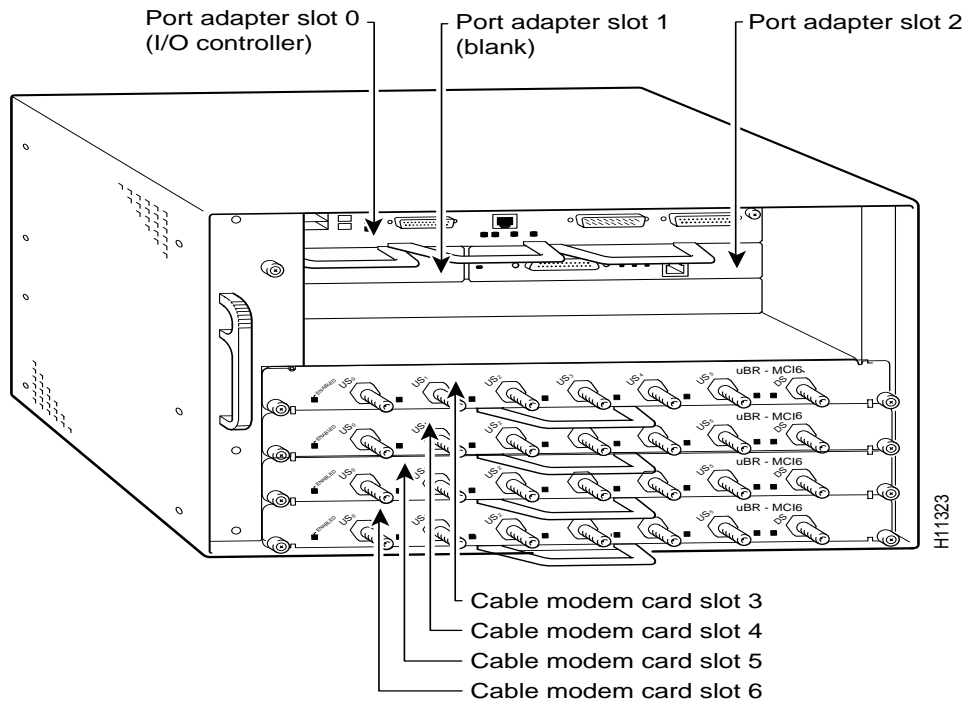


Cisco uBR7200 Series Router Slot Numbering

The Cisco uBR7223 router has one port adapter slot (slot 1). Slot 0 is always reserved for the I/O controller—if present. The Cisco uBR7223 router is not shown.

The Cisco uBR7246 router and Cisco uBR7246VXR router have two port adapter slots (slot 1 and slot 2). Slot 0 is always reserved for the I/O controller—if present. [Figure 1-11](#) shows the slot numbering of port adapters on a Cisco uBR7246 router or Cisco uBR7246VXR router.

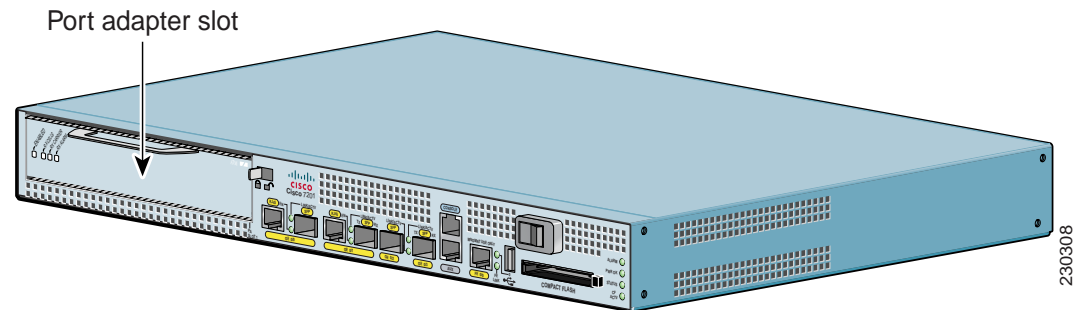
Figure 1-11 Port Adapter Slots in the Cisco uBR7246 and Cisco uBR7246VXR Routers



Cisco 7201 Router Slot Numbering

Figure 1-12 shows the front view of a Cisco 7201 router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7201 router.

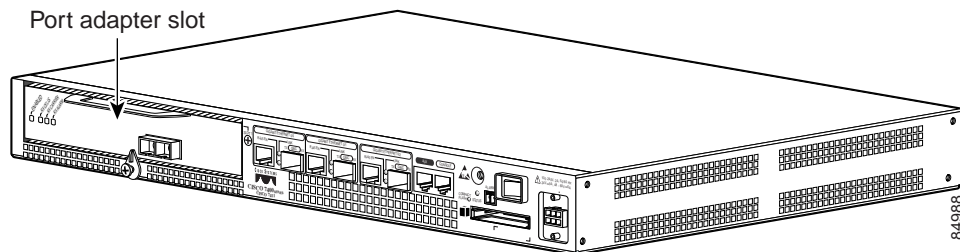
Figure 1-12 Port Adapter Slot in the Cisco 7201 Router



Cisco 7301 Router Slot Numbering

Figure 1-13 shows the front view of a Cisco 7301 router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7301 router.

Figure 1-13 Port Adapter Slot in the Cisco 7301 Router



Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering

The Cisco 7304 PCI Port Adapter Carrier Card installs in Cisco 7304 router module slots 2 through 5. [Figure 1-14](#) shows a Cisco 7304 PCI Port Adapter Carrier Card with a port adapter installed. The Cisco 7304 PCI Port Adapter Carrier Card accepts one single-width port adapter.

[Figure 1-15](#) shows the module slot numbering on a Cisco 7304 router. The port adapter slot number is the same as the module slot number. Slot 0 and slot 1 are reserved for the NPE module or NSE module.

Figure 1-14 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Installed

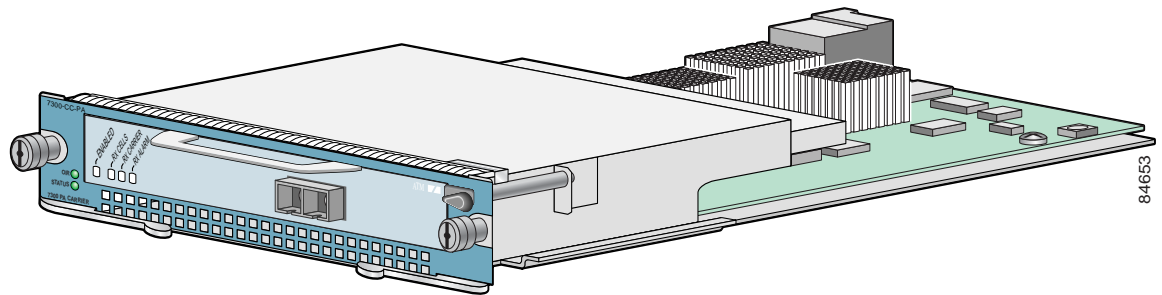
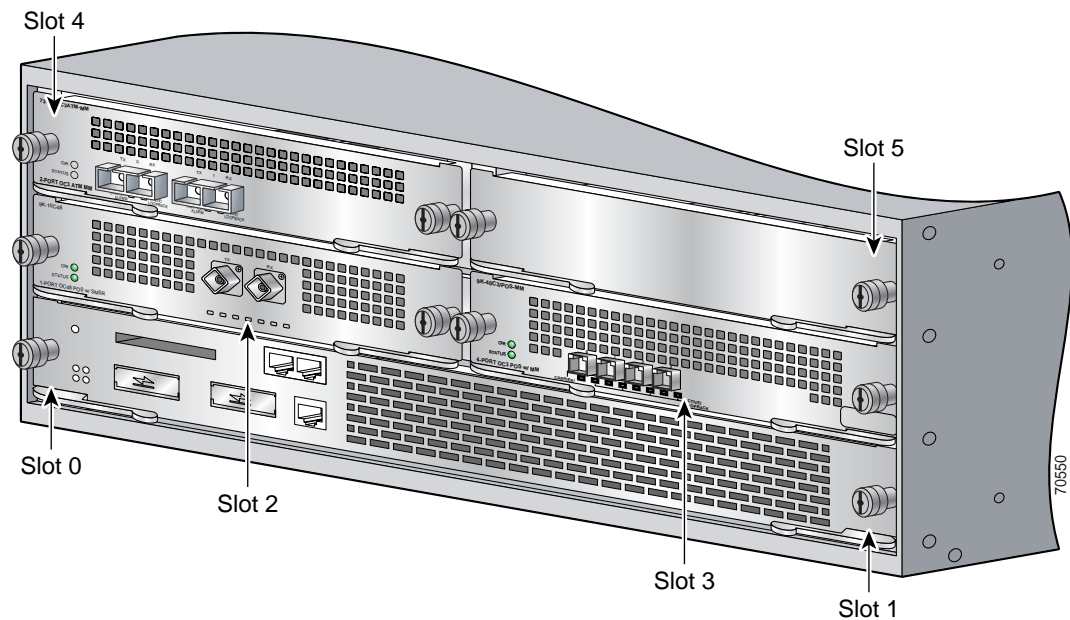


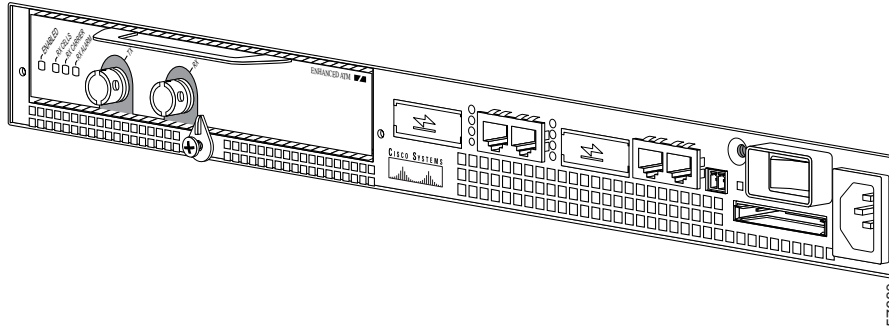
Figure 1-15 Module Slots on the Cisco 7304 Router



Cisco 7401ASR Router Slot Numbering

Figure 1-16 shows the front view of a Cisco 7401ASR router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7401ASR router.

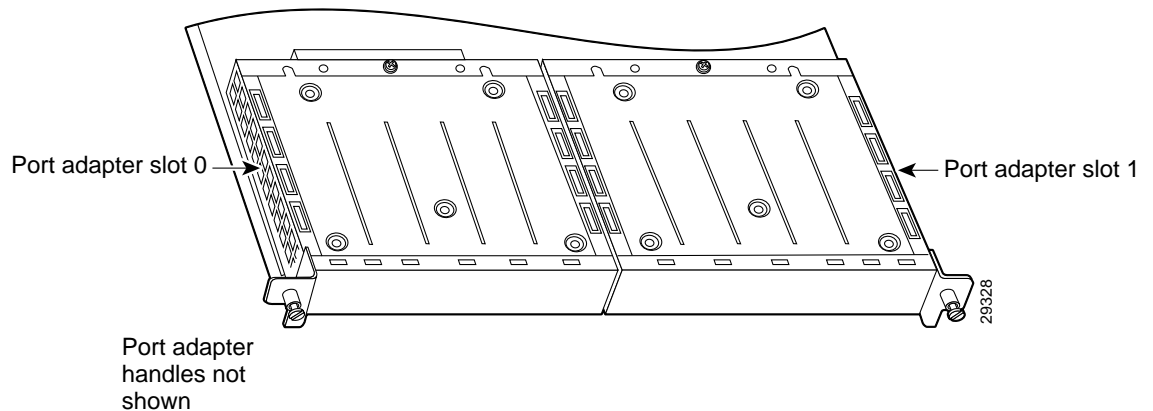
Figure 1-16 Port Adapter Slot in the Cisco 7401ASR Router



Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Slot Numbering

Port adapters are supported on the VIPs (versatile interface processors) used in Cisco 7000 series and Cisco 7500 series routers. In the Cisco 7010 router and Cisco 7505 router, the VIP motherboard is installed horizontally in the VIP slot. In the Cisco 7507 router and Cisco 7513 router, the VIP motherboard is installed vertically in the VIP slot. A port adapter can be installed in either bay (port adapter slot 0 or 1) on the VIP. The bays are numbered from left to right on the VIP. Figure 1-17 shows the slot numbering on a VIP.

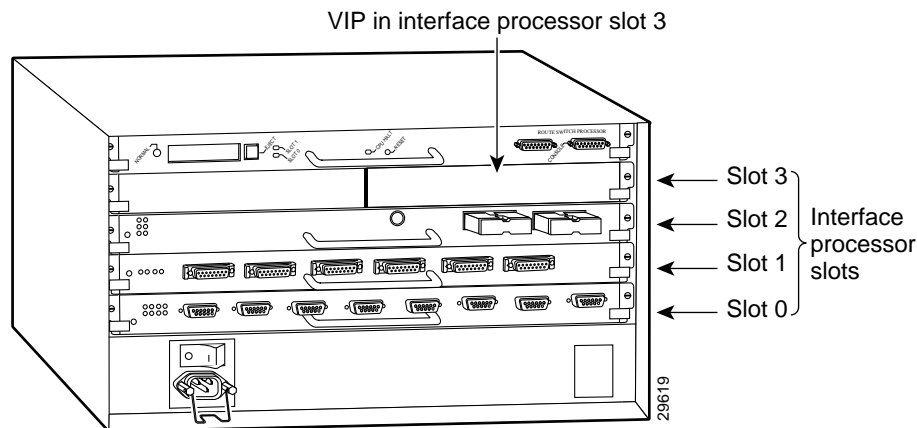
Figure 1-17 VIP Slot Locations



Cisco 7010 routers have three slots for port adapters, and two slots for Route Switch Processors (RSPs). The slots are numbered from bottom to top. You can place a port adapter in any of the VIP interface slots (slot 0 through 2). Slots 3 and 4 are always reserved for RSPs. The Cisco 7010 router is not shown.

Cisco 7505 routers have four slots for port adapters, and one slot for an RSP. The slots are numbered from bottom to top. You can place a port adapter in any of the VIP interface slots (slot 0 through 3). One slot is always reserved for the RSP. [Figure 1-18](#) shows the slot numbering on a Cisco 7505 router.

Figure 1-18 VIP Slots in the Cisco 7505 Router



Cisco 7507 routers have five slots for port adapters, and two slots for RSPs. The slots are numbered from left to right. You can place a port adapter in any of the VIP interface slots (slot 0, 1, 4, 5, or 6). Slots 2 and 3 are always reserved for RSPs. The Cisco 7507 router is not shown.

