



PA-4E1G Serial Port Adapter Installation and Configuration

Product Number: PA-4E1G-120(=) and PA-4E1G-75(=)

Platforms Supported: 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 Series and Cisco 7500 Series Routers

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PA-4E1G Serial Port Adapter Installation and Configuration

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CONTENTS

Preface vii

Document Revision History vii

Objectives vii

Organization viii

Related Documentation viii

Obtaining Documentation, Obtaining Support, and Security Guidelines xi

CHAPTER 1

Overview 1-1

Port Adapter Overview 1-1

Features 1-2

Interface Specifications 1-2

LEDs 1-4

Cables, Connectors, and Pinouts 1-4

Cable Product Numbers 1-6

Cable Distance Limitations 1-6

E1-G.703/G.704 Port Adapter Cable Pinouts 1-7

Port Adapter Slot Locations on the Supported Platforms 1-7

Cisco 7000 Series Routers VIP Slot Numbering 1-8

Cisco 7100 Series Routers Slot Numbering 1-10

Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering 1-11

Cisco uBR7200 Series Router Slot Numbering 1-14

Cisco 7201 Router Slot Numbering 1-16

Cisco 7301 Router Slot Numbering 1-16

Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering 1-17

Cisco 7401ASR Router Slot Numbering 1-18

Cisco 7500 Series Routers VIP Slot Numbering 1-18

Identifying Interface Addresses 1-19

Cisco 7000 Series Routers VIP Interface Addresses 1-21

Cisco 7100 Series Routers Interface Addresses 1-22

Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses 1-22

Cisco uBR7200 Series Routers Interface Addresses 1-22

Cisco 7201 Router Interface Addresses 1-22

Cisco 7301 Router Interface Addresses 1-23

Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses	1-23
Cisco 7401ASR Router Interface Addresses	1-23
Cisco 7500 Series Routers VIP Interface Addresses	1-23

CHAPTER 2

Preparing for Installation 2-1

Required Tools and Equipment	2-1
Minimum Software and Hardware Requirements	2-2
Checking Hardware and Software Compatibility	2-3
Safety Guidelines	2-3
Safety Warnings	2-4
Electrical Equipment Guidelines	2-9
Telephone Wiring Guidelines	2-9
Preventing Electrostatic Discharge Damage	2-9
FCC Class A Compliance	2-10
Telecommunications Authority of Singapore	2-11
BABT Compliance	2-11
Other Safety and Compliance Approvals	2-11

CHAPTER 3

Removing and Installing Port Adapters 3-1

Handling Port Adapters	3-1
Online Insertion and Removal	3-2
Warnings and Cautions	3-2
Port Adapter Removal and Installation	3-3
Cisco 7100 Series Routers—Removing and Installing a Port Adapter	3-4
Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter	3-5
Cisco uBR7200 Series Routers—Removing a Port Adapter	3-6
Cisco uBR7200 Series Routers—Installing a Port Adapter	3-7
Cisco 7201 Router—Removing and Installing a Port Adapter	3-8
Cisco 7301 Router—Removing and Installing a Port Adapter	3-9
Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter	3-10
Cisco 7401ASR Router—Removing and Installing a Port Adapter	3-12
Cisco 7000 Series Routers and Cisco 7500 Series Routers with VIP—Removing and Installing a Port Adapter	3-13
Installing Interface Cables	3-14

CHAPTER 4

Configuring the PA-4E1G 4-1

Using the EXEC Command Interpreter	4-1
------------------------------------	-----

Configuring the Interfaces	4-2
Shutting Down an Interface	4-2
Performing a Basic Interface Configuration	4-7
Customizing the Configuration	4-9
Configuring Framed and Unframed Mode	4-9
Configuring Timing (Clock) Signals	4-10
Configuring Cyclic Redundancy Checks	4-10
Checking the Configuration	4-11
Using show Commands to Verify the New Interface Status	4-11
Using the show version or show hardware Commands	4-13
Using the show diag Command	4-17
Using the show interfaces Command	4-19
Using the ping Command to Verify Network Connectivity	4-24
Using loopback Commands	4-25



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-3065-05, records technical changes to this document.

Document Version	Date	Change Summary
OL-3065-05	April, 2007	Adds Cisco 7201 router information.

Objectives

This document describes how to the install and configure the balanced (120-ohm) and unbalanced (75-ohm) E1-G.703/G.704 synchronous serial port adapters, PA-4E1G-120 and PA-4E1G-75, hereafter referred to as the PA-4E1G, which are used in the following platforms:

- 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 the six-slot Cisco 7206
- Cisco uBR7200 series universal broadband routers, consisting of the six-slot Cisco uBR7246 and Cisco uBR7246VXR, and the three-slot Cisco uBR7223
- Cisco 7201 router
- Cisco 7301 router
- Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router
- Cisco 7401ASR router

- VIP2 in Cisco 7500 series and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

**Note**

Cisco 7000 series and Cisco 7500 series routers require the VIP2-15 at minimum.

- VIP4 in Cisco 7500 series and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)
- VIP6-80 in Cisco 7500 series and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

Organization

This document is organized into the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the PA-4E1G 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-4E1G port adapters in the supported platforms.
Chapter 4	Configuring the PA-4E1G	Provides instructions for configuring the PA-4E1G on the supported platforms.

Related Documentation

The documentation listed below is available online, on the Documentation CD-ROM, or as printed documents.

Your router, switch, or gateway 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>.

- Cisco AS5800 Universal Access Server:

For hardware installation and maintenance information and software configuration information, refer to the following publications:

- *Cisco AS5800 Universal Access Server Hardware Installation and Configuration Guide*
- *Cisco AS5800 Universal Access Server Software Installation and Configuration Guide*

- 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:
 - *Cisco AS5800 Universal Access Server Regulatory Compliance and Safety Information*
 - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
 - *Regulatory Compliance and Safety Information for 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*
 - *Site Preparation and Safety Guide*

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 PA-4E1G port adapter and contains the following sections:

- [Port Adapter Overview, page 1-1](#)
- [Interface Specifications, page 1-2](#)
- [LEDs, page 1-4](#)
- [Cables, Connectors, and Pinouts, page 1-4](#)
- [Port Adapter Slot Locations on the Supported Platforms, page 1-7](#)
- [Identifying Interface Addresses, page 1-19](#)

Port Adapter Overview

The PA-4E1G, shown in [Figure 1-1](#) and [Figure 1-2](#), provides up to four E1 synchronous serial interfaces, which are compatible with and specified by G.703/G.704. The PA-4E1G network interfaces provide a connection between standard serial interfaces such as V.35 to telephone lines or Post, Telephone, and Telegraph (PTT) networks. Each PA-4E1G interface operates in full-duplex mode at E1 (2.048 Mbps) speed.

The PA-4E1G interfaces do not operate in the data terminal equipment (DTE) and data communications equipment (DCE) modes that are typical of data communications interfaces. The PA-4E1G interfaces operate with either a line-recovered or an internal clock signal. The default is for a line clock signal that the interface recovers from the received data stream. The interface can also operate with an internal clock signal. The PA-4E1G generates the internal clock signal; the interface does not use the motherboard or system clock.

Figure 1-1 PA-4E1G—75-Ohm, Unbalanced (Front Panel View)

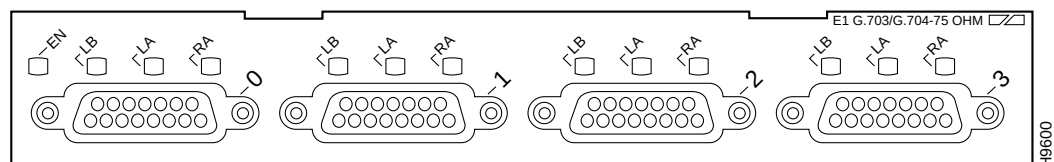
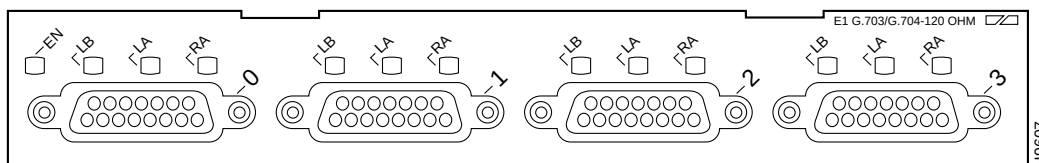


Figure 1-2 PA-4E1G—120-Ohm, Balanced (Front Panel View)

Features

The PA-4E1G provides the following features and capabilities:

- Provides framed and unframed service access, E1 (2.048 Mbps) line speeds over unbalanced 75-ohm or balanced 120-ohm cable, with 15-pin, D-shell (DB-15) receptacles on the port adapter
- Operates over E1 leased-line services, and provides ITU-T G.703 with high-density bipolar of order 3 (HDB3) line encoding
- Operates with either an external or internal clock signal, and runs at wire speed
- Provides for local and remote loopback testing services
- Allows you to fractionalize a data stream into a single channel from 64 kilobits per second (kbps) to 1984 kbps
- Provides G.704 framing for $n \times 64$ -kbps service support (where $n = 1$ to 31)
- Support for 4-bit cyclic redundancy check (CRC4) to provide and ensure data integrity
- Support for point-to-point connections to supported platforms
- Eliminates the need for a separate, external data termination unit that is typically used to convert standard serial interfaces, such as V.35, to E1-G.703/G.704



Note

PA-4E1Gs are available as spare parts PA-4E1G-120(=) and PA-4E1G-75(=).

Interface Specifications

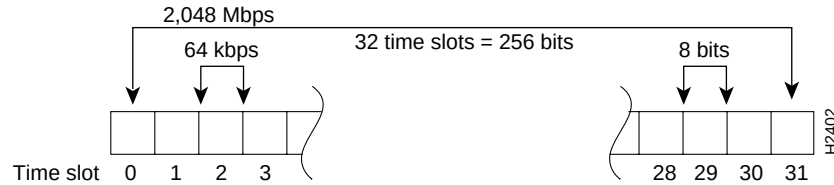
Each PA-4E1G interface is available in either balanced (120-ohm) or unbalanced (75-ohm) mode; a unique port adapter supports each type. Neither the balanced and unbalanced modes nor the balanced and unbalanced cables are interchangeable; you cannot configure a balanced port to support an unbalanced line, nor can you attach an interface cable intended for a balanced line to an unbalanced port.