Cisco 7513 routers have eleven slots for port adapters, and two slots for RSPs. The slots are numbered from left to right. You can place a port adapter in any of the VIP interface slots (slots 0 through 5, or slots 9 through 12). Slots 6 and 7 are always reserved for RSPs. The Cisco 7513 router is not shown.

Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-E3 in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on the PA-E3 installed in a router 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.

Interfaces on a PA-E3 installed in a VIP or FlexWAN module maintain the same address regardless of whether other interface processors or modules are installed or removed. However, when you move a VIP or FlexWAN module to a different slot, the interface processor or module slot number changes to reflect the new interface processor or module slot.



Note

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

The following subsections describe the interface address formats for the supported platforms:

- [Catalyst RSM/VIP2 Interface Addresses, page 1-16](#)
- [Catalyst 6000 Family FlexWAN Module Interface Addresses, page 1-17](#)
- [Cisco 7100 Series Routers Interface Addresses, page 1-17](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses, page 1-17](#)
- [Cisco uBR7200 Series Routers Interface Addresses, page 1-18](#)
- [Cisco 7201 Router Interface Addresses, page 1-18](#)
- [Cisco 7301 Router Interface Addresses, page 1-18](#)
- [Cisco 7301 Router Interface Addresses, page 1-18](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses, page 1-18](#)
- [Cisco 7401ASR Router Interface Addresses, page 1-19](#)
- [Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Interface Addresses, page 1-19](#)

Table 1-2 summarizes the interface address formats for the supported platforms.

Table 1-2 *Identifying Interface Addresses*

Platform	Interface Address Format	Numbers	Syntax
Catalyst RSM/VIP2 in Catalyst 5000 family switches	Port-adapter-slot-number/interface-port-number	Port adapter slot— 0 or 1 Interface port—0 or 1	0/1
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	Module-slot-number/port-adapter-bay-number/ interface-port-number	Module slot —2 ¹ through 13 (depends on the number of slots in the switch) Port adapter bay— 0 or 1 Interface port—0 or 1	3/0/0
Cisco 7120 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 3 Interface port—0 or 1	3/1
Cisco 7140 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 or 1	4/0

Table 1-2 Identifying Interface Addresses (continued)

Platform	Interface Address Format	Numbers	Syntax
Cisco 7200 series routers and Cisco 7200 VXR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—1 through 6 (depends on the number of slots in the router) ² Interface port—0	1/0
Cisco uBR7223 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 ³ Interface port—0 or 1	1/0
Cisco uBR7246 router	Port-adapter-slot-number/interface-port-number	Port adapter slot— 1 or 2 ³ Interface port—0 or 1	1/1
Cisco 7201 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 or 1	1/0
Cisco 7301 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 or 1	1/0
Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router	Module-slot-number/interface-port-number	Module slot—2 through 5 Interface port—0 or 1	3/0
Cisco 7401ASR router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 or 1	1/0
VIP in Cisco 7000 series or Cisco 7500 series routers	Interface-processor-slot-number/port-adapter-slot-number/ interface-port-number	Interface processor slot—0 through 12 (depends on the number of slots in the router) Port adapter slot—0 or 1 Interface port—0 or 1	3/1/0

1. Slot 1 is reserved for the supervisor engine. If a redundant supervisor engine is used, it must go in slot 2; otherwise, slot 2 can be used for other modules.
2. Port adapter slot 0 is reserved for the Fast Ethernet port on the I/O controller (if present).
3. Port adapter slot 0 is reserved for the Fast Ethernet port on the I/O controller (if present).

Catalyst RSM/VIP2 Interface Addresses

In Catalyst 5000 family switches, the Catalyst RSM/VIP2 can be installed in any slot except the top slots, which contain the supervisor engine modules. The Catalyst RSM/VIP2 in a Catalyst 5000 family switch does not use interface processor slot numbering; therefore, the slots in which it is installed are not numbered. A port adapter can be installed into either port adapter slot 0 or slot 1 on a Catalyst RSM/VIP2. See [Figure 1-6](#).

The interface address is composed of a two-part number in the format *port-adapter-slot number/interface-port number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in port adapter slot 1 of a Catalyst RSM/VIP2 in a Catalyst 5000 family switch, the interface address would be 1/0. If a dual-port PA-2E3 is installed in port adapter slot 1 of a Catalyst RSM/VIP2 in a Catalyst 5000 family switch, the interface addresses would be 1/0 and 1/1.

Catalyst 6000 Family FlexWAN Module Interface Addresses

In Catalyst 6000 family switches, the Catalyst 6000 family FlexWAN module can be installed in module slots 2 through 13 (depending on the number of slots in the router). Slot 1 is reserved for the supervisor engine. A port adapter can be installed into either port adapter bay 0 or bay 1 on a FlexWAN module. See [Figure 1-7](#).

The interface address is composed of a three-part number in the format *module-number/port-adapter-bay-number/interface-port-number*. See [Table 1-2](#).

The first number identifies the module slot of the chassis in which the FlexWAN module is installed (slot 2 through slot 3, 6, 9, or 13 depending on the number of slots in the chassis). These module slots are generally numbered from top to bottom, starting with 1.

The second number identifies the bay of the FlexWAN module in which the port adapter is installed (0 or 1). The bays are numbered from left to right on the FlexWAN module.

The third number identifies the physical port number on the port adapter. The PA-E3 is a single-port port adapter, therefore the port is always 0. The PA-2E3 is a dual-port port adapter, therefore the port can be 0 or 1.

For example, if a single-port PA-E3 is installed in a FlexWAN module in module slot 3, port adapter bay 0, then the interface address is 3/0/0 (module slot 3, port adapter bay 0, and interface 0). If a dual-port PA-2E3 is installed in a FlexWAN module in module slot 3, port adapter bay 0, then the interface addresses are 3/0/0 and 3/0/1 (module slot 3, port adapter bay 0, and interfaces 0 and 1).



Note

The FlexWAN module physical port address begins with slot 0, which differs from the conventional Catalyst 6000 family port address, which begins with slot 1.

Cisco 7100 Series Routers Interface Addresses

In Cisco 7120 series router, port adapters are installed in port adapter slot 3. See [Figure 1-8](#). In the Cisco 7140 series router, port adapters are installed in port adapter slot 4. See [Figure 1-9](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed on a Cisco 7120 router, the interface address would be 3/0. If a dual-port PA-2E3 is installed on a Cisco 7120 router, the interface addresses would be 3/0 and 3/1. If a single-port PA-E3 is installed on a Cisco 7140 router, the interface address would be 4/0. If a dual-port PA-2E3 is installed on a Cisco 7140 router, the interface addresses would be 4/0 and 4/1.

Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses

In Cisco 7200 series routers and Cisco 7200 VXR routers, port adapter slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through 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 adapters can be installed in any available port adapter slot from 1 through 6 (depending on the number of slots in the router). (Slot 0 is reserved for the I/O controller.) See [Figure 1-10](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in slot 1 of a Cisco 7200 series router, the interface address would be 1/0. If a dual-port PA-2E3 were installed in slot 1, the interface addresses would be 1/0 and 1/1.

Cisco uBR7200 Series Routers Interface Addresses

In the Cisco uBR7223 router, only one slot accepts port adapters and it is numbered slot 1.

In the Cisco uBR7246 router and Cisco uBR7246VXR router, port adapters can be installed in two port adapter slots (slot1 and slot 2). Slot 0 is always reserved for the I/O controller—if present. See [Figure 1-11](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in slot 1 of a Cisco uBR7223 series router, the interface address would be 1/0. If a dual-port PA-2E3 is installed in slot 1 of a Cisco uBR7223 series router, the interface addresses would be 1/0 and 1/1. If the single-port PA-E3 were installed in slot 2 of a Cisco uBR7246 or Cisco uBR7246VXR router, the interface address would be 2/0. If the dual-port PA-2E3 were installed in slot 2 of a Cisco uBR7246 or Cisco uBR7246VXR router, the interface addresses would be 2/0 and 2/1.

Cisco 7201 Router Interface Addresses

In the Cisco 7201 router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-12](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in a Cisco 7201 router, the interface address would be 1/0. If a dual-port PA-2E3 is installed in a Cisco 7201 router, the interface addresses would be 1/0 and 1/1.

Cisco 7301 Router Interface Addresses

In the Cisco 7301 router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-13](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in a Cisco 7301 router, the interface address would be 1/0. If a dual-port PA-2E3 is installed in a Cisco 7301 router, the interface addresses would be 1/0 and 1/1.

Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses

In the Cisco 7304 router, port adapters are installed in a Cisco 7304 PCI port adapter carrier card, which installs in Cisco 7304 router module slots 2 through 5. The port adapter slot number is the same as the module slot number. See [Figure 1-15](#).

The interface address is composed of a two-part number in the format *module-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in the Cisco 7304 PCI port adapter carrier card in Cisco 7304 router module slot 3, the interface address would be 3/0. If a dual-port PA-2E3 is installed in the Cisco 7304 PCI port adapter carrier card in Cisco 7304 router module slot 3, the interface addresses would be 3/0 and 3/1.

Cisco 7401ASR Router Interface Addresses

In the Cisco 7401ASR router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-12](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-2](#). For example, if a single-port PA-E3 is installed in a Cisco 7401ASR router, the interface address would be 1/0. If a dual-port PA-2E3 is installed in a Cisco 7401ASR router, the interface addresses would be 1/0 and 1/1.

Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Interface Addresses

In Cisco 7000 series routers and Cisco 7500 series routers, port adapters are installed on a versatile interface processor (VIP), which installs in interface processor slots 0 through 12 (depending on the number of slots in the router). The port adapter can be installed in either bay (port adapter slot 0 or 1) on the VIP. See [Figure 1-17](#), and [Figure 1-18](#).

The interface address for the VIP is composed of a three-part number in the format *interface-processor-slot-number/port-adapter-slot-number/interface-port-number*. See [Table 1-2](#).

The first number identifies the slot in which the VIP is installed (slot 0 through 12, depending on the number of slots in the router).

The second number identifies the bay (port adapter slot) on the VIP in which the port adapter is installed (0 or 1). The bays are numbered from left to right on the VIP.

The third number identifies the physical port number (interface port number) on the port adapter. The port numbers always begin at 0 and are numbered from left to right. The number of additional ports depends on the number of ports on the port adapter. The PA-E3 is a single-port port adapter, therefore the port is always 0. The PA-2E3 is a dual-port port adapter, therefore the port can be 0 or 1.

For example, if a single-port PA-E3 is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface address would be 3/1/0 (interface processor slot 3, port adapter slot 1, and interface 0). If a dual-port PA-2E3 is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0 and 3/1/1 (interface processor slot 3, port adapter slot 1, and interfaces 0 and 1).



Note

Although the processor slots in the seven-slot Cisco 7000 and Cisco 7507 chassis and the thirteen-slot Cisco 7513 and Cisco 7576 chassis are vertically oriented and those in the five-slot Cisco 7010 and Cisco 7505 chassis are horizontally oriented, all Cisco 7000 series routers and Cisco 7500 series routers use the same method for slot and port numbering.

Interoperability Guidelines for PA-E3 DSUs

The PA-E3 supports several types of integrated DSUs. [Table 1-3](#) lists the feature compatibilities of the PA-E3 DSUs.

Table 1-3 Feature Compatibilities of PA-E3 DSUs

DSU	Full Rate Support	Scrambling Support	Subrate Support
DL3100E	Yes	No ¹	Yes ¹
Kentrox	Yes	Yes ²	Yes ²

1. DL3100E does not support scrambling. However, the PA-E3 can turn on scrambling in DSU mode 0 for connecting to another PA-E3. The PA-E3 supports either scrambling (in mode 0) or DL3100E subrate, not both at the same time.
2. The PA-E3 supports either scrambling or Kentrox subrate, not both at the same time.



CHAPTER 2

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-E3. This chapter contains the following sections:

- [Required Tools and Equipment, page 2-1](#)
- [Software and Hardware Requirements, page 2-2](#)
- [Safety Guidelines, page 2-4](#)
- [FCC Class A Compliance, page 2-11](#)

Required Tools and Equipment

You need the following tools and parts to install a PA-E3. If you need additional equipment, contact a service representative for ordering information.

- PA-E3 and one of the following:
 - VIP with Cisco 7000 or 7500 series router with Catalyst RSM/VIP2-15 if you are installing only one PA-E3; otherwise, we recommend a Catalyst RSM/VIP2-40.
 - Catalyst 6000 family FlexWAN module
 - Cisco 7100 series router with at least one available port adapter slot
 - Cisco 7200 series router with at least one available port adapter slot
 - Cisco uBR7200 series router with at least one available port adapter slot
 - Cisco 7201 router
 - Cisco 7301 router
 - Cisco 7304 PCI Port Adapter Carrier Card for installation in a Cisco 7304 router
 - Cisco 7401ASR router
- Cisco 75-ohm coaxial serial interface cables. (The PA-E3 75-ohm cables are available *only* from Cisco Systems; they are *not* available from outside commercial vendors.)
- Number 1 Phillips screwdriver and a 3/16-inch flat-blade screwdriver (for VIP and Catalyst RSM/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

Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the one-port PA-E3 and two-port PA-2E3 in supported router platforms.