Balanced interfaces typically use three conductors and three signal states: high, low, and ground. The high and low signals mirror each other. Unbalanced interfaces use only two signals: signal and ground. You can discover the mode of each interface by examining the agency approval label on each port adapter, or by using the **show controller cbus** command.

Following is an example of discovering whether the PA-4E1G is in balanced or unbalanced mode:

```
Router# show controllers cbus
Serial1/1/0, applique is G.703 Unbalanced
[remainder of displayed text omitted from example]
Serial1/1/1, applique is G.703 Unbalanced
[remainder of displayed text omitted from example]
```

The PA-4E1G interface is divided into 32 time slots or *frames*. (See [Figure 1-3](#).)

Figure 1-3 Time Slot Diagram

Each of the 32 time slots is an 8-bit frame that transmits data at 64 kbps. Each of these time slots can be configured to carry data or to remain empty. (The PA-4E1G inserts an idle pattern into empty time slots.)

Time slot 0, or the first 8 bits, is reserved as overhead. The remaining 248 bits (31 frames with 8 bits each) are designated time slots 1 through 31. Time slot 16 is also designated as a framing slot when using framed mode. When you use framed mode (G.704), you can configure time slot 16 to carry data and operate as any of the other slots; therefore, in framed mode time slot 0 must be designated as a framing signal; time slot 16 can be configured for either data or framing.

With framed mode (G.704) you can specify a bandwidth for the interface by designating 31 of the time slots for data and reserving time slot 0 for framing (timing). When you use framed mode, you must designate start and stop time slots; the slots within the start and stop boundaries are used for data, and the remaining slots are left idle. For example, on an interface with framing set on time slots 1 through 8, the interface carries data within the specified 8 frames, and frames 9 through 31 remain idle. Because each time slot transmits at 64 kbps, the interface operates at 512 kbps (8 frames x 64 kbps = 512 kbps).

By configuring 16 of the time slots to carry data and the other 16 to remain empty, you can essentially configure the interface for 1.024 Mbps (by leaving half the time slots empty and unable to carry data). The system inserts an idle pattern into unused time slots to identify them as overhead (unused for data). Only one contiguous time slot range can be used. In Private Automatic Branch Exchange (PABX) systems, time slot 16 is always left unused. By default, time slot 16 is *not* enabled for data in the PA-4E1G interface. The command **ts16** overrides the default and enables time slot 16 to carry data.

Unframed mode (G.703) uses all 32 time slots for data. None of the 32 time slots are used for framing signals. This allows each of the 32 time slots to transmit at 64 kbps; therefore, 32 time slots x 64 kbps = 2.048 Mbps. While unframed mode is the default, you can also specify unframed mode with the command **timeslot 0-0**, which specifies time slot 0 as the start slot with no stop (ending) time slot; therefore, all slots are used for data. The **no timeslot** command restores the default of unframed mode.

Framed mode supports a 4-bit cyclic redundancy check (CRC4), which you enable with a software command. The default is for no CRC.

**Note**

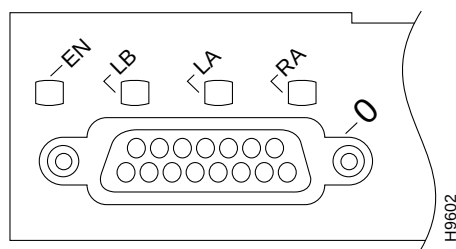
The E1-G.703/G.704 interface on PA-4E1G is compliant with BABT 221.

For more information about CRC4 with a PA-4E1G on a VIP, Cisco 7100 series router, Cisco 7200 series router, or Cisco uBR7200 series router, refer to [Chapter 4, “Configuring the PA-4E1G.”](#)

LEDs

The PA-4E1G has one row of three status LEDs for each port and one ENABLED LED. (See [Figure 1-4](#).) The green- and amber-colored LED for each port indicates port status.

Figure 1-4 PA-4E1G LEDs—Partial Front-Panel View



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

The following conditions must be met before the PA-4E1G is enabled:

- The PA-4E1G is correctly connected and receiving power.
- A valid system software image for the port adapter has been downloaded successfully.
- The system recognizes the PA-4E1G or a VIP with a PA-4E1G.

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

Table 1-1 lists port LED colors and indications.

Table 1-1 PA-4E1G LEDs

LED Label	Color	State	Meaning
Enabled (EN)	Green	On	Port adapter is enabled for operation.
Loopback (LB)	Amber	On	Line or local loopback is active.
Local alarm (LA)	Amber	On	A loss of signal (LOS), a loss of frame (LOF), an alarm indication signal (AIS), or any combination of these is detected.
Remote alarm (RA)	Amber	On	A remote source indicates an error on its incoming signal.

Cables, Connectors, and Pinouts

This section describes the port adapter cables for data communications and the PA-4E1G interfaces. Each PA-4E1G provides up to four 15-pin, D-shell (DB-15) receptacles, which support only E1-G.703/G.704 interfaces.

The PA-4E1Gs use a DB-15 receptacle for both the balanced and unbalanced ports. The label on the port adapter indicates if the ports on that port adapter are 75-ohm or 120-ohm. (See [Figure 1-1](#) and [Figure 1-2](#).)

The port adapter end of all E1-G.703/G.704 adapter cables is a DB-15 connector. At the network end, the adapter cable for unbalanced (75-ohm) connections uses a BNC connector. The adapter cables for balanced (120-ohm) connections use DB-15, twinaxial, or RJ-45 connections to accommodate connection standards in different countries.

**Note**

You must connect the correct type of interface cable for the port to operate.

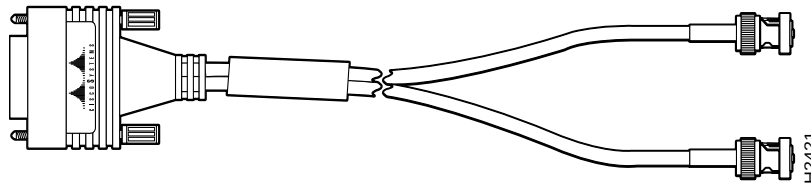
**Warning**

It is a requirement of the statutory approval of the E1-G.703/G.704 interface that the jackscrews of the connector backshell are securely screwed down while the port adapter is operating.

Cables for balanced and unbalanced mode are available with the following types of network-end connectors:

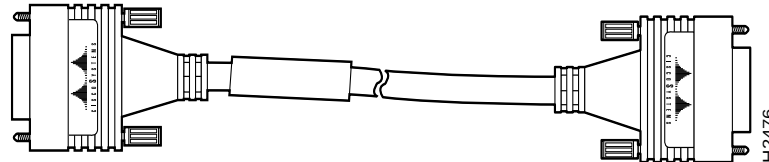
- Unbalanced (75-ohm) coaxial cables with BNC connectors at the network end, which are used primarily for connection in the United Kingdom. (See [Figure 1-5](#).)

Figure 1-5 *E1-G.703/G.704 Interface Cable for Unbalanced Connections—with BNC Connectors and Coaxial Cables*



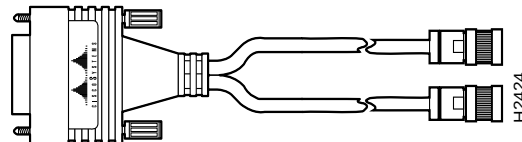
- Balanced (120-ohm) cable with a DB-15 connector at the network end. (See [Figure 1-6](#).)

Figure 1-6 *E1-G.703/G.704 Interface Cable for Balanced Connections—with DB-15 Connectors on Both Ends*



- Balanced (120-ohm) twinaxial split cable (with separate transmit and receive cables), each with a twinaxial connector. (See [Figure 1-7](#).)

Figure 1-7 *E1-G.703/G.704 Interface Cable for Balanced Connections—with Twinaxial Connectors and Cables*



Cable Product Numbers

Table 1-2 lists the product numbers and descriptions of the E1-G.703/G.704 cables.

Table 1-2 Product Numbers and Descriptions of E1-G.703/G.704 Port Adapter Cables

Cable Product Numbers	Description
CAB-E1-TWINAX(=) ¹	E1 cable, twinaxial, 120-ohm, balanced, 5 m
CAB-E1-DB15(=)	E1 cable, DB-15, 120-ohm, balanced, 5 m
CAB-E1-BNC(=)	E1 cable, BNC, 75-ohm, unbalanced, 5 m

1. The appended equal sign (=) indicates a spare part.

Cable Distance Limitations

Unbalanced G.703 interfaces allow for a longer maximum cable length than those specified for balanced circuits. Table 1-3 lists the maximum cable lengths for each E1-G.703/G.704 cable type by the connector used at the network (non-port adapter) end.

Table 1-3 E1-G.703/G.704 Maximum Cable Lengths

Connection Type	BNC	Twinaxial
Balanced	—	300 m
Unbalanced	600 m	—

E1-G.703/G.704 Port Adapter Cable Pinouts

Table 1-4 shows the signal pinouts for each type of E1-G.703/G.704 interface cable. All cables use a DB-15 connector at the port adapter end.