Table 2-1 PA-E3 and PA-2E3 Software Requirements

Platforms	Recommended Minimum Cisco IOS Release
Catalyst 5000 Family Switches	
<ul style="list-style-type: none"> With Catalyst RSM/VIP2-15(=) or Catalyst RSM/VIP2-40(=) 	Cisco IOS Release 12.0(1) or a later release of Cisco IOS Release 12.0
Catalyst 6000 Family Switches with Catalyst 6000 Family FlexWAN Module	
<ul style="list-style-type: none"> Catalyst 6000 family MSFC¹ 	Cisco IOS Release 12.1(1)EX or later
Cisco 7100 Series Routers	
<ul style="list-style-type: none"> Cisco 7120 series and Cisco 7140 series 	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0T
Cisco 7200 Series and Cisco 7200 VXR Routers	
<ul style="list-style-type: none"> Cisco 7204VXR and Cisco 7206VXR Cisco 7204 and Cisco 7206 Cisco 7202 	Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0T Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1CA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3AA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
Cisco uBR7200 Series Routers	
<ul style="list-style-type: none"> Cisco uBR72236, Cisco uBR7246 Cisco uBR7246VX 	Cisco IOS Release 12.0(2)XC, Cisco IOS Release 12.0(3)T or later, Cisco IOS Release 12.1(2)EC1 or later, or Cisco IOS Release 12.0(6)SC or later. Cisco IOS Release 12.1(3)T or later, Cisco IOS Release 12.0(12)SC or later, or Cisco IOS Release 12.1(3a)EC1 or later.
Cisco 7201 Router	
	Cisco IOS Release 12.4(4)XD7 or a later release of Cisco IOS Release 12.4XD, Cisco IOS Release 12.2(31)SB5 or a later release of Cisco IOS Release 12.2(31)SB5
Cisco 7301 Router	
	Cisco IOS Release 12.2(11)YZ or a later release of Cisco IOS Release 12.2YZ
Cisco 7304 Router	
<ul style="list-style-type: none"> With Cisco 7304 PCI Port Adapter Carrier Card 	Cisco IOS Release 12.2(14)SZ or a later release of Cisco IOS Release 12.2SZ

Table 2-1 PA-E3 and PA-2E3 Software Requirements (continued)

Platforms	Recommended Minimum Cisco IOS Release
Cisco 7401ASR Router	
	Cisco IOS Release 12.2(1)DX or a later release of Cisco IOS Release 12.2DX Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
VIP in Cisco 7000 and Cisco 7500 Series Router	Cisco IOS Release 11.1(13)CA or a later release of Cisco IOS Release 11.1CA Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1CA
	Cisco IOS Release 11.1(13)CA or a later release of Cisco IOS Release 11.1CA Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1CA

1. MSFC = Multilayer Switch Feature Card

**Caution**

The VIP requires that the host Cisco 7000 series router have the RSP7000 and RSP7000CI installed. The VIP does not operate properly with the Route Processor (RP), Switch Processor (SP), or Silicon Switch Processor (SSP) installed in the host Cisco series router.

The PA-E3 is considered a *high-bandwidth* port adapter; therefore at a minimum, Cisco recommends that the PA-E3 be installed on the VIP or Catalyst RSM/VIP2-15 motherboard (with 1 MB of SRAM and 16 MB of DRAM). Installation of the PA-E3 on the VIP (with 512 KB of SRAM and 8 MB of DRAM) is not recommended.

**Note**

The Catalyst RSM/VIP2, the Catalyst 6000 family FlexWAN module, the VIP, and the Cisco 7304 PCI Port Adapter Carrier Card support online insertion and removal (OIR), but individual port adapters do not. To replace port adapters, you must first remove the Catalyst RSM/VIP2, the Catalyst 6000 family FlexWAN module, the VIP, or the Cisco 7304 PCI Port Adapter Carrier Card from the chassis and then replace port adapters as required.

OIR is supported for port adapters in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router.

In the Cisco 7000 series routers, Cisco 7100 series routers, Cisco 7500 series routers, and Cisco uBR7200 series routers, and Catalyst 5000 and 6000 family switches, there are no restrictions on slot locations or sequence.

One PA-E3 or PA-2E3 can be installed in the Cisco 7304 PCI Port Adapter Carrier Card; the Cisco 7304 PCI Port Adapter Carrier Card installs in Cisco 7304 router module slots 2 through 5.

In the Cisco 7200 series routers, there are specific configuration guidelines that must be observed for high-bandwidth port adapters. For specific Cisco 7200 series hardware configuration information and for memory configuration guidelines for Cisco 7200 series routers, refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* at the following URL:

http://www.cisco.com/en/US/products/hw/modules/ps2033/products_configuration_guide_book09186a00801056ef.html

To determine if your Cisco 7000 series routers, Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series routers, Cisco 7201 routers, Cisco 7301 routers, Cisco 7304 routers, Cisco 7401ASR routers, Cisco 7500 series routers, Catalyst 6000 family FlexWAN modules, or

Catalyst RSM/VIP2 routers are compatible with the PA-E3, use the **show version** command to display the current hardware configuration of the router, including the system software version that is currently loaded and running.

You can check the version of the default ROM image by removing the board and checking the ROM labels, or by configuring the interface or system software to boot from ROM, restarting the system, and using the **show version** command to check the running version.

To display the current system software version, use the **show version** command. In the following example, the running system software is Cisco IOS Release 11.1(16)CA.