Table 1-4 E1-G.703/G.704 Port Adapter Cable Connector Pinouts

Port Adapter End		Network End					
DB-15 ¹		DB-15 ²	DB-15 (Null Modem)	Twinaxial ²	RJ-45 ²		BNC ³
Pin	Signal ⁴	Pin	Pin	Signal	Pin	Signal	Signal
9	Tx tip	1	3	Rx tip	4	Rx tip	Tip
2	Tx ring	9	11	Rx ring	5	Rx ring	Shield
10	Tx shield	2	4	Rx shield	6	Rx shield	–
8	Rx tip	3	1	Tx tip	1	Tx tip	Tip
15	Rx ring	11	9	Tx ring	2	Tx ring	Shield
7	Rx shield	4	2	Tx shield	3	Tx shield	–

- Any pins not described in this table are not connected.
- 120-ohm, balanced cable
- 75-ohm, unbalanced cable
- Tx = transmit, Rx = receive

Port Adapter Slot Locations on the Supported Platforms

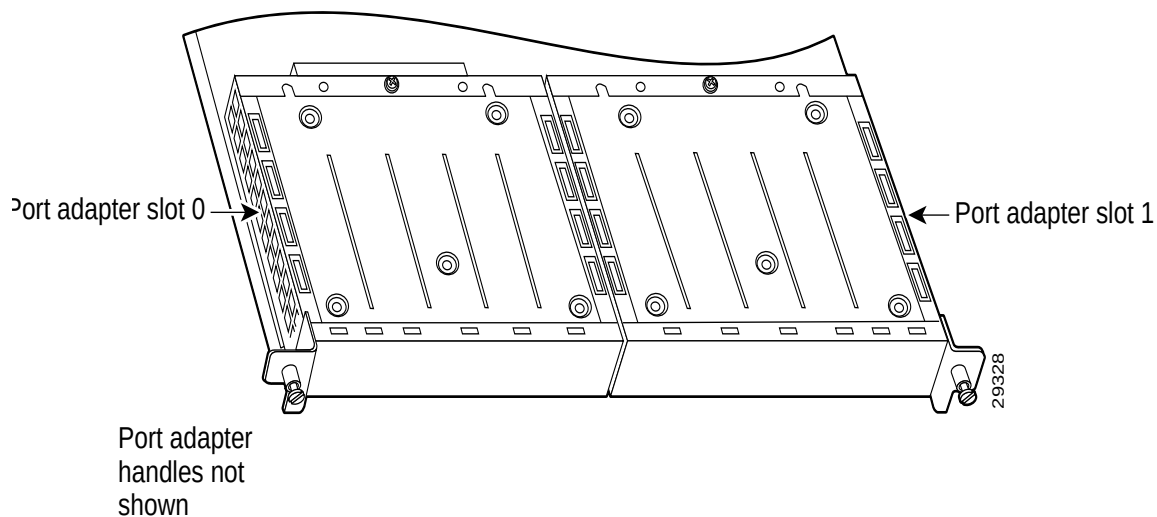
This section discusses port adapter slot locations on the supported platforms. The illustrations that follow summarize slot location conventions on each platform:

- [Cisco 7000 Series Routers VIP Slot Numbering, page 1-8](#)
- [Cisco 7100 Series Routers Slot Numbering, page 1-10](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering, page 1-11](#)
- [Cisco uBR7200 Series Router Slot Numbering, page 1-14](#)
- [Cisco 7201 Router Slot Numbering, page 1-16](#)
- [Cisco 7301 Router Slot Numbering, page 1-16](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering, page 1-17](#)
- [Cisco 7401ASR Router Slot Numbering, page 1-18](#)
- [Cisco 7500 Series Routers VIP Slot Numbering, page 1-18](#)

Cisco 7000 Series Routers VIP Slot Numbering

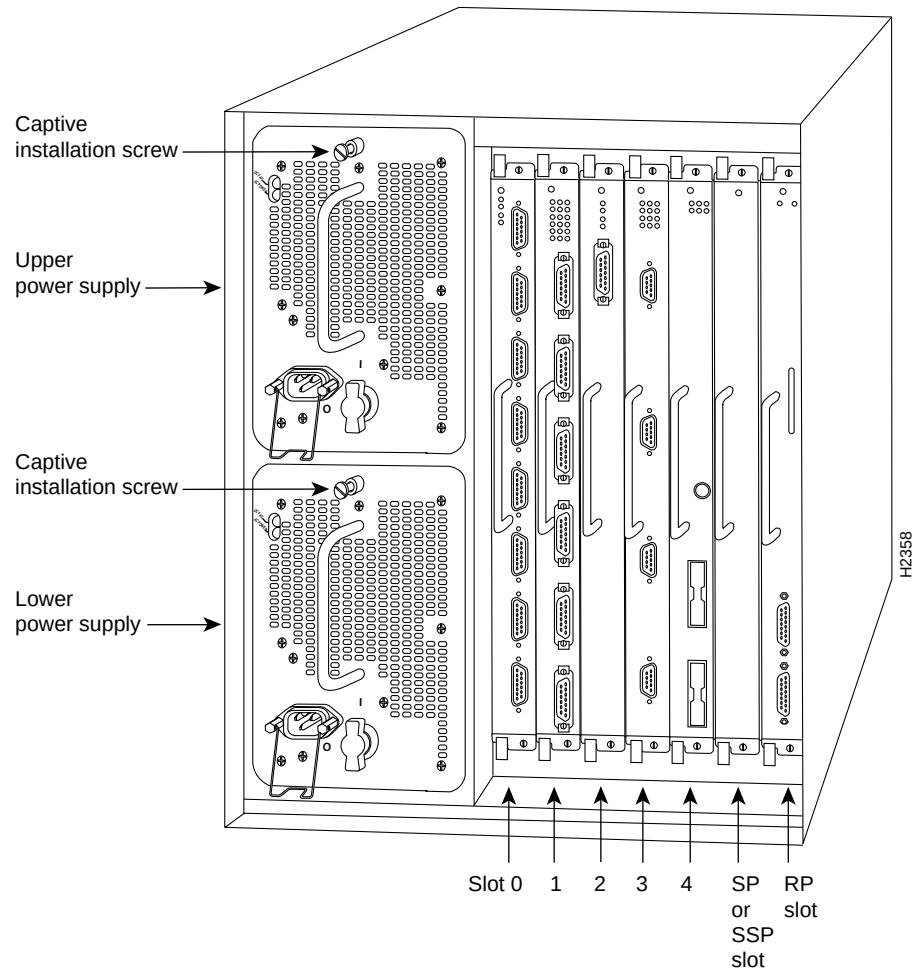
Port adapters are supported on the VIPs (versatile interface processors) used in Cisco 7000 series routers. In the Cisco 7000 router, the VIP motherboard is installed vertically in the VIP slot. In the Cisco 7010 router, the VIP motherboard is installed horizontally in the VIP slot. A port adapter can 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 1-8](#) shows the slot numbering of a VIP.

Figure 1-8 VIP Slot Locations



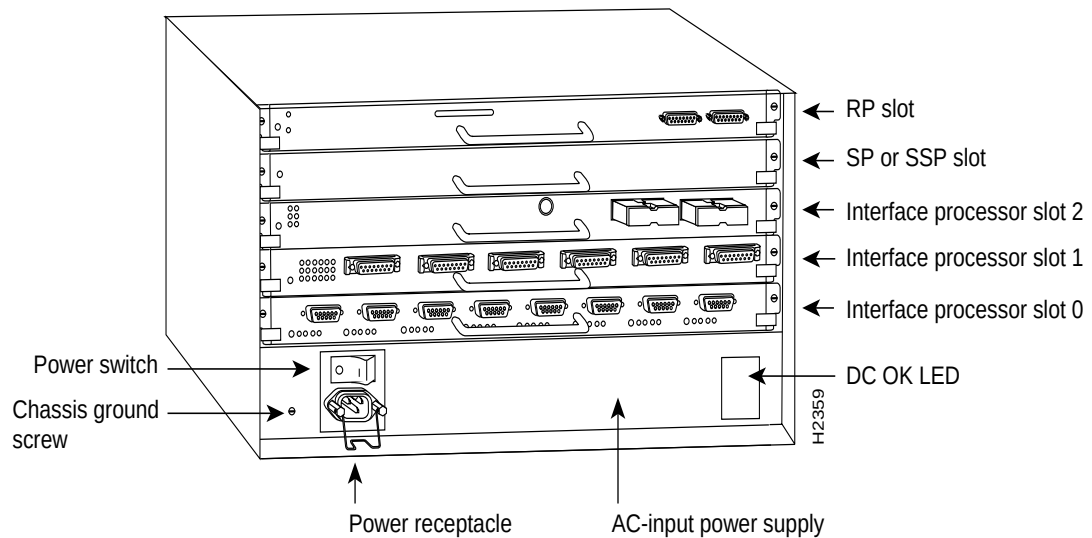
Cisco 7000 routers have five slots for port adapters, and two slots for Route Switch Processors (RSPs). The slots are numbered from left to right. You can place a port adapter in any of the VIP interface slots (slot 0 through 4). [Figure 1-9](#) shows the slot numbering on a Cisco 7000 router.

Figure 1-9 VIP Slots in the Cisco 7000 Router



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. [Figure 1-10](#) shows the slot numbering on a Cisco 7010 router.

Figure 1-10 VIP Slots in the Cisco 7010 Router



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 1-11](#) shows the slot numbering on a Cisco 7120 series router. [Figure 1-12](#) shows the slot numbering on a Cisco 7140 series router.