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software, Version 11.1(16)CA
Synced to mainline version: 11.1(10.5)
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Thu 22-May-97 14:32
```

If your system lacks the required system software and microcode, contact a customer service representative for upgrade information.

Checking Hardware and Software Compatibility

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



Note

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

To access Software Advisor, click **Log In** at Cisco.com and go to Support > Tools and Resources. You can also access the tool by pointing your browser directly to http://www.cisco.com/en/US/support/tsd_most_requested_tools.html.

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

Safety Guidelines

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

Safety Warnings

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

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

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 translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Waarschuwing**BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

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 de standaard praktijken om ongelukken te voorkomen. Voor een vertaling van de waarschuwingen die in deze publicatie verschijnen, dient u de vertaalde veiligheidswaarschuwingen te raadplegen die bij dit apparaat worden geleverd.

Opmerking BEWAAR DEZE INSTRUCTIES.

Opmerking Deze documentatie dient gebruikt te worden in combinatie met de installatiehandleiding voor het specifieke product die bij het product wordt geleverd. Raadpleeg de installatiehandleiding, configuratiehandleiding of andere verdere ingesloten documentatie voor meer informatie.

Varoitus**TÄRKEITÄ TURVALLISUUTEEN LIITTYVIÄ OHJEITA**

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 asiakirjassa esitettyjen varoitusten käännökset löydät laitteen mukana toimitetuista ohjeista.

Huomautus SÄILYTÄ NÄMÄ OHJEET

Huomautus Tämä asiakirja on tarkoitettu käytettäväksi yhdessä tuotteen mukana tulleen asennusoppaan kanssa. Katso lisätietoja asennusoppaasta, kokoonpano-oppaasta ja muista mukana toimitetuista asiakirjoista.

Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ

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 les consignes de sécurité traduites qui accompagnent cet appareil.

Remarque CONSERVEZ CES INFORMATIONS

Remarque Cette documentation doit être utilisée avec le guide spécifique d'installation du produit qui accompagne ce dernier. Veuillez vous reporter au Guide d'installation, au Guide de configuration, ou à toute autre documentation jointe pour de plus amples renseignements.

Warnung WICHTIGE SICHERHEITSAUWEISUNGEN

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 sind im Lieferumfang des Geräts enthalten.

Hinweis BEWAHREN SIE DIESE SICHERHEITSAUWEISUNGEN AUF

Hinweis Dieses Handbuch ist zum Gebrauch in Verbindung mit dem Installationshandbuch für Ihr Gerät bestimmt, das dem Gerät beiliegt. Entnehmen Sie bitte alle weiteren Informationen dem Handbuch (Installations- oder Konfigurationshandbuch o. Ä.) für Ihr spezifisches Gerät.

Figyelem! FONTOS BIZTONSÁGI ELŐÍRÁSOK

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található.

Megjegyzés ŐRIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Megjegyzés Ezt a dokumentációt a készülékhez mellékelt üzembe helyezési útmutatóval együtt kell használni. További tudnivalók a mellékelt Üzembe helyezési útmutatóban (Installation Guide), Konfigurációs útmutatóban (Configuration Guide) vagy más dokumentumban található.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Per le traduzioni delle avvertenze riportate in questo documento, vedere le avvertenze di sicurezza che accompagnano questo dispositivo.

Nota CONSERVARE QUESTE ISTRUZIONI

Nota La presente documentazione va usata congiuntamente alla guida di installazione specifica spedita con il prodotto. Per maggiori informazioni, consultare la Guida all'installazione, la Guida alla configurazione o altra documentazione acclusa.

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette varselssymbolet betyr fare. Du befinner deg i en situasjon som kan forårsake personskade. Før du utfører arbeid med utstyret, bør du være oppmerksom på farene som er forbundet med elektriske kretssystemer, og du bør være kjent med vanlig praksis for å unngå ulykker. For å se oversettelser av advarslene i denne publikasjonen, se de oversatte sikkerhetsvarslene som følger med denne enheten.

Merk TA VARE PÅ DISSE INSTRUKSJONENE

Merk Denne dokumentasjonen skal brukes i forbindelse med den spesifikke installasjonsveiledningen som fulgte med produktet. Vennligst se installasjonsveiledningen, konfigureringsveiledningen eller annen vedlagt tilleggsdokumentasjon for detaljer.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. O utilizador encontra-se numa situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha em atenção os perigos envolvidos no manuseamento de circuitos eléctricos e familiarize-se com as práticas habituais de prevenção de acidentes. Para ver traduções dos avisos incluídos nesta publicação, consulte os avisos de segurança traduzidos que acompanham este dispositivo.

Nota GARDE ESTAS INSTRUÇÕES

Nota Esta documentação destina-se a ser utilizada em conjunto com o manual de instalação incluído com o produto específico. Consulte o manual de instalação, o manual de configuração ou outra documentação adicional inclusa, para obter mais informações.

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Vea las traducciones de las advertencias que acompañan a este dispositivo.

Nota GARDE ESTAS INSTRUCCIONES

Nota Esta documentación está pensada para ser utilizada con la guía de instalación del producto que lo acompaña. Si necesita más detalles, consulte la Guía de instalación, la Guía de configuración o cualquier documentación adicional adjunta.

Varning! VIKTIGA SÄKERHETSANVISNINGAR

Denna varningssignal 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 vanliga förfaranden för att förebygga olyckor. Se översättningarna av de varningsmeddelanden som finns i denna publikation, och se de översatta säkerhetsvarningarna som medföljer denna anordning.

OBS! SPARA DESSA ANVISNINGAR

OBS! Denna dokumentation ska användas i samband med den specifika produktinstallationshandbok som medföljde produkten. Se installationshandboken, konfigurationshandboken eller annan bifogad ytterligare dokumentation för närmare detaljer.

Предупреждение ВАЖНЫЕ СВЕДЕНИЯ ПО БЕЗОПАСНОСТИ

Этот символ предупреждает о наличии опасности. При неправильных действиях возможно получение травм. Перед началом работы с любым оборудованием необходимо ознакомиться с ситуациями, в которых возможно поражение электротоком, и со стандартными действиями для предотвращения несчастных случаев. Переведенный текст предупреждений содержится в соответствующем документе, поставляемом вместе с устройством.

Примечание **СОХРАНЯЙТЕ ЭТУ ИНСТРУКЦИЮ**

Примечание Эта инструкция должна использоваться вместе с руководством по установке конкретного изделия, входящим в комплект поставки. Дополнительные сведения см. в руководстве по установке, руководстве по настройке и другой документации, поставляемой с изделием.

警告 有关安全的重要说明

这个警告符号指有危险。您所处的环境可能使身体受伤。操作设备前必须意识到电流的危险性，务必熟悉操作标准，以防发生事故。如果需要了解本说明中出现的警告符号的译文，请参阅本装置所附之安全警告译文。

注意 保存这些说明

注意 本文件应与本产品附带的特定安装说明一并阅读。如欲了解详情，请参阅《安装说明》、《配置说明》或所附的其他文件。

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止対策に留意してください。このマニュアルに記載されている警告の各国語版は、装置に付属の「Translated Safety Warnings」を参照してください。

注 これらの注意事項を保管しておいてください。

注 この資料は、製品に付属のインストレーション ガイドと併用してください。詳細は、インストレーション ガイド、コンフィギュレーション ガイド、または添付されているその他のマニュアルを参照してください。

Предупреждение **ВАЖНЫЕ СВЕДЕНИЯ ПО БЕЗОПАСНОСТИ**

Этот символ предупреждает о наличии опасности. При неправильных действиях возможно получение травм. Перед началом работы с любым оборудованием необходимо ознакомиться с ситуациями, в которых возможно поражение электротоком, и со стандартными действиями для предотвращения несчастных случаев. Переведенный текст предупреждений содержится в соответствующем документе, поставляемом вместе с устройством.

Примечание **СОХРАНИЙТЕ ЭТУ ИНСТРУКЦИЮ**

Примечание Эта инструкция должна использоваться вместе с руководством по установке конкретного изделия, входящим в комплект поставки. Дополнительные сведения см. в руководстве по установке, руководстве по настройке и другой документации, поставляемой с изделием.

警告 有关安全的重要说明

这个警告符号指有危险。您所处的环境可能使身体受伤。操作设备前必须意识到电流的危险性，务必熟悉操作标准，以防发生事故。如果需要了解本说明中出现的警告符号的译文，请参阅本装置所附之安全警告译文。

注意 保存这些说明

注意 本文件应与本产品附带的具体安装说明一并阅读。如欲了解详情，请参阅《安装说明》、《配置说明》或所附的其他文件。

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止対策に留意してください。このマニュアルに記載されている警告の各国語版は、装置に付属の「Translated Safety Warnings」を参照してください。

注 これらの注意事項を保管しておいてください。

注 この資料は、製品に付属のインストラクション ガイドと併用してください。詳細は、インストラクション ガイド、コンフィギュレーション ガイド、または添付されているその他のマニュアルを参照してください。

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

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

Telephone Wiring Guidelines

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

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

Preventing Electrostatic Discharge Damage

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

The following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.

- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

**Caution**

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

**Note**

The PA-E3 port adapter has been designed to meet these requirements. Modifications to this product that are not authorized by Cisco Systems, Inc., could void the various approvals and negate your authority to operate the product.



CHAPTER 3

Removing and Installing Port Adapters

This chapter describes how to remove the PA-E3 port adapter from supported platforms and also how to install a new or replacement port adapter. This chapter contains the following sections:

- [Handling Port Adapters, page 3-1](#)
- [Online Insertion and Removal, page 3-2](#)
- [Warnings and Cautions, page 3-3](#)
- [Port Adapter Removal and Installation, page 3-4](#)
- [Connecting a PA-E3 Cable, page 3-17](#)

Handling Port Adapters

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



Note

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



Caution

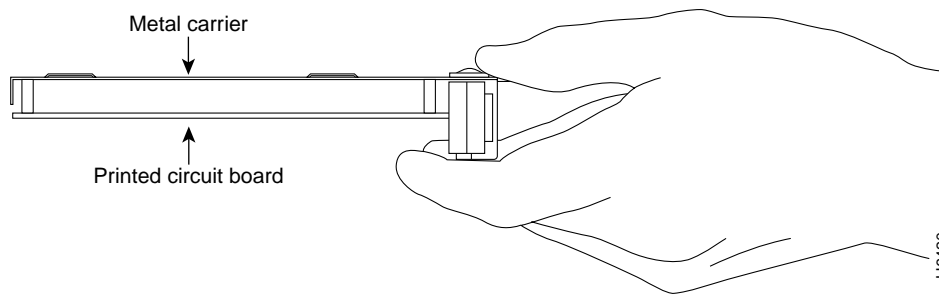
When powering off the router, wait a minimum of 30 seconds before powering it on again.



Caution

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

Figure 3-1 Handling a Port Adapter



Online Insertion and Removal

Several platforms support online insertion and removal (OIR) of port adapters; therefore, you do not have to power down routers when removing and replacing a PA-E3 or PA-2E3 in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router.

Although the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, and VIP support OIR, individual port adapters do not. To replace port adapters in the Catalyst 5000 switches, Catalyst 6000 switches, Cisco 7304 router, or Cisco 7000 or 7500 series routers, you must first remove the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, or VIP from the chassis and then install or replace port adapters as required. If a blank port adapter is installed on the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, or VIP on which you want to install a new port adapter, you must first remove the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, or VIP from the chassis, and then remove the blank port adapter.



Caution

To prevent system problems, do not remove port adapters from the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, or VIP or attempt to install other port adapters on the motherboard when the system is operating. To install or replace port adapters, first remove the Catalyst RSM/VIP2, FlexWAN module, Cisco 7304 PCI port adapter carrier card, or VIP from its interface processor slot.

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



Note

As you disengage the port adapter from the router or switch, OIR administratively shuts down all active interfaces in the port adapter.

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

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a PA-E3 or PA-2E3 in a supported platform, refer to the “[Port Adapter Removal and Installation](#)” section on page 3-4.

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

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

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

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

**Note**

Before you begin installation, read [Chapter 2, “Preparing for Installation,”](#) for a list of parts and tools required for installation.

Warnings and Cautions

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

**Caution**

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

**Note**

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

**Caution**

To prevent jamming the carrier between the upper and the lower edges of the port adapter slot, and to ensure that the edge connector at the rear of the port adapter mates with the connection at the rear of the port adapter slot, make certain that the carrier is positioned correctly, as shown in the cutaway illustrations in the “[Port Adapter Removal and Installation](#)” section on page 3-4.

**Warning**

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

Port Adapter Removal and Installation

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

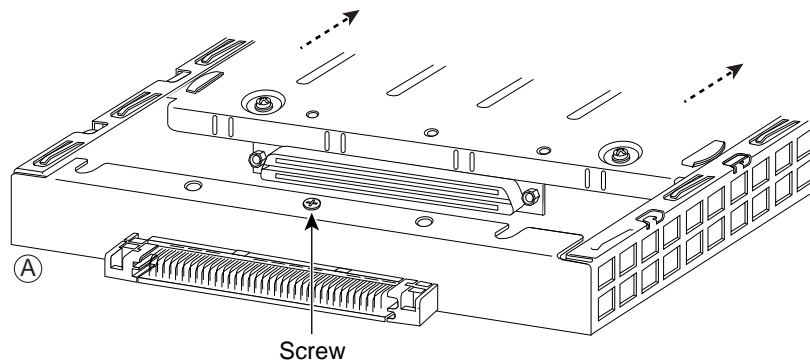
- [Catalyst RSM/VIP2—Removing and Installing a Port Adapter, page 3-5](#)