Figure 1-11 Port Adapter Slots in the Cisco 7120 Series Router

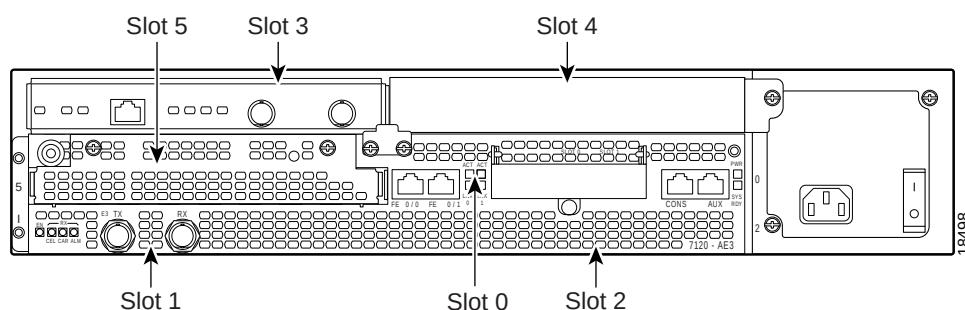
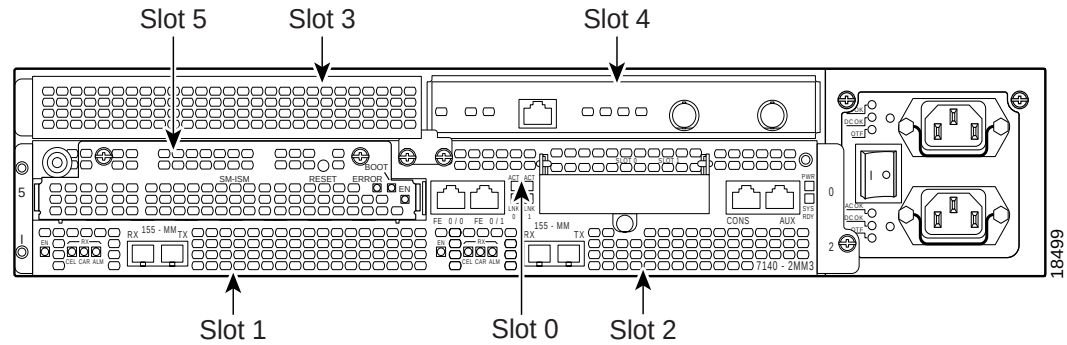
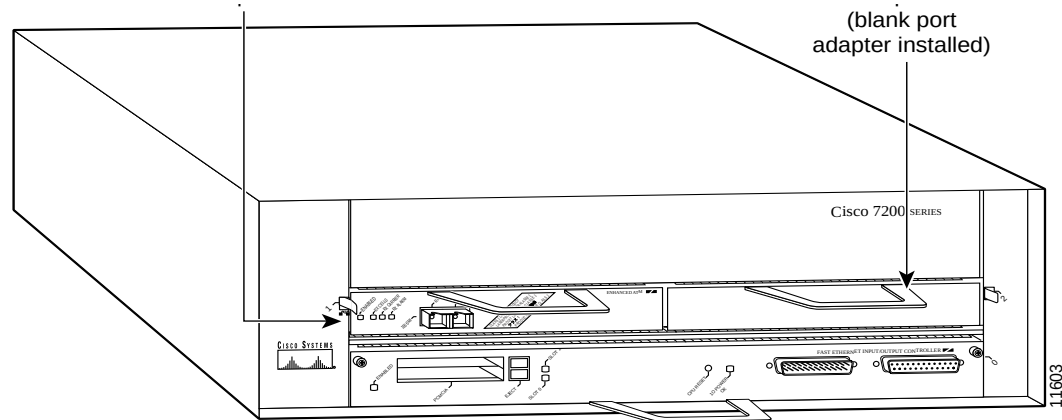


Figure 1-12 Port Adapter Slots in the Cisco 7140 Series Router

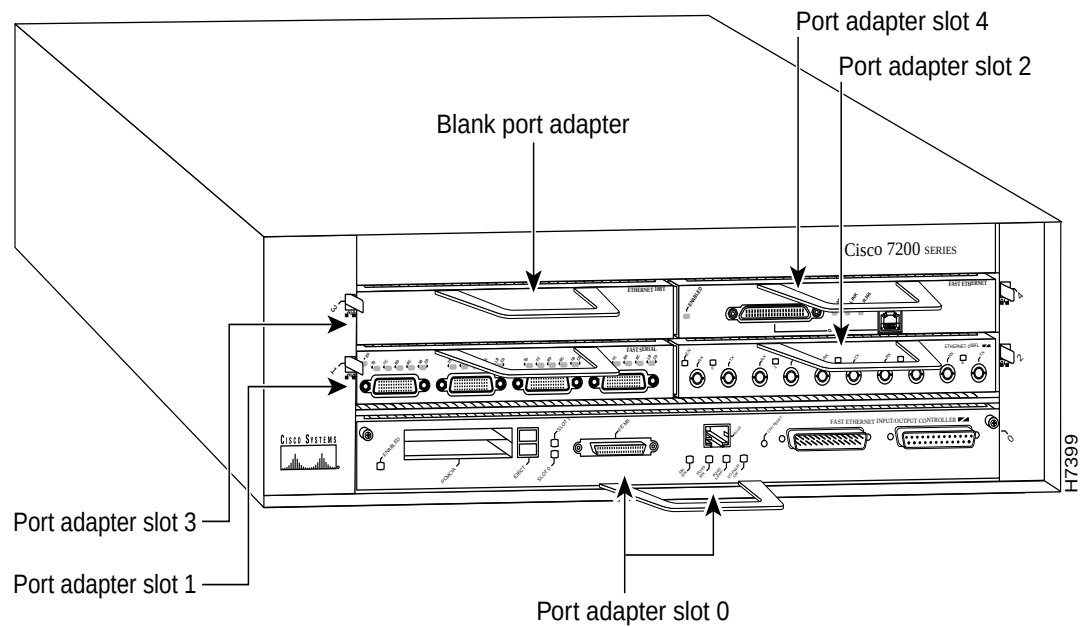
Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering

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). [Figure 1-13](#) shows the slot numbering on a Cisco 7202 router.

Figure 1-13 Port Adapter Slots in the Cisco 7202 Router

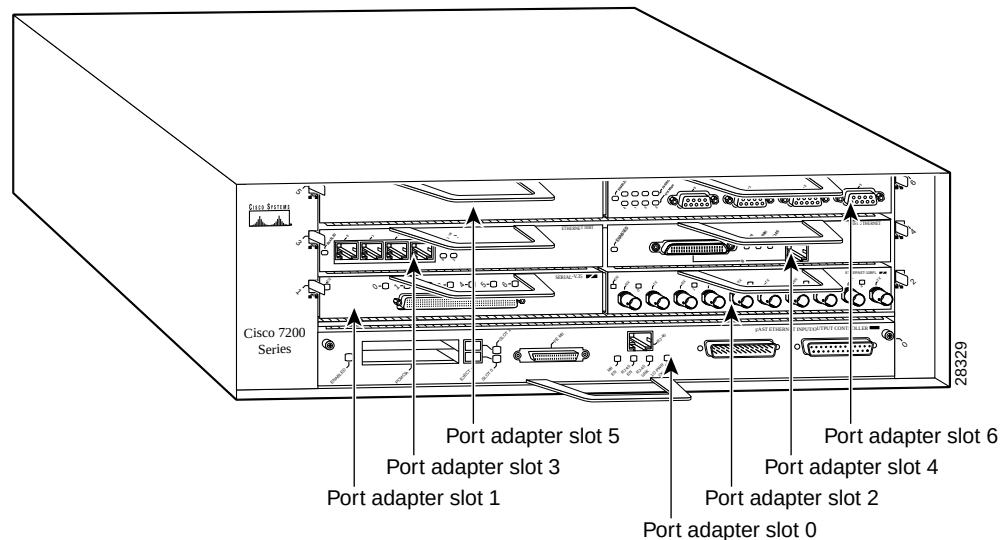
Cisco 7204 routers and Cisco 7204VXR routers have four slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 4. You can place a port adapter in any of the slots (slot 1 through slot 4). Slot 0 is always reserved for the I/O controller. [Figure 1-14](#) shows the slot numbering on a Cisco 7204 router. The Cisco 7204VXR router is not shown.

Figure 1-14 Port Adapter Slots in the Cisco 7204 Router



Cisco 7206 routers and Cisco 7206VXR routers 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 1-15 shows the slot numbering on a Cisco 7206 router. The Cisco 7206VXR router is not shown.