- [Catalyst 6000 Family FlexWAN Module—Removing and Installing a Port Adapter, page 3-6](#)
- [Cisco 7100 Series Routers—Removing and Installing a Port Adapter, page 3-7](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter, page 3-8](#)
- [Cisco uBR7200 Series Routers—Removing a Port Adapter, page 3-9](#)
- [Cisco uBR7200 Series Routers—Installing a Port Adapter, page 3-10](#)
- [Cisco 7201 Router—Removing and Installing a Port Adapter, page 3-11](#)
- [Cisco 7301 Router—Removing and Installing a Port Adapter, page 3-12](#)
- [Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter, page 3-13](#)
- [Cisco 7401ASR Router—Removing and Installing a Port Adapter, page 3-15](#)
- [VIP—Removing and Installing a Port Adapter, page 3-16](#)

Catalyst RSM/VIP2—Removing and Installing a Port Adapter

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

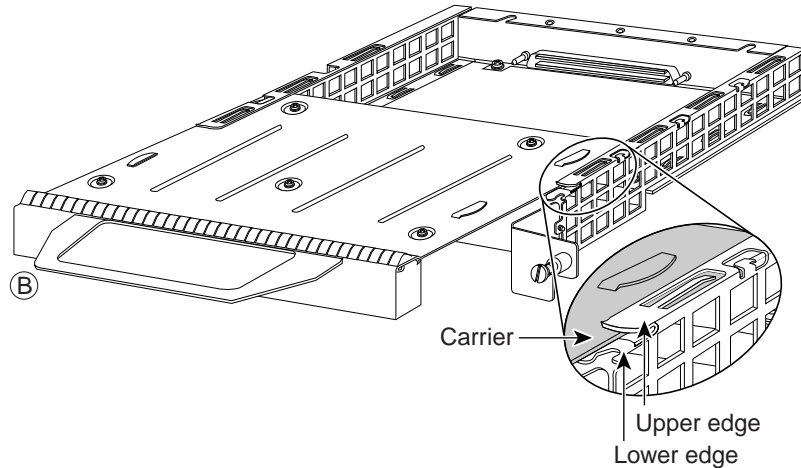
Step 1

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



Step 2

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



Step 3

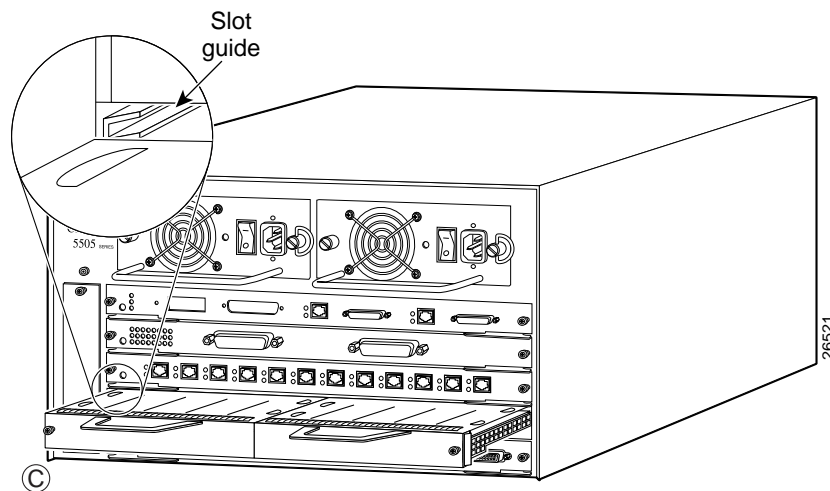
To install the port adapter, carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)

Step 4

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

Step 5

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



Step 6

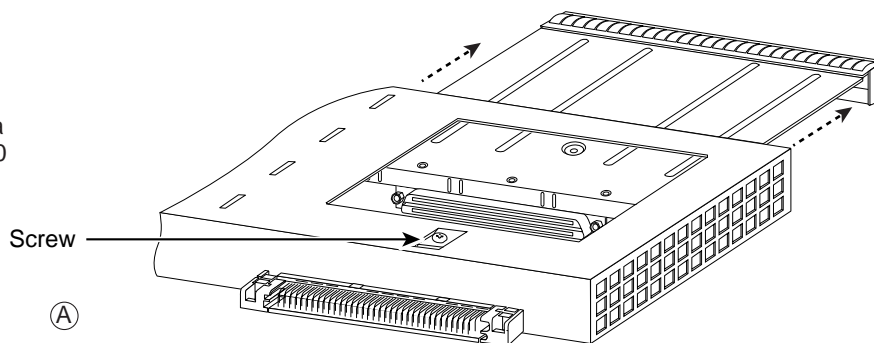
Reinstall the Catalyst RSM/VIP2 motherboard in the chassis and tighten the captive installation screw on each side of the Catalyst RSM/VIP2 faceplate. (See C.)

Catalyst 6000 Family FlexWAN Module—Removing and Installing a Port Adapter

Note: You must first remove the Catalyst 6000 FlexWAN module from the chassis before removing a port adapter from the Catalyst 6000 FlexWAN module.

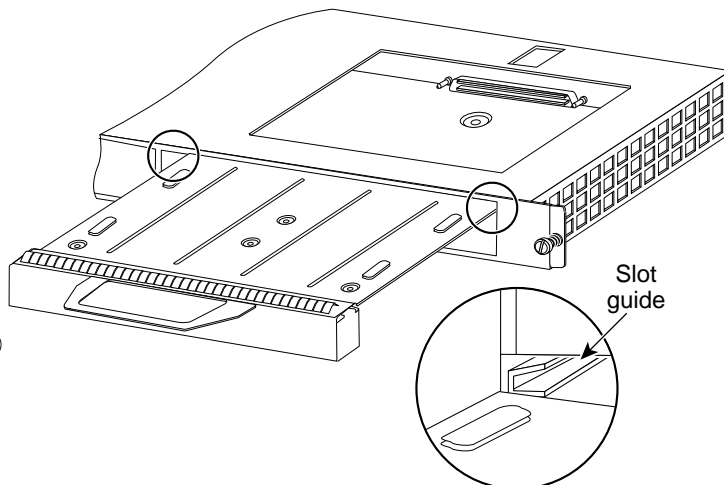
Step 1

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



Step 2

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



Step 3

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

Step 4

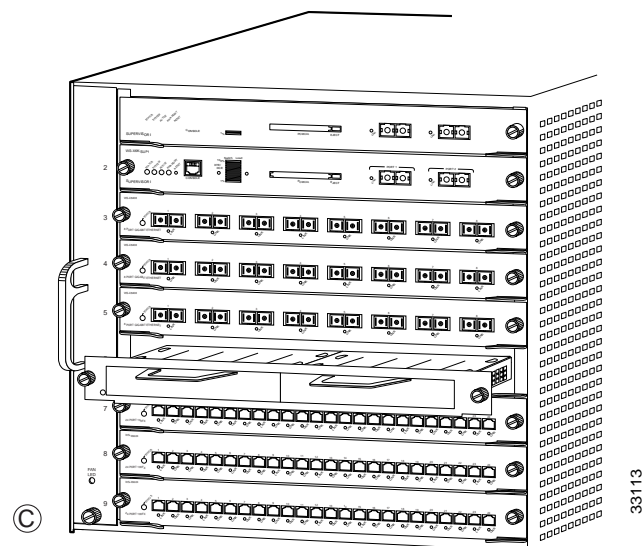
Carefully slide the new port adapter into the port adapter bay until the connector on the port adapter is completely seated in the connector at the rear of the port adapter slot. (See B.)

Step 5

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

Step 6

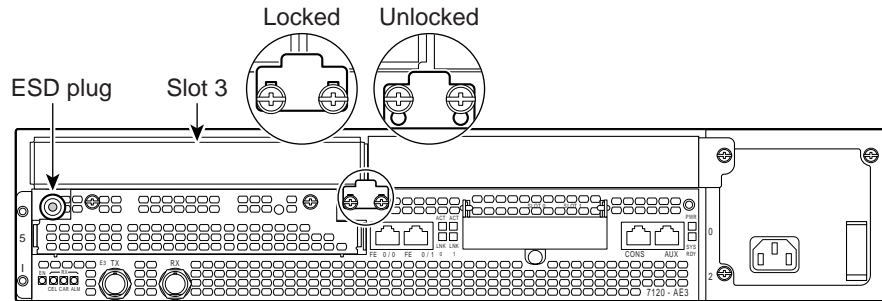
Reinstall the Catalyst 6000 FlexWAN module in the chassis, and tighten the captive installation screw on each side of the Catalyst 6000 FlexWAN module faceplate. (See C.)



Cisco 7100 Series Routers—Removing and Installing a Port Adapter

Step 1

To remove the port adapter, use a number 2 Phillips screwdriver to loosen the screws on the locking tab. Then slide the tab down to the unlocked position.



Step 2

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

Step 3

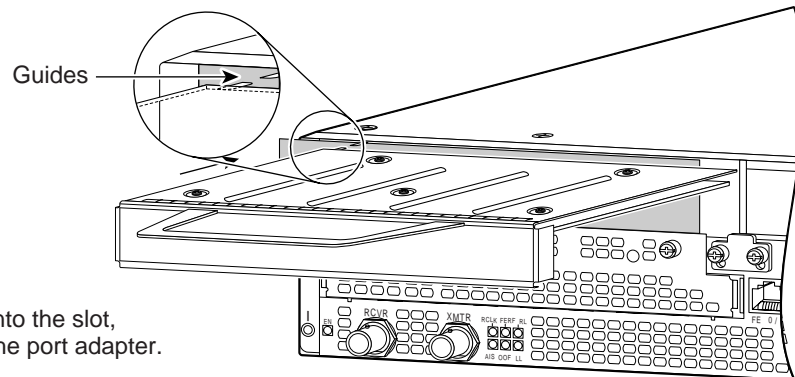
With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

Step 4

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

Step 5

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



Step 6

With the port adapter halfway into the slot, connect all required cables to the port adapter.

Step 7

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 8

After the port adapter is properly seated, lock the port adapter retaining mechanism.

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Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

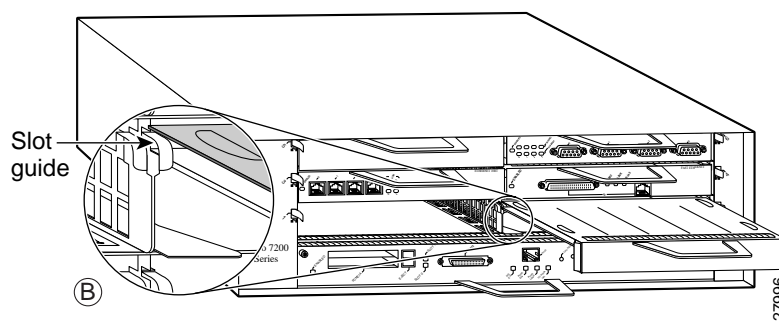
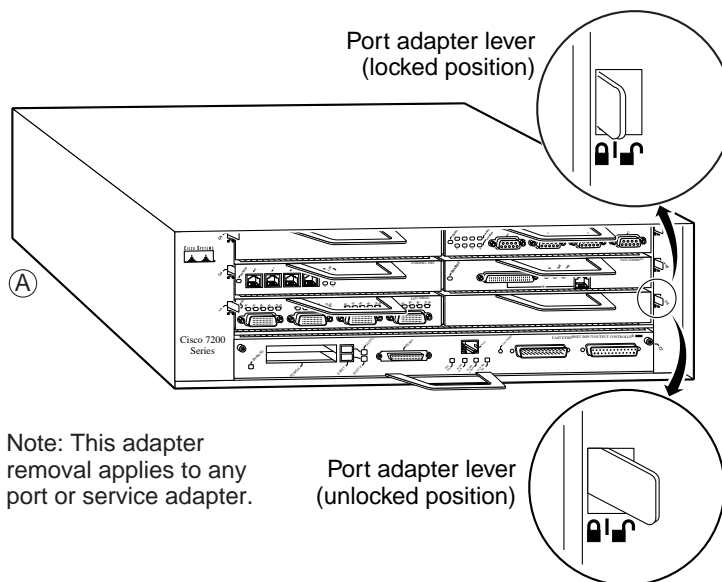
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

Step 6

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

Step 7

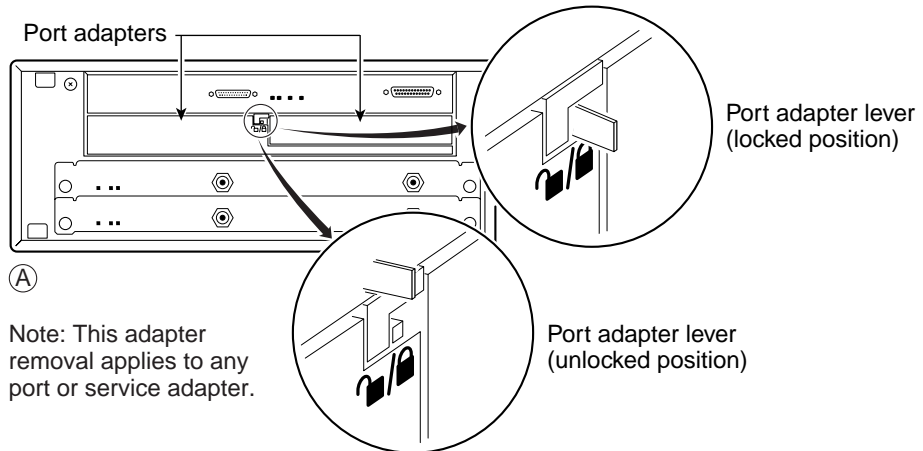
After the port adapter is properly seated, lock the port adapter lever. (See A.)



Cisco uBR7200 Series Routers—Removing a Port Adapter

Step 1

To remove the port adapter, unlock the port adapter retaining mechanism. The port adapter lever remains in the unlocked position.

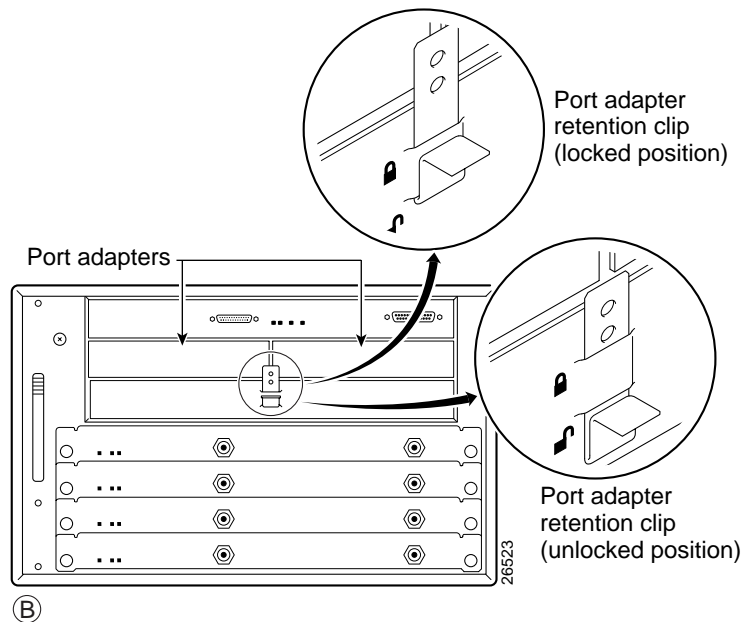


Place the port adapter lever (Cisco uBR7223, see A), or the port adapter retention clip (Cisco uBR7246 and Cisco uBR7246 VXR, see B) in the unlocked position. Either mechanism remains in the unlocked position.

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

Step 2

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



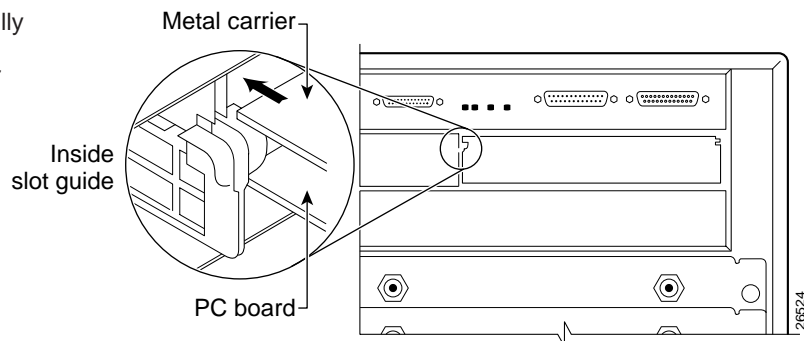
Step 3

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

Cisco uBR7200 Series Routers—Installing a Port Adapter

Step 1

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



Step 2

Carefully slide the new port adapter halfway into the port adapter slot.

Step 3

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

Step 4

After the port adapter is properly seated, lock the port adapter lever or retention clip, depending on your system. (See illustration on preceding page.)

Cisco 7201 Router—Removing and Installing a Port Adapter

Step 1

Use an ESD wrist strap to ground yourself to the router.

Step 2

To remove the port adapter, place the port adapter lever in the unlocked position. The port adapter lever remains in the unlocked position.

Step 3

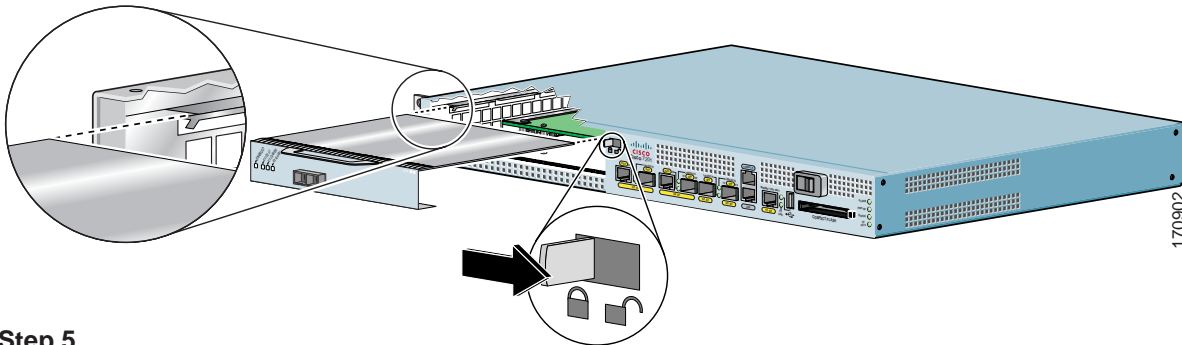
Grasp the handle of the port adapter and pull the port adapter about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 4

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

Caution

The port adapter must slide into the slot guides close to the chassis lid. Do not allow the port adapter components to come in contact with the system board or the port adapter could be damaged.



Step 5

To insert the port adapter, carefully align the port adapter carrier in the slot guides. Slide the new port adapter halfway into the chassis.

Step 6

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

Step 7

After the port adapter is properly seated, lock the port adapter lever.

Cisco 7301 Router—Removing and Installing a Port Adapter

Step 1

Use an ESD wrist strap to ground yourself to the router.

Step 2

To remove a port adapter, use a Phillips screwdriver to turn the screw holding the port adapter latch. The screw should be loose enough to allow the latch to rotate to an unlocked position. (See A.) The latch can rotate 360°.

Step 3

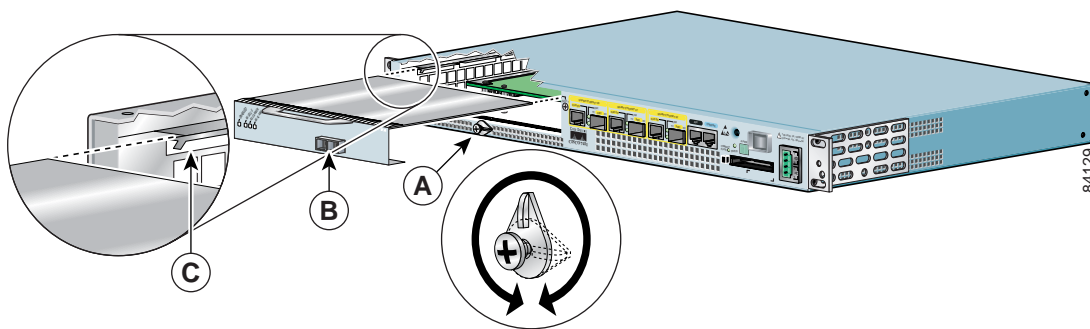
Grasp the handle and pull the port adapter from the router, about halfway out of its slot. (See B.) If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 4

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

Caution

The port adapter must slide into the slot guides close to the chassis lid. (See C.) Do not allow the port adapter components to come in contact with the system board or the port adapter could be damaged.



Step 5

To insert the port adapter, carefully align the port adapter carrier in the slot guides. (See C.) Slide the new port adapter halfway into the chassis.

Step 6

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

Step 7

After the port adapter is properly seated, turn and secure the port adapter latch in the upright, locked position. (See A.) Tighten the screw to ensure the port adapter remains firmly in place.

Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter

You can install one single-width port adapter in a Cisco 7304 PCI Port Adapter Carrier Card. This section provides step-by-step instructions for removing and installing a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card.



Warning

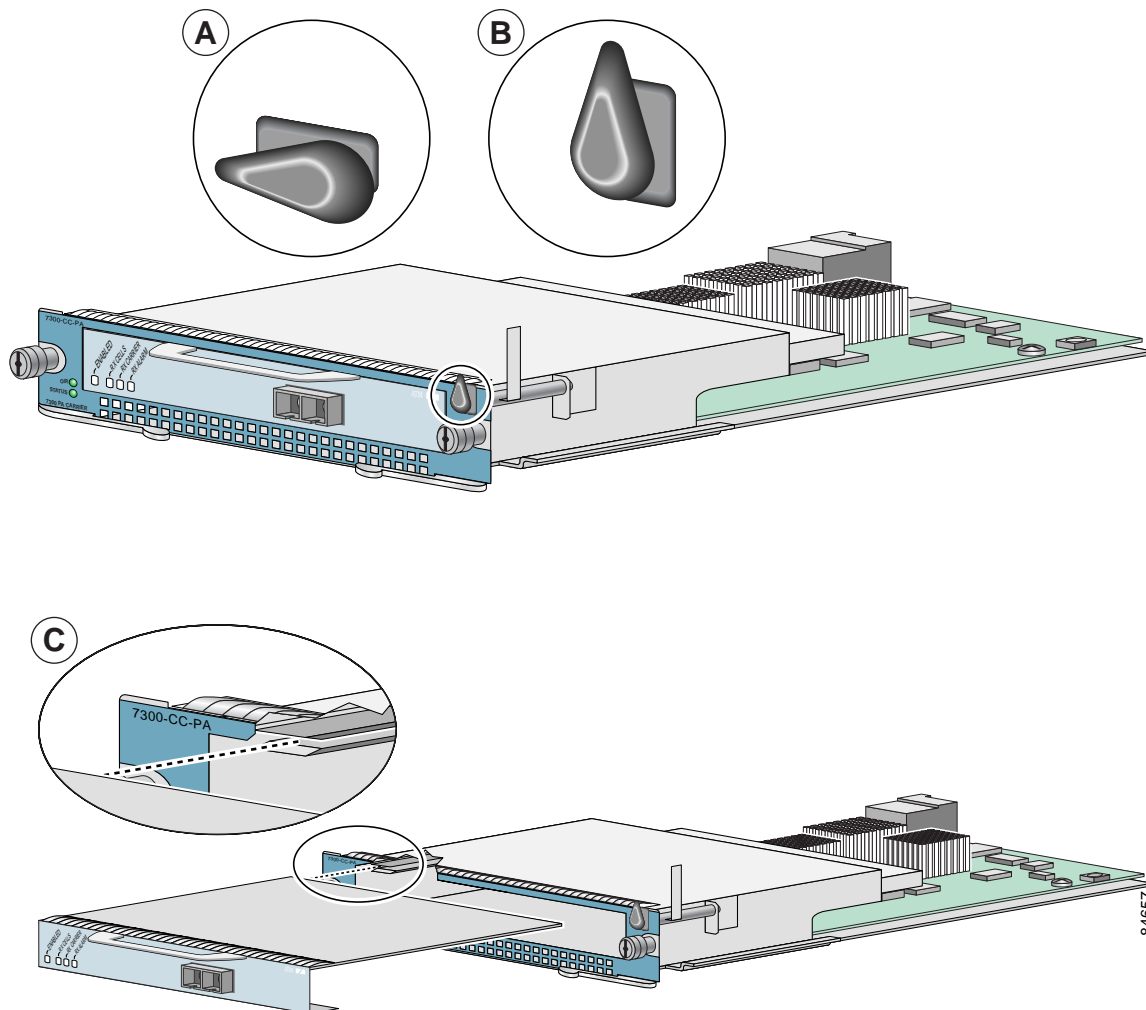
When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the Cisco 7304 PCI Port Adapter Carrier Card. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.

To remove and install a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card, refer to [Figure 3-2](#) and do the following:

- Step 1** If the Cisco 7304 PCI Port Adapter Carrier Card is still in the router, you must remove the Cisco 7304 PCI Port Adapter Carrier Card before removing a port adapter.
- Step 2** To remove the port adapter from the Cisco 7304 PCI Port Adapter Carrier Card, turn the port adapter lock from its locked and horizontal position shown in A of [Figure 3-2](#) to its unlocked and vertical position shown in B of [Figure 3-2](#).
- Step 3** Grasp the handle of the port adapter and pull the port adapter from the Cisco 7304 PCI Port Adapter Carrier Card. (You have already disconnected the cables from the port adapter when removing the Cisco 7304 PCI Port Adapter Carrier Card).
- Step 4** To insert the port adapter in the Cisco 7304 PCI Port Adapter Carrier Card, locate the guide rails inside the Cisco 7304 PCI Port Adapter Carrier Card that hold the port adapter in place. They are at the top left and top right of the port adapter slot and are recessed about an inch, as shown in C of [Figure 3-2](#).
- Step 5** Carefully slide the port adapter in the Cisco 7304 PCI Port Adapter Carrier Card until the port adapter makes contact with the port adapter interface connector. When fully seated, the port adapter front panel should be flush with the face of the Cisco 7304 PCI Port Adapter Carrier Card.
- Step 6** After the port adapter is properly seated, turn the port adapter lock to its locked and horizontal position, as shown in A of [Figure 3-2](#).

Figure 3-2 illustrates how to remove and install a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card.

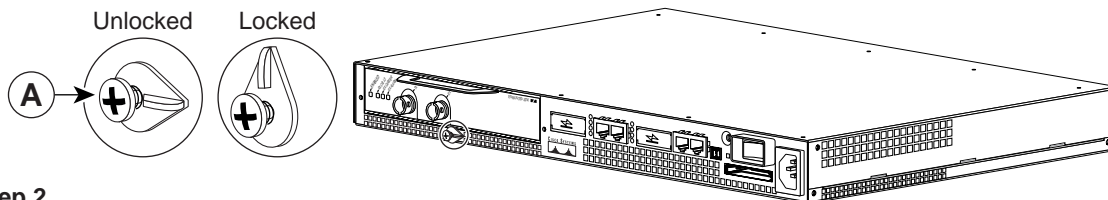
Figure 3-2 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Removal and Installation



Cisco 7401ASR Router—Removing and Installing a Port Adapter

Step 1

To remove the port adapter, use a number 2 Phillips screwdriver to loosen the screw on the port adapter latch. Rotate the port adapter latch until it clears the faceplate of the port adapter. (See A.) The latch can rotate 360°.



Step 2

Pull the port adapter from the router, about halfway out of its slot. (If you remove a blank port adapter, keep the blank port adapter for use in the router if you should ever remove the port adapter. The port adapter slot must always be filled.)

Step 3

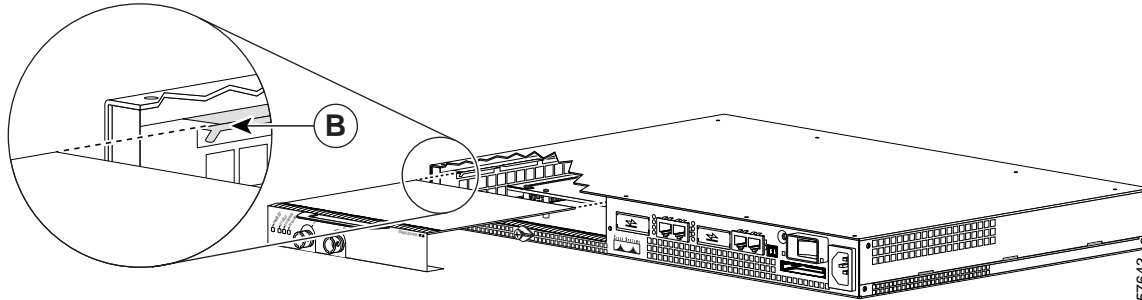
With the port adapter halfway out of the slot, disconnect all cables from the port adapter. After disconnecting the cables, pull the port adapter completely out of the chassis slot.

Step 4

To insert the port adapter, locate the port adapter slot guides inside the Cisco 7401ASR router. They are near the top, and are recessed about 1/2 inch. (See B.)

Caution

The port adapter must slide into the slot guides under the chassis lid. Do not allow the port adapter components to come in contact with the system board, or the port adapter could be damaged.



Step 5

Insert the port adapter in the slot guides halfway, and then reconnect the port adapter cables.

Step 6

After the cables are connected, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane. When installed, the port adapter input/output panel should be flush with the face of the router.

Step 7

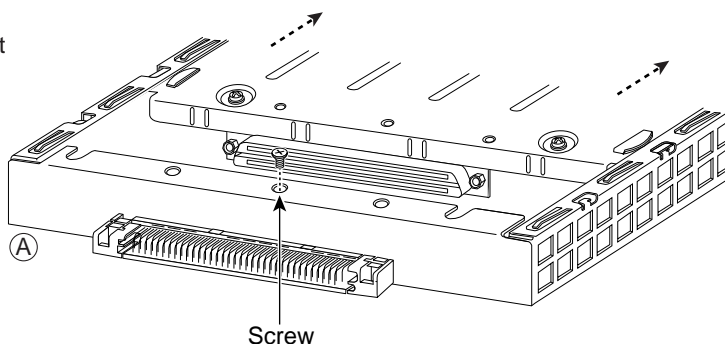
After the port adapter is properly seated, rotate the port adapter latch to the upright locked position and use a number 2 Phillips screwdriver to tighten the latch screw. If needed, loosen the latch screw to rotate the latch over the port adapter. Finish the installation by tightening the latch screw.

VIP—Removing and Installing a Port Adapter

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

Step 1

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

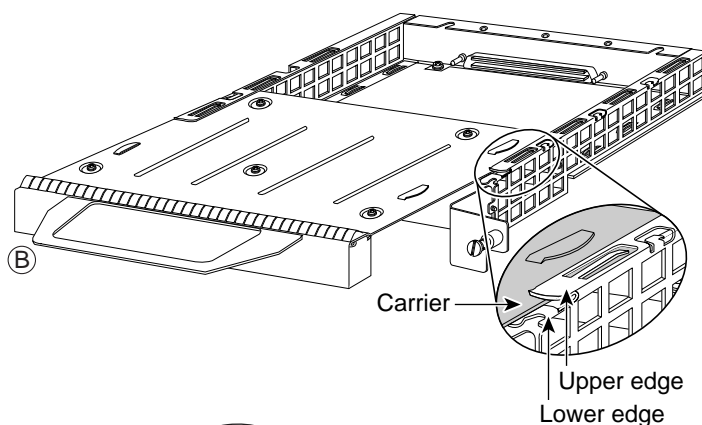


Step 2

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

Step 3

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

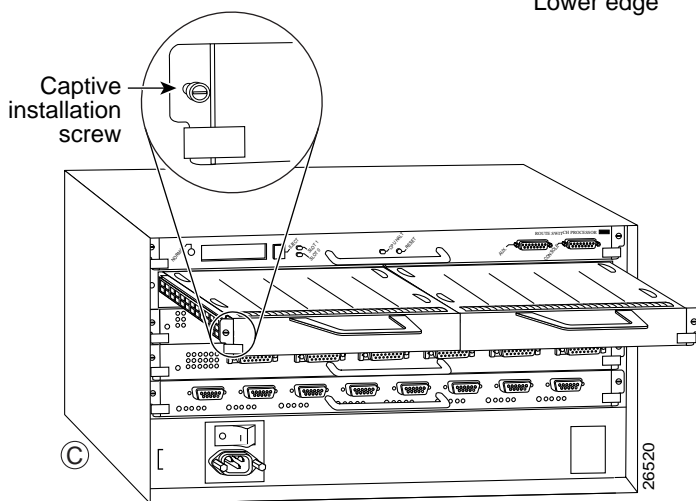


Step 4

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

Step 5

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



Step 6

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

Connecting a PA-E3 Cable

On a PA-E3(=) you use only one coaxial cable, and on a PA-2E3(=) you can use one or two coaxial cables.



Caution

You can attach only an EIA/TIA-612 and EIA/TIA-613 75-ohm coaxial cable to the PA-E3 installed in your router. Attaching a compact serial cable of another interface type to the port adapter could damage your router or the hardware at the network end of the cable.

To connect a coaxial cable to a PA-E3, follow these steps:

Step 1

Attach the coaxial cable directly to the receptacle on the PA-E3 and tighten the BNC connectors. (See [Figure 3-3](#).)

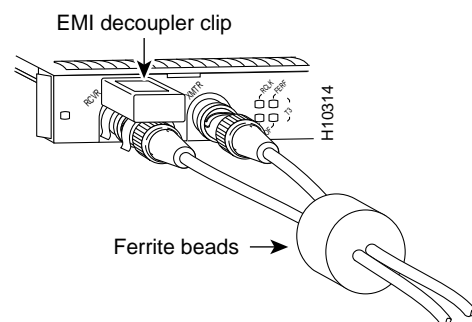


Note

Port adapters have a handle attached, but this handle is not shown to allow a full detailed view of the faceplate.

When attaching the cable receptacle on the PA-E3, use the cable-management bracket that shipped with your router for extra strain relief.

Figure 3-3 Connecting a PA-E3 Compact Coaxial Cable—Front View (Shown Without Handle)



Step 2

Attach the network end of your coaxial cable to your DSU, CSU, DTE, or other external E3 equipment and tighten the BNC connectors.

This completes the procedure for attaching a PA-E3 compact coaxial cable to the PA-E3.



CHAPTER 4

Configuring the PA-E3

To continue your PA-E3 port adapter installation, you must configure the serial interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- [Using the EXEC Command Interpreter, page 4-1](#)
- [Configuring the Interfaces, page 4-2](#)
- [Customizing the PA-E3, page 4-11](#)
- [Checking the Configuration, page 4-12](#)

Using the EXEC Command Interpreter

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

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

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

```
Router> enable
```

```
Password:
```

- Step 2** Enter the password (the password is case sensitive). For security purposes, the password is not displayed. When you enter the correct password, the system displays the privileged-level system prompt (#):

```
Router#
```

To configure the new interfaces, proceed to the [“Configuring the Interfaces” section on page 4-2](#).

Configuring the Interfaces

After you verify that the new PA-E3 is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

- Protocols you plan to route on each new interface
- IP addresses, if you plan to configure the interfaces for IP routing
- Bridging protocols you plan to use
- Clock timing source you plan to use for each new interface and clock speeds for external timing.

If you installed a new PA-E3 or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interfaces. If you replaced a PA-E3 that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configurations.

For a summary of the configuration options available and instructions for configuring interfaces on a PA-E3, refer to the appropriate configuration publications listed in the [“Related Documentation” section on page viii](#).

You execute configuration commands from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain password access. (See the [“Using the EXEC Command Interpreter” section on page 4-1](#) for an explanation of the privileged level of the EXEC.)

This section contains the following subsections:

- [Shutting Down an Interface, page 4-2](#)
- [Performing a Basic Interface Configuration, page 4-8](#)
- [Configuring Cyclic Redundancy Checks, page 4-10](#)

Shutting Down an Interface

Before you remove an interface that you will not replace, replace a compact coaxial cable, or replace port adapters, use the **shutdown** command to shut down (disable) the interfaces to prevent anomalies when you reinstall the new or reconfigured interface processor. When you shut down an interface, it is designated administratively down in the **show** command displays.

Follow these steps to shut down an interface:

Step 1 Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the [“Using the EXEC Command Interpreter” section on page 4-1](#) for instructions.)

Step 2 At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

Step 3 Shut down interfaces by entering the **interface serial** subcommand (followed by the interface address of the interface), and then enter the **shutdown** command.

When you have finished, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter.

Table 4-1 shows the **shutdown** command syntax for the supported platforms:

Table 4-1 Syntax of the **shutdown** Command for the Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1. Router(config-if)# interface serial 1/0 Router(config-if)# shutdown Router(config-if)# interface serial 1/1 Router(config-if)# shutdown Ctrl-Z Router#
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	interface , followed by the <i>type (serial)</i> and <i>mod_num/bay/port</i> (module-slot-number/port-adapter-bay-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3. Router(config-if)# interface serial 3/0/0 Router(config-if)# shutdown Router(config-if)# interface serial 3/0/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7120 series routers	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 3. Router(config-if)# interface serial 3/0 Router(config-if)# shutdown Router(config-if)# interface serial 3/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7140 series routers	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 4. Router(config-if)# interface serial 4/0 Router(config-if)# shutdown Router(config-if)# interface serial 4/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7200 series routers and Cisco 7200 VXR routers	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 6. Router(config-if)# interface serial 6/0 Router(config-if)# shutdown Router(config-if)# interface serial 6/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7201 router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in slot 1. Router(config)# interface serial 1/0 Router(config-if)# shutdown Router(config-if)# interface serial 1/1 Router(config-if)# shutdown Ctrl-Z Router#

Table 4-1 Syntax of the shutdown Command for the Supported Platforms (continued)

Platform	Command	Example
Cisco uBR7223 router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1. Router(config-if)# interface serial 1/0 Router(config-if)# shutdown Router(config-if)# interface serial 1/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco uBR7246 router and Cisco uBR7246 VXR router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 2. Router(config-if)# interface serial 2/0 Router(config-if)# shutdown Router(config-if)# interface serial 2/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7301 router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in slot 1. Router(config)# interface serial 1/0 Router(config-if)# shutdown Router(config-if)# interface serial 1/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (module-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. Router(config-if)# interface serial 3/0 Router(config-if)# shutdown Router(config-if)# interface serial 3/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7401ASR router	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 0 and interface 1 on a port adapter in slot 1. Router(config)# interface serial 1/0 Router(config-if)# shutdown Router(config-if)# interface serial 1/1 Router(config-if)# shutdown Ctrl-Z Router#
VIP in Cisco 7000 series routers or Cisco 7500 series routers	interface , followed by the <i>type (serial)</i> and <i>slot/port adapter/port</i> (interface-processor-slot-number port-adapter-slot-number/interface-port-number) shutdown	The example is for interface 1 and interface 0 on a port adapter in port adapter slot 1 of a VIP installed in interface processor slot 1. Router(config-if)# interface serial 1/1/1 Router(config-if)# shutdown Router(config-if)# interface serial 1/1/0 Router(config-if)# shutdown Ctrl-Z Router#



Note If you need to shut down additional interfaces, enter the **interface serial** command (followed by the interface address of the interface) for each of the interfaces on your port adapter. Use the **no shutdown** command to enable the interface.

Step 4 Write the new configuration to NVRAM as follows:

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

The system displays an OK message when the configuration has been stored in NVRAM.

Step 5 Verify that new interfaces are now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface.

Table 4-2 provides examples of the **show interfaces serial** command for the supported platforms.

Table 4-2 Examples of the **show interfaces** Command for the Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# show interfaces serial 1/0 Serial 1/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	show interfaces serial , followed by <i>mod_num/bay/port</i> (module-slot-number/port-adapter-bay-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter bay 0 of a FlexWAN module in module slot 3. Router# show interfaces serial 3/0/0 Serial 3/0/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco 7120 series routers	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 3. Router# show interfaces serial 3/0 Serial 3/0 is administratively down, line protocol is down [Additional display text omitted from this example]

Table 4-2 Examples of the show interfaces Command for the Supported Platforms (continued)

Platform	Command	Example
Cisco 7140 series routers	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 4. Router# show interfaces serial 4/0 Serial 4/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco 7200 series routers and Cisco 7200 VXR routers	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 6. Router# show interfaces serial 6/0 Serial 6/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco 7201 router	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# show interfaces serial 1/0 Serial 1/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco uBR7223 router	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# show interfaces serial 1/0 Serial 1/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco uBR7246 router and Cisco uBR7246 VXR router	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 2. Router# show interfaces serial 2/0 Serial 2/0 is administratively down, line protocol is down [Additional display text omitted from this example]

Table 4-2 Examples of the `show interfaces` Command for the Supported Platforms (continued)

Platform	Command	Example
Cisco 7301 router	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# show interfaces serial 1/0 Serial 1/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	show interfaces serial , followed by <i>slot/port</i> (module-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. Router(config-if)# show interfaces serial 3/0 Serial 3/0 is administratively down, line protocol is down [Additional display text omitted from this example]
Cisco 7401ASR router	show interfaces serial , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# show interfaces serial 1/0 Serial 1/0 is administratively down, line protocol is down [Additional display text omitted from this example]
VIP in Cisco 7000 series router or Cisco 7500 series routers	show interfaces serial , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1 of a VIP in interface processor slot 1. Router# show interfaces serial 1/1/0 Serial 1/1/0 is administratively down, line protocol is down [Additional display text omitted from this example]

- Step 6** Re-enable interfaces by doing the following:
- Repeat Step 3 to re-enable an interface. Substitute the **no shutdown** command for the **shutdown** command.
 - Repeat Step 4 to write the new configuration to memory. Use the **copy running-config startup-config** command.
 - Repeat Step 5 to verify that the interfaces are in the correct state. Use the **show interfaces** command followed by the interface type and interface address of the interface.

For complete descriptions of software configuration commands, refer to the publications listed in the “[Related Documentation](#)” section on page viii.

Performing a Basic Interface Configuration

Following are instructions for a basic configuration, which include enabling an interface, specifying IP routing, and setting up external timing on a DCE interface. 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 complete descriptions of configuration subcommands and the configuration options available for serial interfaces, refer to the appropriate software documentation.

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>
```

- Step 1** Enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

- Step 2** Specify the first interface to configure by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure. (The command for your port adapter may be different, for example, **interface atm**.)