Figure 1-15 Port Adapter Slots in the Cisco 7206 Router

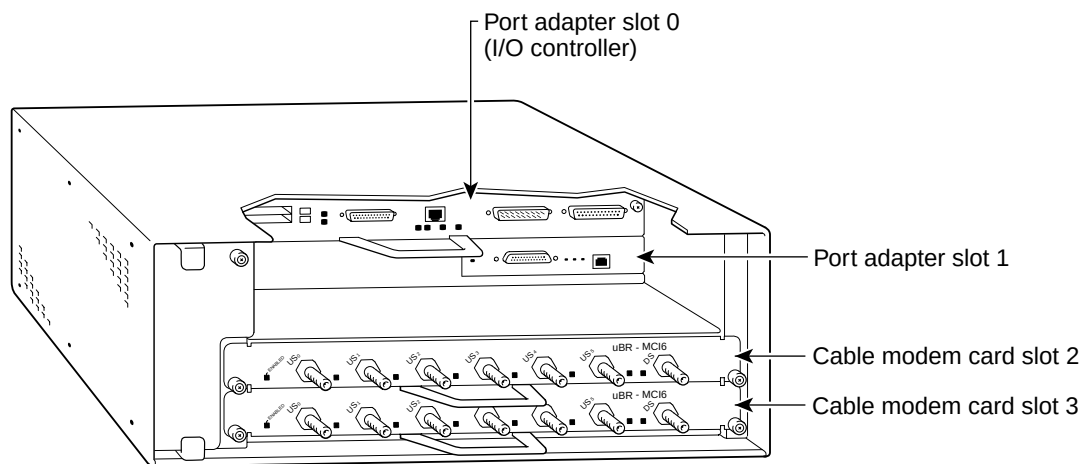


Cisco uBR7200 Series Router Slot Numbering

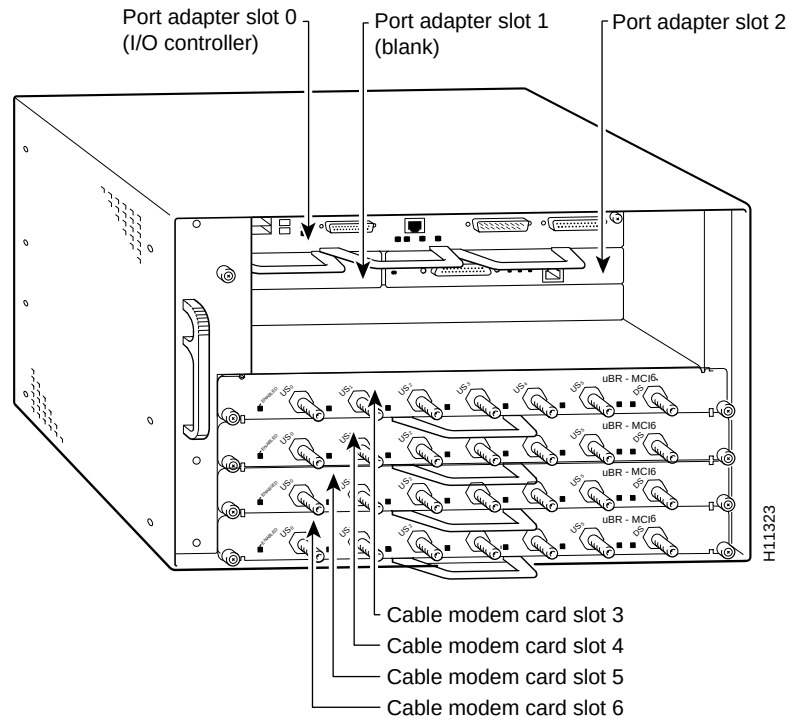
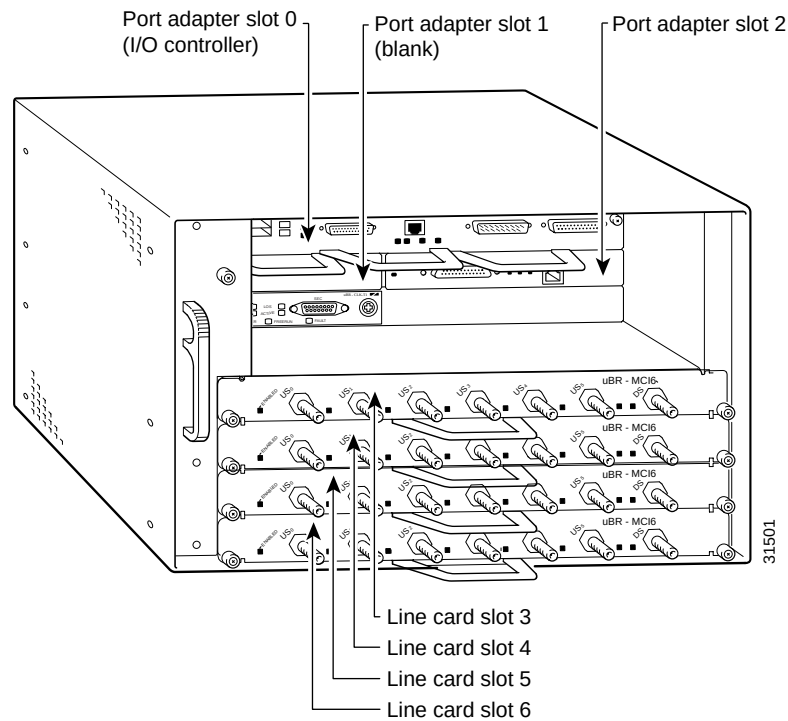
The Cisco uBR7223 router has one port adapter slot (slot 1). Slot 0 is always reserved for the I/O controller—if present. [Figure 1-16](#) shows the slot numbering of port adapters on a Cisco uBR7223 router.

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 1-17](#) shows the slot numbering of port adapters on a Cisco uBR7246 router. [Figure 1-18](#) shows the slot numbering of port adapters on a Cisco uBR7246VXR router.

Figure 1-16 Port Adapter Slots in the Cisco uBR7233 Router



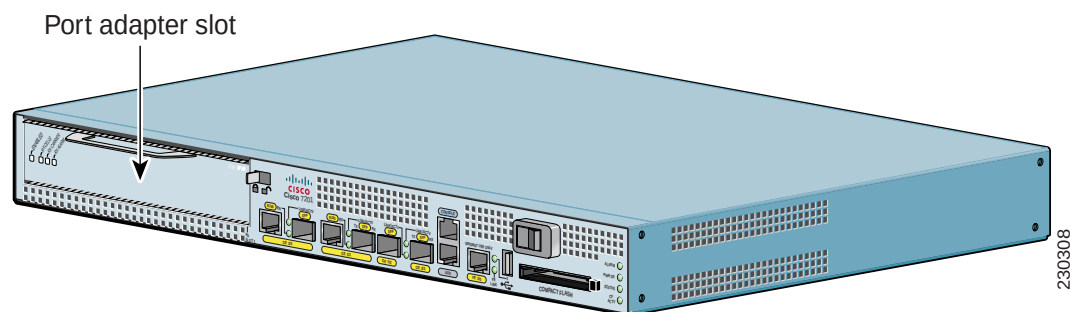
15745

Figure 1-17 Port Adapter Slots in the Cisco uBR7246 Router**Figure 1-18** Port Adapter Slots in the Cisco uBR7246VXR Router

Cisco 7201 Router Slot Numbering

Figure 1-19 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.

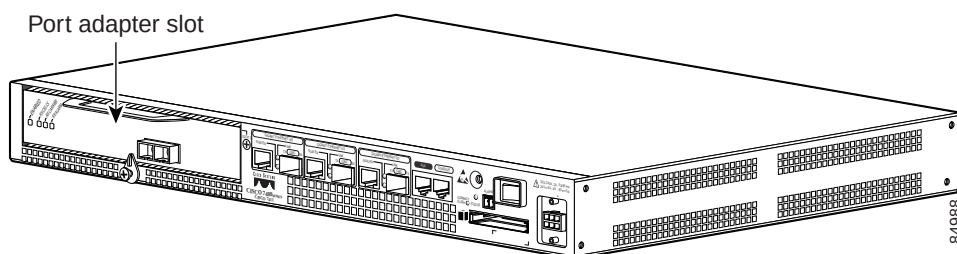
Figure 1-19 Port Adapter Slot in the Cisco 7201 Router



Cisco 7301 Router Slot Numbering

Figure 1-20 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 1-20 Cisco 7301 Router with a Port Adapter Installed



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 1-21](#) 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 1-22](#) 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 1-21 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Installed

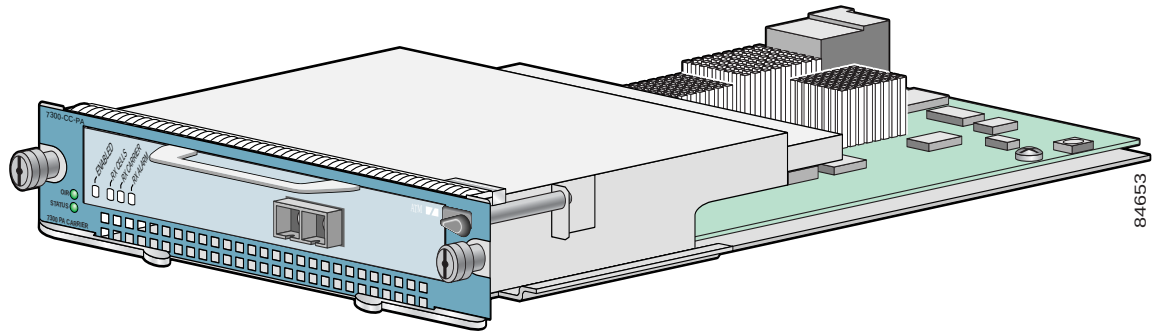
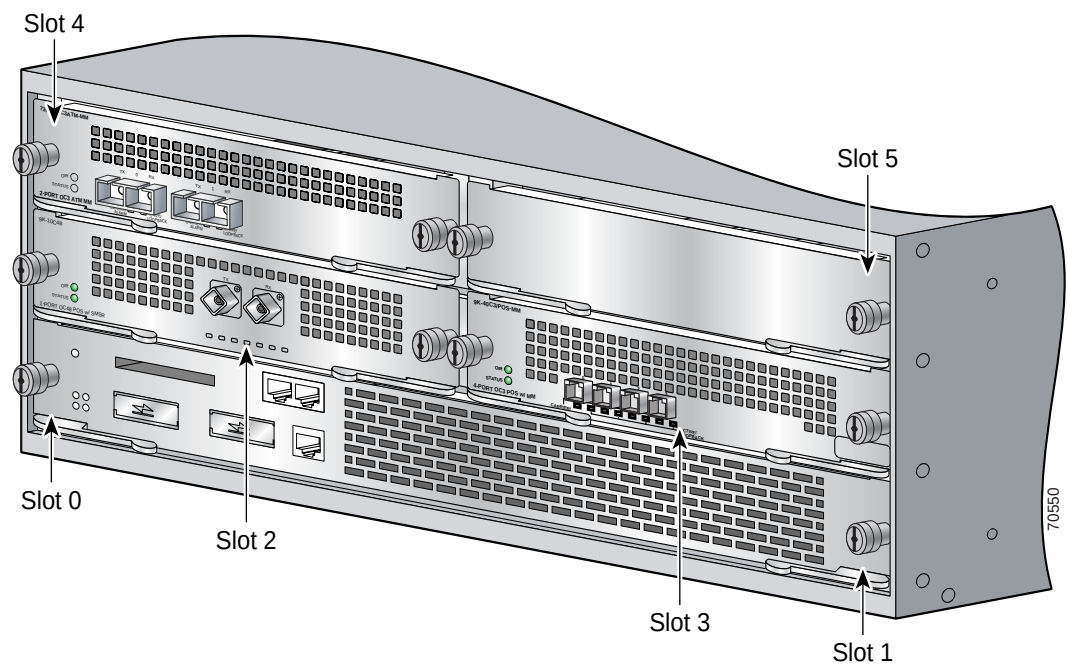


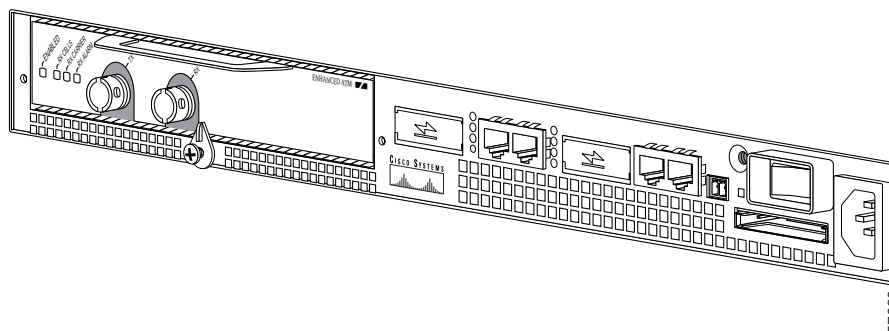
Figure 1-22 Module Slots on the Cisco 7304 Router



Cisco 7401ASR Router Slot Numbering

Figure 1-23 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.

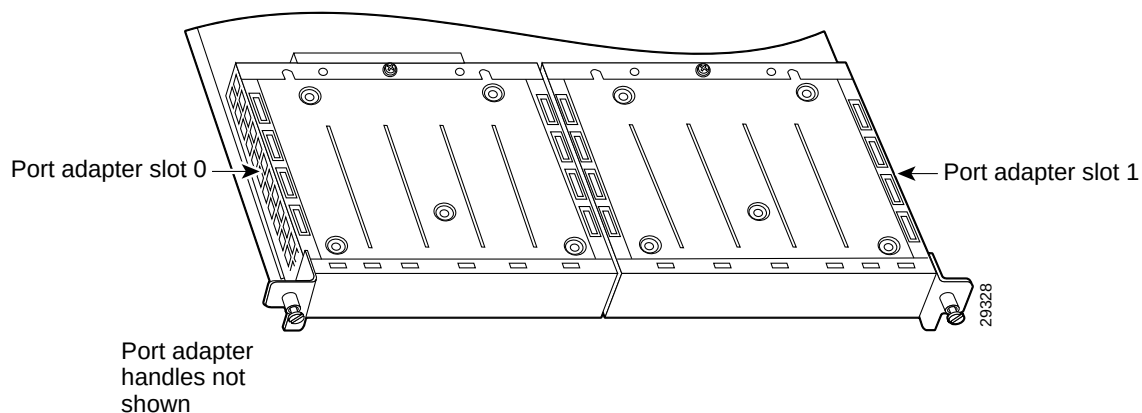
Figure 1-23 Port Adapter Slot in the Cisco 7401ASR Router



Cisco 7500 Series Routers VIP Slot Numbering

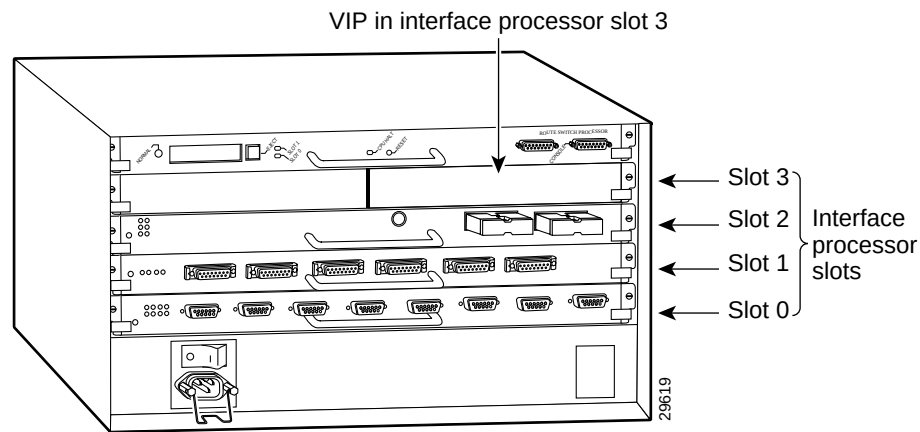
Port adapters are supported on the VIPs (versatile interface processors) used in Cisco 7500 series routers. In the Cisco 7505 router, the VIP motherboard is installed horizontally in the VIP slot. In the Cisco 7507 router and Cisco 7513 router, the VIP motherboard is installed vertically in the VIP slot. 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 1-24 shows the slot numbering on a VIP.

Figure 1-24 VIP Slot Locations



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 1-25](#) shows the slot numbering on a Cisco 7505 router.

Figure 1-25 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-4E1G in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on a PA-4E1G 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-4E1G installed in a VIP maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP to a different slot, the interface processor slot number changes to reflect the new interface processor slot.

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

- [Cisco 7000 Series Routers VIP Interface Addresses, page 1-21](#)
- [Cisco 7100 Series Routers Interface Addresses, page 1-22](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses, page 1-22](#)
- [Cisco uBR7200 Series Routers Interface Addresses, page 1-22](#)
- [Cisco 7201 Router Interface Addresses, page 1-22](#)
- [Cisco 7301 Router Interface Addresses, page 1-23](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses, page 1-23](#)
- [Cisco 7401ASR Router Interface Addresses, page 1-23](#)
- [Cisco 7500 Series Routers VIP Interface Addresses, page 1-23](#)

Table 1-5 summarizes the interface address formats for the supported platforms.

Table 1-5 **Identifying Interface Addresses**

Platform	Interface Address Format	Numbers	Syntax
VIP in Cisco 7000 series routers	Interface-processor-slot-number/port-adapter-slot-number/interface-port-number	Interface processor slot—0 through 4 (depends on the number of slots in the router) Port adapter slot— 0 or 1 Interface port—0 through 3	3 / 1 / 0
Cisco 7120 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 3 Interface port—0 through 3	3 / 1
Cisco 7140 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 through 3	4 / 0
Cisco 7200 series routers and Cisco 7200 VXR routers (Cisco 7202, Cisco 7204, Cisco 7204VXR, Cisco 7206, Cisco 7206VXR)	Port-adapter-slot-number/interface-port-number	Port adapter slot—1 through 6 (depends on the number of slots in the router) ¹ Interface port—0 through 3	1 / 0
Cisco 7201 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 through 3	1 / 0
Cisco uBR7223 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 ¹ Interface port—0 through 3	1 / 0
Cisco uBR7246 and Cisco uBR7246 VXR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—1 or 2 ¹ Interface port—0 through 3	1 / 0
Cisco 7301 routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 through 3	1 / 0

Table 1-5 **Identifying Interface Addresses (continued)**

Platform	Interface Address Format	Numbers	Syntax
Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 routers	Module-slot-number/interface-port-number	Module slot—2 through 5 Interface port—0 through 3	3 / 0
Cisco 7401ASR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 through 3	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 through 3	3 / 1 / 0

1. Port adapter slot 0 is reserved for the Fast Ethernet port on the I/O controller (if present).

Cisco 7000 Series Routers VIP Interface Addresses

In Cisco 7000 series routers, port adapters are installed on a versatile interface processor (VIP), which installs in interface processor slots 0 through 4 (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 1-8](#), [Figure 1-9](#), and [Figure 1-10](#).

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 1-5](#).

The first number identifies the slot in which the VIP is installed (slot 0 through 4, depending on the number of slots in the router).

The second number identifies which bay on the VIP 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-4E1G is a four-port port adapter, therefore the port can be 0 through 3.

For example, if the four-port PA-4E1G is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0, 3/1/1, 3/1/2, and 3/1/3 (interface processor slot 3, port adapter slot 1, and interfaces 0, 1, 2, and 3).



Note

Although the processor slots in the 7-slot Cisco 7000 are vertically oriented and those in the 5-slot Cisco 7010 are horizontally oriented, all Cisco 7000 series routers use the same method for processor slot and interface port numbering.

Cisco 7100 Series Routers Interface Addresses

In Cisco 7120 series router, port adapters are installed in port adapter slot 3. See [Figure 1-11](#). In the Cisco 7140 series router, port adapters are installed in port adapter slot 4. 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 1-5](#). For example, if a four-port PA-4E1G is installed on a Cisco 7120 router, the interface addresses would be 3/0 through 3/3. If a four-port PA-4E1G is installed on a Cisco 7140 router, the interface addresses would be 4/0 through 4/3.

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 1-13](#), [Figure 1-14](#), and [Figure 1-15](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G is installed in slot 1 of a Cisco 7200 series router, the interface addresses would be 1/0 through 1/3.

Cisco uBR7200 Series Routers Interface Addresses

In the Cisco uBR7223 router, only one slot accepts port adapters and it is numbered slot 1. See [Figure 1-16](#).

In the Cisco uBR7246 router and Cisco uBR7246VXR router, port adapters can be installed in two port adapter slots (slot 1 and slot 2). Slot 0 is always reserved for the I/O controller—if present. See [Figure 1-17](#) and [Figure 1-18](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G is installed in slot 1 of a Cisco uBR7223 series router, the interface addresses would be 1/0 through 1/3. If a four-port PA-4E1G is installed in slot 2 of a Cisco uBR7246 or Cisco uBR7246VXR router, the interface addresses would be 2/0 through 2/3.

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 1-19](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G is installed in a Cisco 7201 router, the interface addresses would be 1/0 through 1/3.

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 1-20](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G is installed in a Cisco 7301 router, the interface addresses would be 1/0 through 1/3.

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 1-21](#) and [Figure 1-22](#).

The interface address is composed of a two-part number in the format *module-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G 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 through 3/3.

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 1-23](#).

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See [Table 1-5](#). For example, if a four-port PA-4E1G is installed in a Cisco 7401ASR router, the interface addresses would be 1/0 through 1/3.

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 1-24](#), and [Figure 1-25](#).

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 1-5](#).

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-4E1G is a four-port port adapter, therefore the port can be 0 through 3.

For example, if a four-port PA-4E1G is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0 through 3/1/3 (interface processor slot 3, port adapter slot 1, and interfaces 0, 1, 2 and 3).

**Note**

Although the processor slots in the 7-slot Cisco 7507 and the 13-slot Cisco 7513 and Cisco 7576 are vertically oriented and those in the 5-slot Cisco 7505 are horizontally oriented, all Cisco 7500 series routers use the same method for slot and interface port numbering.



CHAPTER 2

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-4E1G. This chapter contains the following sections:

- [Required Tools and Equipment, page 2-1](#)
- [Minimum Software and Hardware Requirements, page 2-2](#)
- [Checking Hardware and Software Compatibility, page 2-3](#)
- [Safety Guidelines, page 2-3](#)
- [FCC Class A Compliance, page 2-10](#)
- [Telecommunications Authority of Singapore, page 2-11](#)
- [BABT Compliance, page 2-11](#)
- [Other Safety and Compliance Approvals, page 2-11](#)

Required Tools and Equipment

You need the following parts and tools to install the PA-4E1G. If you need additional equipment, contact a service representative for ordering information.