[Table 4-3](#) provides example of the **interface serial** subcommand for the supported platforms.

Table 4-3 Examples of the interface serial Subcommand for the Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 0. Router(config)# interface serial 0/0 Router(config-if)#
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	interface serial , followed by <i>mod_num/bay/port</i> (module-slot-number/ port-adapter-bay-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter bay 0 of a FlexWAN module in module slot 3. Router(config)# interface serial 3/0/0 Router(config-if)#
Cisco 7120 series routers	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 3. Router(config)# interface serial 3/0 Router(config-if)#
Cisco 7140 series routers	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 4. Router(config)# interface serial 4/0 Router(config-if)#

Table 4-3 Examples of the interface serial Subcommand for the Supported Platforms (continued)

Platform	Command	Example
Cisco 7200 series routers and Cisco 7200 VXR routers	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 6. Router(config)# interface serial 6/0 Router(config-if)#
Cisco 7201 router	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0 Router(config-if)#
Cisco uBR7223 router	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0 Router(config-if)#
Cisco uBR7246 router and Cisco uBR7246 VXR router	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 2. Router(config)# interface serial 2/0 Router(config-if)#
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	interface serial , followed by <i>slot/port</i> (module-slot-number/ interface-port-number)	The example is for the first interface on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. Router(config)# interface serial 3/0 Router(config-if)#
Cisco 7301 router and Cisco 7401ASR router	interface serial , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0 Router(config-if)#
VIP in Cisco 7000 series router or Cisco 7500 series routers	interface serial , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1 of a VIP in interface processor slot 1. Router(config)# interface serial 1/1/0 Router(config-if)#

- Step 3** Assign an IP address and subnet mask to the interface (if IP routing is enabled on the system) by using the **ip address** subcommand, as in the following example:

```
Router(config-if)# ip address 10.0.0.0 10.255.255.255
```

- Step 4** Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.
- Step 5** Re-enable the interfaces using the **no shutdown** command. (See the “[Shutting Down an Interface](#)” section on page 4-2.)
- Step 6** Configure all additional port adapter interfaces as required.
- Step 7** After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.

Step 8 Write the new configuration to NVRAM as follows:

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

This completes the procedure for creating a basic configuration.

The PA-E3 supports internal or external clocking, and the clock rate is fixed at 32,064 kbit/s per ITU G.703 and cannot be changed.

Configuring Cyclic Redundancy Checks

Cyclic redundancy check (CRC) is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. All interfaces use a 16-bit CRC (CRC-CITT) by default but also support a 32-bit CRC. The sender of a data frame calculates the frame check sequence (FCS). Before it sends a frame, the sender appends the FCS value to the message. The receiver recalculates the FCS and compares its calculation to the FCS from the sender. If there is a difference between the two calculations, the receiver assumes that a transmission error occurred and sends a request to the sender to resend the frame.

Table 4-4 summarizes CRC commands.

Table 4-4 CRC Commands

Purpose	Command	Example
Enable 32-bit CRC.	crc size	The example enables 32-bit CRD on a serial interface: <pre>Router(config)# interface serial 3/0 Router(config-if)# crc 32</pre>
Return to default 16-bit CRC.	no crc size	The example disables 32-bit CRD on a serial interface and returns to the default 16-bit CRC: <pre>Router(config)# interface serial 3/0 Router(config-if)# no crc 32</pre>

Enable 32-bit CRC using the **crc 32** command. Before you can enable 32-bit CRC, you must use the **interface serial** command (followed by the interface address of the interface) to select the interface on which you want to enable 32-bit CRC. This command functions in the same way on all supported platforms.

In the example that follows, 32-bit CRC is specified:

```
Router(config-if)# crc 32
```

The preceding command example applies to all systems in which the PA-E3 is supported.

Use the **no crc 32** command to disable CRC-32 and return the interface to the default CRC-16 (CRC-CITT) setting.

When you have finished, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.

Then write the new configuration to NVRAM using the **copy running-config startup-config** command.

For command descriptions, refer to the *Configuration Fundamentals Configuration Guide* on Cisco.com. For more information, see the “[Related Documentation](#)” section on page viii.

Customizing the PA-E3

Depending on the requirements for your system configuration and the protocols you plan to route on the interface, you might need to enter configuration commands to customize the PA-E3. Most of the features you can customize have default values that will probably suit your environment and need not be changed. However, if you need to customize your configuration, see the following sections:

- [Setting the Bandwidth, page 4-11](#)
- [Defining the DSU Mode, page 4-11](#)
- [Defining Set Bit \(National\), page 4-12](#)
- [Enabling E3 Scrambling, page 4-12](#)
- [Specifying E3 Framing, page 4-12](#)

Setting the Bandwidth

In interface configuration mode, reduce effective bandwidth (range of 22 to 34010 kilobits per second) by entering the **dsu bandwidth** configuration subcommand, as in the following example:

```
router(config-if)# dsu bandwidth 16000
```

Use the **no** form of this command to return to the default, 34010.



Note

The local port configuration must match the remote port configuration. For example, if you reduce the effective bandwidth to 16000 on the local port, you must do the same on the remote port.

Defining the DSU Mode

In interface configuration mode, define the DSU interoperability mode by entering the **dsu mode [0 | 1]** configuration subcommand, as in the following example:

```
router(config-if)# dsu mode 1
```

Use the **no** form of this command to return to the default, 0.



Note

The local port configuration must match the remote port configuration. For example, if you define the DSU interoperability mode as 1 on the local port, you must do the same on the remote port. You need to know what type of DSU is at the remote port to find out if it interoperates with the PA-E3. For E3 serial interfaces, specify mode 0 for connection from a PA-E3 to another PA-E3 or a Digital Link DSU (DL3100). Specify mode 1 for connection from a PA-E3 to a Kentrox DSU.

Also refer to the [“Interoperability Guidelines for PA-E3 DSUs”](#) section on page 1-20 section for information regarding DSU feature compatibilities.

Defining Set Bit (National)

In interface configuration mode, define set bit in G751 frame (national bit) by entering the **national bit** [0 | 1] configuration subcommand, as in the following example:

```
router(config-if)# national bit 1
```

Use the **no** form of this command to return to the default, which is 0.

Enabling E3 Scrambling

In interface configuration mode, enable E3 scrambling by entering the **scramble** configuration subcommand, as in the following example:

```
router(config-if)# scramble
```

Use the **no** form of this command to restore the default value, which is disabled.



Note

The local port configuration must match the remote port configuration. For example, if you enable scrambling on the local port, you must do the same on the remote port.

Specifying E3 Framing

In interface configuration mode, specify E3 framing by entering the **framing {g751 | bypass}** configuration subcommand, as in the following example:

```
router(config-if)# framing g751
```

Use the **no** form of this command to return to the default, which is G.751 framing.



Note

If you use the **bypass** option, scrambling must be set to the default, disabled; the DSU mode must be set to the default, 0; and the DSU bandwidth must be set to the default, 34010.

Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces, and use the **ping** and **loopback** commands to check connectivity. This section includes the following subsections:

- [Using show Commands to Verify the New Interface Status, page 4-13](#)
- [Using the ping Command to Verify Network Connectivity, page 4-29](#)
- [Using loopback Commands, page 4-29](#)

Using show Commands to Verify the New Interface Status

Table 4-5 demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the PA-E3 appears in them correctly. Sample displays of the output of selected **show** commands appear in the sections that follow. For complete command descriptions and examples, refer to the publications listed in the “[Related Documentation](#)” section on page viii.



Note

The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

Table 4-5 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	Router# show controllers
show diag slot Note The <i>slot</i> argument is not required with Catalyst 5000 family switches.	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	Router# show diag 2
show interfaces type 0 or 1/ interface-port-number	Displays status information about a specific type of interface (for example, serial) on a Catalyst RSM/VIP2	Router# show interfaces serial 1/0
show interfaces type module-slot-number/port-adapter-bay-number/ interface-port-number	Displays status information about a specific type of interface (for example, serial) on a Catalyst 6000 family FlexWAN module	Router# show interfaces serial 3/0/0
show interfaces type 3/interface-port-number	Displays status information about a specific type of interface (for example, serial) in a Cisco 7120 series router	Router# show interfaces serial 3/1
show interfaces type 4/interface-port-number	Displays status information about a specific type of interface (for example, serial) in a Cisco 7140 series router	Router# show interfaces serial 4/1

Table 4-5 Using Show Commands (continued)

Command	Function	Example
show interfaces <i>type port-adapter-slot-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco 7200 series router, Cisco 7200 VXR router, Cisco 7201 router, Cisco 7301 router, and Cisco 7401 ASR router	Router# show interfaces serial 1/0
show interfaces <i>type 1/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7223 router	Router# show interfaces serial 1/1
show interfaces <i>type 1 or 2/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7246 router and Cisco uBR7246 VXR router	Router# show interfaces serial 2/0
show interfaces <i>type 2 or 3 or 4 or 5/interface-port-number</i>	Displays status information about a serial interface on a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	Router# show interfaces serial 3/0
show interfaces <i>type interface-processor-slot-number/port-adapter-slot-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) on a VIP in a Cisco 7000 series router or Cisco 7500 series router	Router# show interfaces serial 3/1/0
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

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:

- [Using the show version or show hardware Commands, page 4-15](#)
- [Using the show diag Command, page 4-20](#)
- [Using the show interfaces Command, page 4-23](#)

These subsections offer some platform-specific output examples using the **show** commands. Choose the subsection appropriate for your system. Proceed to the [“Using the ping Command to Verify Network Connectivity”](#) section on page 4-29 when you have finished using the **show** commands.

Using the show version or show hardware Commands

Display the configuration of the system hardware, the number of each interface type installed, the Cisco IOS software version, the names and sources of configuration files, and the boot images, using the **show version** (or **show hardware**) command.



Note

The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

The following sections provide output of the **show version** command for some of the supported platforms:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command, page 4-15](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show version Command, page 4-16](#)
- [Cisco 7100 Series Routers—Example Output of the show version Command, page 4-16](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command, page 4-17](#)
- [Cisco 7201 Router—Example Output of the show version Command, page 4-18](#)
- [Cisco 7401ASR Router—Example Output of the show version Command, page 4-18](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command, page 4-19](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 5000 family switch with a PA-E3 installed:

```
Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) C5RSM Software (C5RSM-JSV-M), Version 11.2(9)P
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled True 24-Jun-97 17:09 by biff
Image text-base: 0x600108E0, data-base: 0x6095E000

ROM: System Bootstrap, Version 11.2(15707)
BOOTFLASH: C5RSM Software (C5RSM-JSV-M), Version 11.2

Router uptime is 17 hours, 17 minutes
System restarted by reload
System image file is "c5rsm-jsv-mz.7P", booted via tftp

cisco RSP2 (R4700) processor with 32768K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software.
1 C5IP controller (15 Vlan).
2 MIP controllers (4 E1).
1 VIP2 controller (2 E1)(4 Token Ring).
6 Channelized E1/PRI ports.
```

```

123K bytes of non-volatile configuration memory.

16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x100

```

Catalyst 6000 Family FlexWAN Module—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 6000 family switch with a PA-E3 installed:

```

Router# show version
Cisco Internetwork Operating System Software
IOS (tm) MSFC Software (C6MSFC-JSV-M), Experimental Version 12.1(20000209:134547)
[amcrae-cosmos_e_nightly 163]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Wed 09-Feb-00 07:10 by
Image text-base: 0x60008900, data-base: 0x6140E000

ROM: System Bootstrap, Version 12.0(3)XE, RELEASE SOFTWARE

const-uut uptime is 5 minutes
System returned to ROM by reload
System image file is "bootflash:c6msfc-jsv-mz.Feb9"

cisco Cat6k-MSFC (R5000) processor with 122880K/8192K bytes of memory.
Processor board ID SAD03457061
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
Channelized E1, Version 1.0.
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
6 FlexWAN controllers (13 Serial)(8 E1)(8 T1)(2 HSSI)(2 ATM)(1 Channelized T3)(1
Channelized E3)(2 POS).
1 Virtual Ethernet/IEEE 802.3 interface(s)
17 Serial network interface(s)
2 HSSI network interface(s)
2 ATM network interface(s)
2 Packet over SONET network interface(s)
1 Channelized T3 port(s)
1 Channelized E3 port(s)
123K bytes of non-volatile configuration memory.
4096K bytes of packet SRAM memory.

16384K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x1

```

Cisco 7100 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7120 series router with a PA-E3 installed:

```

Router# show version
Cisco Internetwork Operating System Software
IOS (tm) EGR Software (c7100-IS-M), Version 12.0(4)XE, EARLY DEPLOYMENT
RELEASE)
TAC:Home:SW:IOS:Specials for info
Copyright (c) 1986-1999 by cisco Systems, Inc.