- PA-4E1G-120 (for balanced operation) or PA-4E1G-75 (for unbalanced operation)
- VIP2, VIP4, or VIP6-80 (for installation in Cisco 7000 series or Cisco 7500 series chassis only). For information about the specific VIP models that support the PA-4E1G, see the “[Minimum Software and Hardware Requirements](#)” section on page 2-2.



Note Cisco 7000 series and Cisco 7500 series routers require the VIP2-15 at minimum.

- Cisco 7304 PCI Port Adapter Carrier Card (for installation in a Cisco 7304 router)
- 75-ohm unbalanced or 120-ohm balanced, 15-pin serial cables with 15-pin, D-shell (DB-15) terminations at the port adapter end
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver
- Number 2 Phillips screwdriver
- Your own electrostatic discharge (ESD)-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares
- Antistatic mat

- Antistatic container

Minimum Software and Hardware Requirements

This section indicates the recommended minimum Cisco IOS software release required to use the PA-4E1G in supported platforms.

Table 2-1 lists the minimum Cisco IOS software release required to use the PA-4E1G port adapter in supported router platforms. For the latest releases supporting the port adapter, refer to the [“Checking Hardware and Software Compatibility”](#) section on page 2-3.

Table 2-1 PA-4E1G Port Adapter Software Requirements

Router Platform	Recommended Minimum Cisco IOS Release
Cisco 7100 series routers • Cisco 7120 series and Cisco 7140 series	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0T
Cisco 7200 series and Cisco 7200 VXR routers • Cisco 7204VXR and Cisco 7206VXR • Cisco 7204 and Cisco 7206 • Cisco 7202	Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0T Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B Cisco IOS Release 11.1(11)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 • Cisco uBR7246, Cisco uBR7223, and uBR7246VXR	Cisco IOS Release 12.1(2)EC or a later release of Cisco IOS Release 12.1EC
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 12.2SB
Cisco 7301 router	Cisco IOS Release 12.2(11)YZ or a later release of Cisco IOS Release 12.2YZ
Cisco 7304 router • 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
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
VIP2 in the Cisco 7000 series and Cisco 7500 series routers^{1, 2} • With VIP2-15(=), VIP2-20(=), or VIP2-40(=) • With VIP2-50(=)	Cisco IOS Release 11.1(11)CA or a later release of Cisco IOS Release 11.1 A Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1CA
VIP4 in the Cisco 7000 series and Cisco 7500 series³ • With VIP4-50(=) or VIP4-80(=)	Cisco IOS Release 12.0(10)S or a later release of Cisco IOS Release 12.0S

Table 2-1 PA-4E1G Port Adapter Software Requirements

Router Platform	Recommended Minimum Cisco IOS Release
VIP6-80 in the Cisco 7500 series routers	
With VIP6-80(=)	Cisco IOS Release 12.0(22)S, 12.1(12)E, 12.2(12)T or a later release of Cisco IOS Release 12.0S, 12.1E, or 12.2T.

1. The minimum recommended VIP2 model for the PA-4E1G in all Cisco 7500 series routers, and in Cisco 7000 series routers using the RSP7000 and RSP7000CI is the VIP2-15, which has 1 MB of SRAM and 8 MB of DRAM.
2. If you plan to use distributed switching or distributed services, you *must* use the VIP2-40 (with 2 MB of SRAM and 32 MB of DRAM), or VIP2-50 (with 4 to 8 MB of SRAM and 32 to 128 MB of SDRAM) at a minimum. We do not recommend the use of any other VIP2 model with the PA-4E1G.
3. For proper operation of the VIP4 in all Cisco 7500 series routers, and in Cisco 7000 series routers using the RSP7000 and RSP7000CI, we recommend that your RSP or RSP7000 have at least 64 MB of DRAM.

**Caution**

To prevent system problems, do *not* operate the VIP2 or VIP4 in Cisco 7000 series systems without the RSP7000 and RSP7000CI. The VIP2 or VIP4 will *not* operate properly with the Route Processor, Switch Processor, or Silicon Switch Processor (SSP) installed in the earlier host Cisco 7000 series routers.

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 SICHERHEITSANWEISUNGEN

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 SICHERHEITSANWEISUNGEN 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 találhatók.

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 GUARDE 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 GUARDE 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 **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.
- 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 comprise printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

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

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

**Caution**

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

FCC Class A Compliance

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

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

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

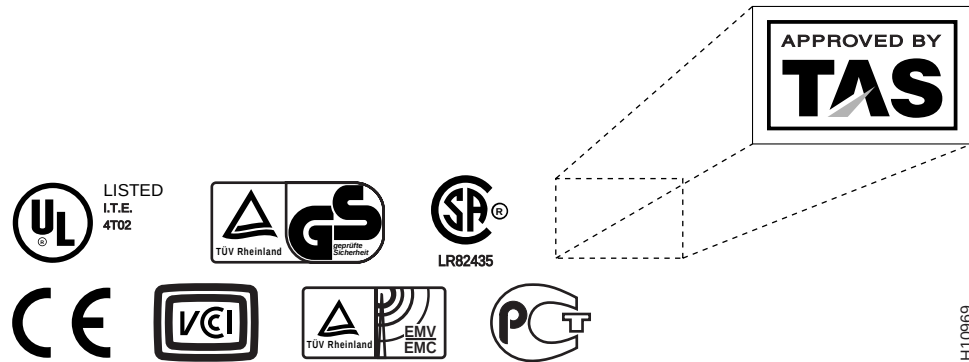
**Note**

The PA-4E1G 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.

Telecommunications Authority of Singapore

- A Telecommunications Authority of Singapore (TAS) label is shipped with each PA-4E1G-120(=) or PA-4E1G-75(=) port adapter and signifies that each port adapter meets Singapore's requirements as specified for connecting to the public network.
- Attach the TAS label to the rear of the host chassis next to the other agency approvals for the chassis. (See [Figure 2-1](#).)

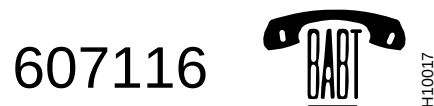
Figure 2-1 Attaching the TAS Label to the Host Chassis



BABT Compliance

The BABT607116 marking on the PA-4E1G signifies that it meets United Kingdom directive 607116 and has been designed to BABT standards. The BABT label is located on the top of the PA-4E1G. [Figure 2-2](#) shows the BABT label for the PA-4E1G.

Figure 2-2 BABT Label for the PA-4E1G Port Adapter



Other Safety and Compliance Approvals

The PA-4E1G port adapter is designed to comply with the following safety and compliance standards:

- Emission requirement: EN55022
- Performance approvals: G.703, G.704
- Safety approvals: UL 1950, CSA 22.2 No. 950, EN60950, AUSTEL TS001, AS/NZ 3260, IEC 950
- The European Union's requirements as specified by approval number CE0168X
- The United Kingdom's requirements as specified by approval number 607113



CHAPTER 3

Removing and Installing Port Adapters

This chapter describes how to remove the PA-4E1G 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 3-2](#)
- [Port Adapter Removal and Installation, page 3-3](#)
- [Installing Interface Cables, page 3-14](#)

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 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 installed 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.



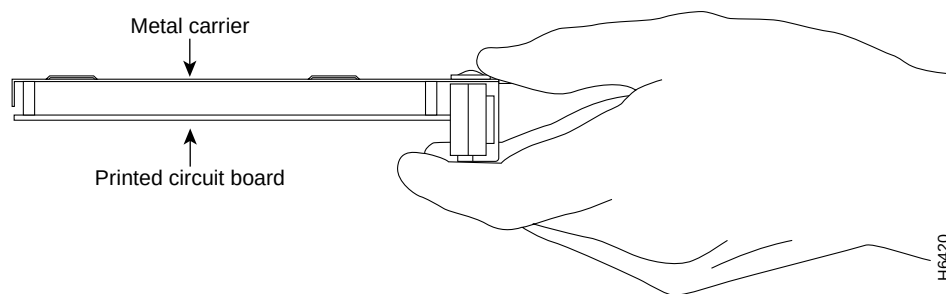
Caution

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-4E1G 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 Cisco 7304 PCI port adapter carrier card and VIP support OIR, individual port adapters do not. To replace port adapters, you must first remove the 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 Cisco 7304 PCI port adapter carrier card or VIP on which you want to install a new port adapter, you must first remove the 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 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 Cisco 7304 PCI port adapter carrier card or VIP from its interface processor slot.



Note

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

Warnings and Cautions

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

- 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.
- 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.
- 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 3-3.

**Note**

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

**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

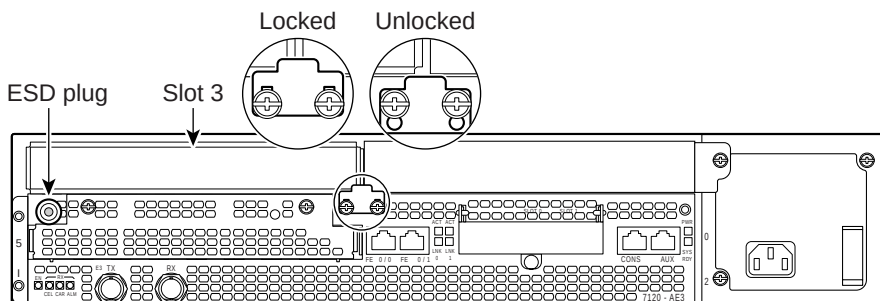
In this section, the illustrations that follow give step-by-step instructions on how to remove and install port adapters. Although the procedures may refer to a particular type of port adapter, the steps are the same for installing and removing all types of port adapters. This section contains the following illustrations:

- [Cisco 7100 Series Routers—Removing and Installing a Port Adapter, page 3-4](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter, page 3-5](#)
- [Cisco uBR7200 Series Routers—Removing a Port Adapter, page 3-6](#)
- [Cisco uBR7200 Series Routers—Installing a Port Adapter, page 3-7](#)
- [Cisco 7201 Router—Removing and Installing a Port Adapter, page 3-8](#)
- [Cisco 7301 Router—Removing and Installing a Port Adapter, page 3-9](#)
- [Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter, page 3-10](#)
- [Cisco 7401ASR Router—Removing and Installing a Port Adapter, page 3-12](#)
- [Cisco 7000 Series Routers and Cisco 7500 Series Routers with VIP—Removing and Installing a Port Adapter, page 3-13](#)

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

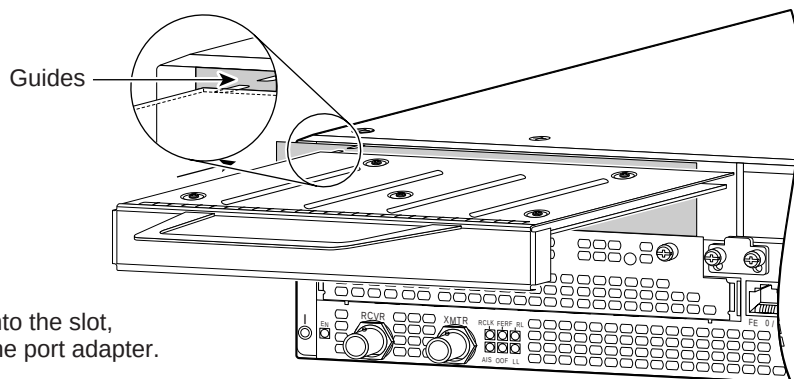
With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

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.