```

```

Compiled Thu 10-Jun-99 15:32 by linda
Image text-base:0x60008900, data-base:0x60D8E000

ROM:System Bootstrap, Version 12.0(19990720:023243)
[gautham-conn_4xe-PRE_ALPHE
BOOTFLASH:EGR Software (c7100-IS-M), Version 12.0(4)XE, EARLY DEPLOYMENT
RELEA)

Router uptime is 24 minutes
System restarted by power-on
System image file is "disk0:c7100-is-mz.120-4.XE"

cisco 7120-bad (EGR) processor with 61440K/69632K bytes of memory.
R527x CPU at 225Mhz, Implementation 40, Rev 10.0, 2048KB L2 Cache
Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
2 FastEthernet/IEEE 802.3 interface(s)
125K bytes of non-volatile configuration memory.

40960K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2000

```

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7200 series router with a PA-E3 installed:

```

Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 11.1(7)CA [biff 105]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 04-Aug-96 06:00 by biff
Image text-base: 0x600088A0, data-base: 0x605A4000

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

Router uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "c7200-j-mz", booted via slot0

cisco 7206 (NPE150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV INC).
Chassis Interface.
4 Ethernet/IEEE 802.3 interfaces.
2 FastEthernet/IEEE 802.3 interfaces.
4 Token Ring /IEEE802.5 interfaces.
12 Serial network interfaces.
1 Compression port adapter.
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2

```

Cisco 7201 Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7201 router:

```
Router# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alpha uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 22222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

Cisco 7401ASR Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7401ASR router with a PA-E3 installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7401ASR Software (C7401ASR-J-M), Version 11.1(7)CA [biff 105]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 04-Aug-96 06:00 by biff
Image text-base: 0x600088A0, data-base: 0x605A4000

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

Router uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "c7401ASR-j-mz", booted via slot0

cisco 7401ASR processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
```



```

X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV INC).
Chassis Interface.
4 Ethernet/IEEE 802.3 interfaces.
2 FastEthernet/IEEE 802.3 interfaces.
4 Token Ring /IEEE802.5 interfaces.
12 Serial network interfaces.
1 Compression port adapter.
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).Configuration register is 0x2

```

VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7500 series router with a PA-E3 installed:

```

Router# show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-A), Version 11.1(7)CA [biff 125]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sat 10-Aug-96 17:56 by biff
Image text-base: 0x600108A0, data-base: 0x60952000

ROM: System Bootstrap, Version 5.3(16645) [biff 571], RELEASE SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(7)CA, RELEASE SOFTWARE (fc1)

Router uptime is 5 days, 4 minutes
System restarted by reload
System image file is "rsp-jv-mz", booted via slot0

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.
1 EIP controller (6 Ethernet).
1 VIP2 controller (8 Ethernet)(1 HSSI).
14 Ethernet/IEEE 802.3 interfaces.
1 HSSI network interface.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0

```

Using the show diag Command

Display the types of port adapters installed in your system (and specific information about each) using the **show diag slot** command, where *slot* is the *port adapter slot* in Catalyst 5000 family switches, Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router, the *module slot* in a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router, and the *interface processor slot* in Cisco 7000 series routers or Cisco 7500 series routers with a VIP. In the FlexWAN module, the **show diag** command is used without the *slot* designation.



Note

The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.



Note

The *slot* argument is not required for Catalyst 5000 family switches.

The following sections provide output of the **show diag** command for some of the supported platforms:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show diag Command, page 4-20](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show diag Command, page 4-21](#)
- [Cisco 7100 Series Routers, page 4-21](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command, page 4-21](#)
- [Cisco 7201 Router—Example Output of the show diag Command, page 4-22](#)
- [Cisco 7401ASR Router—Example Output of the show diag Command, page 4-22](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command, page 4-23](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-E3 on a Catalyst RSM/VIP2:

```
Switch# show diag 6
Slot 6:
E3 PA port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 2w0d ago
EEPROM contents at hardware discovery:
Hardware revision 1.0          Board revision B0
Serial number 14061433        Part number 73-2324-03
Test history 0x0              RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 52 01 00 00 D6 8F 79 49 09 14 03 00 00 00 00
0x30:58 00 00 00 99 05 06 00 FF FF FF FF FF FF FF FF
```

Catalyst 6000 Family FlexWAN Module—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-E3 on a Catalyst 6000 family FlexWAN module:

```
Router# show diag

(display text omitted)

Slot 8: Logical_index 17
Board is analyzed ipc ready FlexWAN controller

Slot database information:
Flags: 0x2004Insertion time: unknown

CWAN Controller Memory Size: Unknown

PA Bay 1 Information:
E3 PA port adapter, 2 ports
EEPROM format version 0
HW rev 0.00, Board revision UNKNOWN
Serial number: 00000000 Part number: 00-0000-00
```

Cisco 7100 Series Routers

Following is an example of the **show diag** command that shows a Fast Ethernet port adapter in port adapter slot 3 of a Cisco 7120 series router:

```
Router# show diag 3
Slot 3:
10/100 Fast-ethernet with RJ45 Integrated port adapter, 2 ports
Integrated port adapter is analyzed
EEPROM contents at hardware discovery:
Hardware revision 255.255          Board revision UNKNOWN
EEPROM format version 1
EEPROM contents (hex):
0x20:01 D3 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x30:FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```



Note

To use the **show diag** command with the Cisco 7140 series router, replace the slot argument **3** with **4**.

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-E3 in port adapter slot 1 of a Cisco 7200 series router:

```
Router# show diag 1
Slot 1:
E3 PA port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 2w0d ago
EEPROM contents at hardware discovery:
Hardware revision 1.0          Board revision B0
Serial number 14061433        Part number 73-2324-03
Test history 0x0              RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 52 01 00 00 D6 8F 79 49 09 14 03 00 00 00 00
```

```
0x30:58 00 00 00 99 05 06 00 FF FF FF FF FF FF FF FF
```

Cisco 7201 Router—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7201 router:

```
Router# show diag 1
Slot 1:
  Dual OC3 POS Port adapter, 2 ports
  Port adapter is analyzed
  Port adapter insertion time 00:02:19 ago
  EEPROM contents at hardware discovery:
  Hardware Revision : 1.0
  PCB Serial Number : JAE07520DYL
  Part Number : 73-8220-02
  Board Revision : A0
  RMA Test History : 00
  RMA Number : 0-0-0-0
  RMA History : 00
  Deviation Number : 0
  Product (FRU) Number : PA-POS-2OC3
  Top Assy. Part Number : 800-21857-02
  EEPROM format version 4
  EEPROM contents (hex):
    0x00: 04 FF 40 03 E3 41 01 00 C1 8B 4A 41 45 30 37 35
    0x10: 32 30 44 59 4C 82 49 20 1C 02 42 41 30 03 00 81
    0x20: 00 00 00 00 04 00 88 00 00 00 00 CB 94 50 41 2D
    0x30: 50 4F 53 2D 32 4F 43 33 20 20 20 20 20 20 20 20
    0x40: 20 C0 46 03 20 00 55 61 02 FF FF FF FF FF FF FF
    0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
    0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
    0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

Cisco 7401ASR Router—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-E3 in port adapter slot 1 of a Cisco 7401ASR router:

```
Router# show diag 1
Slot 1:
  E3 PA port adapter, 2 ports
  Port adapter is analyzed
  Port adapter insertion time 2w0d ago
  EEPROM contents at hardware discovery:
  Hardware revision 1.0          Board revision B0
  Serial number 14061433        Part number 73-2324-03
  Test history 0x0              RMA number 00-00-00
  EEPROM format version 1
  EEPROM contents (hex):
    0x20:01 52 01 00 00 D6 8F 79 49 09 14 03 00 00 00 00
    0x30:58 00 00 00 99 05 06 00 FF FF FF FF FF FF FF FF
```

VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-E3 in port adapter slot 1 on a VIP2 in interface processor slot 1:

```
Router# show diag 1
Slot 1:
  E3 PA port adapter, 2 ports
  Port adapter is analyzed
  Port adapter insertion time 2w0d ago
  EEPROM contents at hardware discovery:
  Hardware revision 1.0           Board revision B0
  Serial number 14061433         Part number 73-2324-03
  Test history 0x0               RMA number 00-00-00
  EEPROM format version 1
  EEPROM contents (hex):
  0x20:01 52 01 00 00 D6 8F 79 49 09 14 03 00 00 00 00
  0x30:58 00 00 00 99 05 06 00 FF FF FF FF FF FF FF FF
```

Using the show interfaces Command

Display status information (including the physical slot and interface address) for the interfaces you specify using the **show interfaces** command.

For complete descriptions of interface subcommands and the configuration options available for interfaces, refer to the publications listed in the [“Related Documentation” section on page viii](#).



Note

The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

The following sections provide output of the **show interfaces** command for some of the supported platforms:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command, page 4-24](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show interfaces Command, page 4-24](#)
- [Cisco 7100 Series Routers—Example Output of the show interfaces Command, page 4-25](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command, page 4-26](#)
- [Cisco 7201 Router—Example Output of the show interfaces Command, page 4-27](#)
- [Cisco 7401ASR Router—Example Output of the show interfaces Command, page 4-27](#)
- [VIP in Cisco 7000 Series Routers or Cisco 7500 Series Routers—Example Output of the show interfaces Command, page 4-28](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command from a Catalyst 5000 family switch. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 1 of a Catalyst RSM/VIP2; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Switch# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.1
    MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text omitted from this example]
```

```
Switch# show interfaces serial 1/1
Serial1/1 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.1
    MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text omitted from this example]
```

```
Switch# show interfaces serial 1/2
Serial1/2 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.2
    MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text for remaining interfaces omitted]
```

Catalyst 6000 Family FlexWAN Module—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command from a Catalyst 6000 family switch. In these examples, the serial interfaces are on a port adapter in port adapter bay 1 of a Catalyst 6000 family FlexWAN module in module slot 8; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 8/1/0
Serial8/1/0 is administratively down, line protocol is down
  Hardware is Serial
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
(display text omitted)
```

```
Router# show interfaces serial 8/1/1
Serial8/1/1 is administratively down, line protocol is down
  Hardware is Serial
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
(display text omitted)
```

Cisco 7100 Series Routers—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command from a Cisco 7120 series router. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 3 of a Cisco 7120 series router; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 3/0
Serial3/0 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 3/1
Serial3/1 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.1
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 3/2
Serial3/2 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.2
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text for remaining interfaces omitted]
```



Note

To use the **show interfaces serial** command with the Cisco 7140 series router, replace the interface address arguments **3/0**, **3/1**, **3/2**, **3/3**, **3/4**, **3/5**, **3/6**, and **3/7** with **4/0**, **4/1**, **4/2**, **4/3**, **4/4**, **4/5**, **4/6**, and **4/7**, respectively.

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface 0 on a PA-E3 installed in port adapter slot 3 of a Cisco 7120 series router:

```
Router# show interfaces serial 3/0
Serial3/0 is up, line protocol is up
  Hardware is M8T-RS232
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output 1d17h, output hang never
  Last clearing of "show interface" counters never
  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
  24 packets output, 5137 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions      DCD=down  DSR=down  DTR=down  RTS=down  CTS=down
```



Note

To use the **show interfaces serial** command with the Cisco 7140 series router, replace the interface address argument **3/0** with **4/0**.

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command from a Cisco 7200 series router. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 1; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 1/1
Serial1/1 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.1
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 1/2
Serial1/2 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.2
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text for remaining interfaces omitted]
```

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface port 0 on a PA-E3 installed in port adapter slot 1:

```
Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
  Hardware is M8T-RS232
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output 1d17h, output hang never
  Last clearing of "show interface" counters never
  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
  24 packets output, 5137 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions      DCD=down  DSR=down  DTR=down  RTS=down  CTS=down
```


Cisco 7201 Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command from a Cisco 7201 router:

```
Router# show interfaces
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia
0019.56c5.2adb)
  Internet address is 209.165.200.225
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 180240000 bits/sec, 430965 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    2222975 packets input, 133378500 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
  0 watchdog, 0 multicast, 0 pause input
  0 input packets with dribble condition detected
  0 packets output, 0 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 babbles, 0 late collision, 0 deferred
  0 lost carrier, 0 no carrier, 0 pause output
  0 output buffer failures, 0 output buffers swapped out
```

Cisco 7401ASR Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface port 0 on a PA-E3 installed in port adapter slot 1 of a Cisco 7401ASR router:

```
Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
  Hardware is M8T-RS232
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output 1d17h, output hang never
  Last clearing of "show interface" counters never
  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
  24 packets output, 5137 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions      DCD=down DSR=down DTR=down RTS=down CTS=down
```

VIP in Cisco 7000 Series Routers or Cisco 7500 Series Routers—Example Output of the show interfaces Command

Following are examples of the **show interfaces** command used with the VIP2. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 3; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 3/1/1
Serial3/1/1 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.1
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text omitted from this example]
```

```
Router# show interfaces serial 3/1/2
Serial3/1/2 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.2
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
[Additional display text for remaining interfaces omitted]
```

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface 0 on a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 3:

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 10.0.0.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input 2d18h, output 00:00:54, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
    Conversations 0/1 (active/max active)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    16 packets input, 1620 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort
    3995 packets output, 1147800 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    1 carrier transitions
  RTS up, CTS up, DTR up, DCD up, DSR up
```

Proceed to the next section, “[Using the ping Command to Verify Network Connectivity](#),” to check network connectivity of the PA-E3 and switch or router.

Using the ping Command to Verify Network Connectivity

Using the **ping** command, you can verify that an interface port is functioning properly. This section provides a brief description of this command. Refer to the publications listed in the “[Related Documentation](#)” section on page viii 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 system waits a specified time for the remote device to reply. Each echo reply is displayed as an exclamation point (!) on the console terminal; each request that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate a bad connection.

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 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.0.0.10, 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.

Proceed to the next section, “[Using loopback Commands](#),” to finish checking network connectivity.

Using loopback Commands

Use the **loopback {dte | local | network {line | payload}}** command to troubleshoot the E3 serial port adapter at the physical interface level. The command loops all packets from the E3 interface either back to the interface or from the network back out toward the network. Use the **no** form of the command to remove the loop.

The following examples of the **loopback {dte | local | network {line | payload}}** command configure loopback modes on the single interface (interface 0) of a one-port E3 serial port adapter in port adapter slot 0 of a VIP2 in chassis slot 10 of a Cisco 7500 series router:

To set the interface into loopback data terminal equipment (DTE) mode, which loops the router output data back toward the router (after the line interface unit), use the **loopback dte** command as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback dte
```

To set the interface into local loopback mode, which loops the router output data back toward the router at the framer, use the **loopback local** command as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback local
```

To set the interface into network line loopback mode, which loops the data back toward the network (before the framer), use the **loopback network line** command as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 10/0/0  
router(config-if)# loopback network line
```

To set the interface into network payload loopback mode, which loops just the payload data back toward the network at the E3 framer, use the **loopback network payload** command as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 10/0/0  
router(config-if)# loopback network payload
```