26522

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

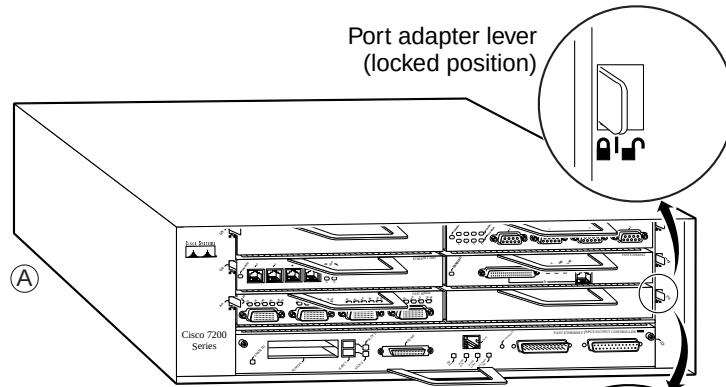
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

Step 6

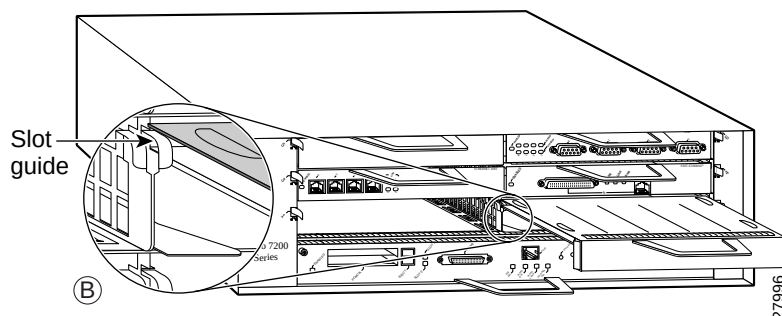
With the port adapter halfway into the slot, connect all required cables to the port adapter. After connecting all required cables, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane.

Step 7

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



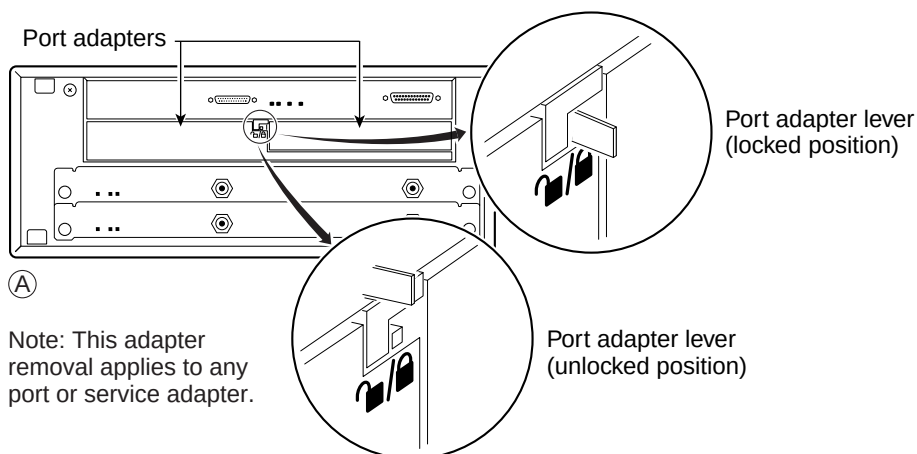
Note: This adapter removal applies to any port or service adapter.



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.



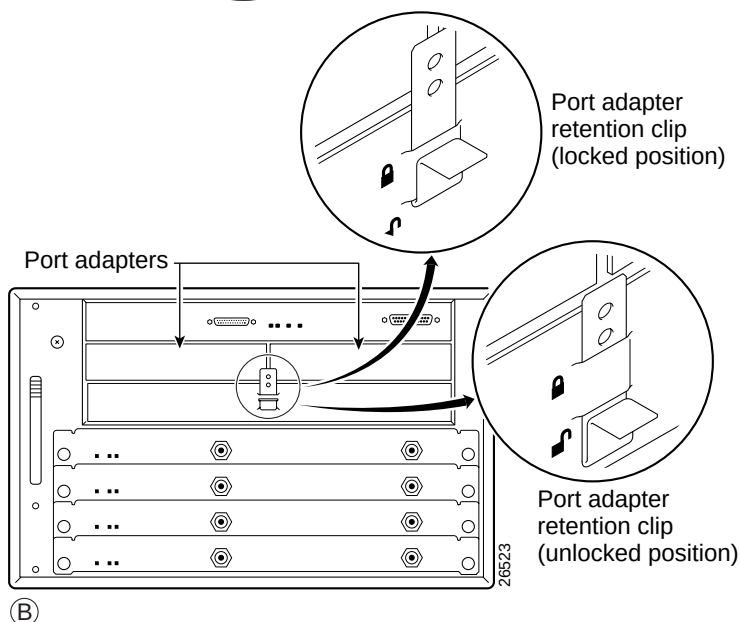
Place the port adapter lever (Cisco uBR7223, see A), or the port adapter retention clip (Cisco uBR7246 and Cisco uBR7246 VXR, see B) in the unlocked position. Either mechanism remains in the unlocked position.

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.



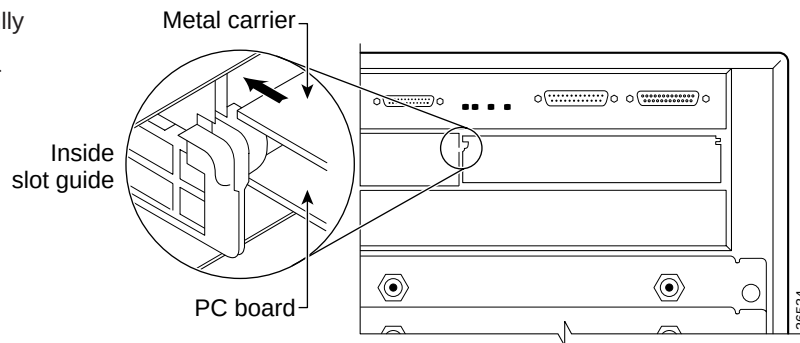
Step 3

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

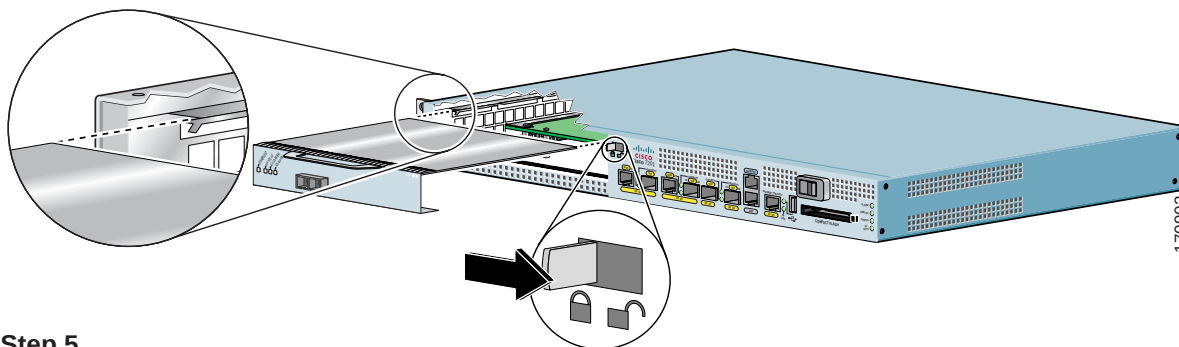
Grasp the handle of the port adapter and pull the port adapter about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

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

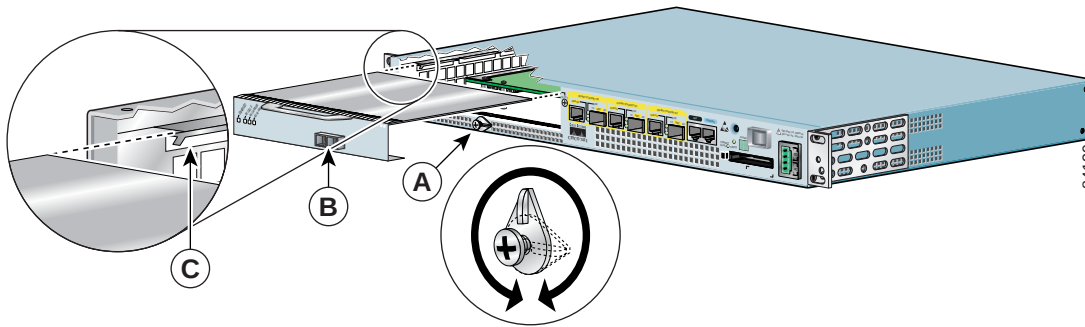
Grasp the handle and pull the port adapter from the router, about halfway out of its slot. (See B.) If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

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

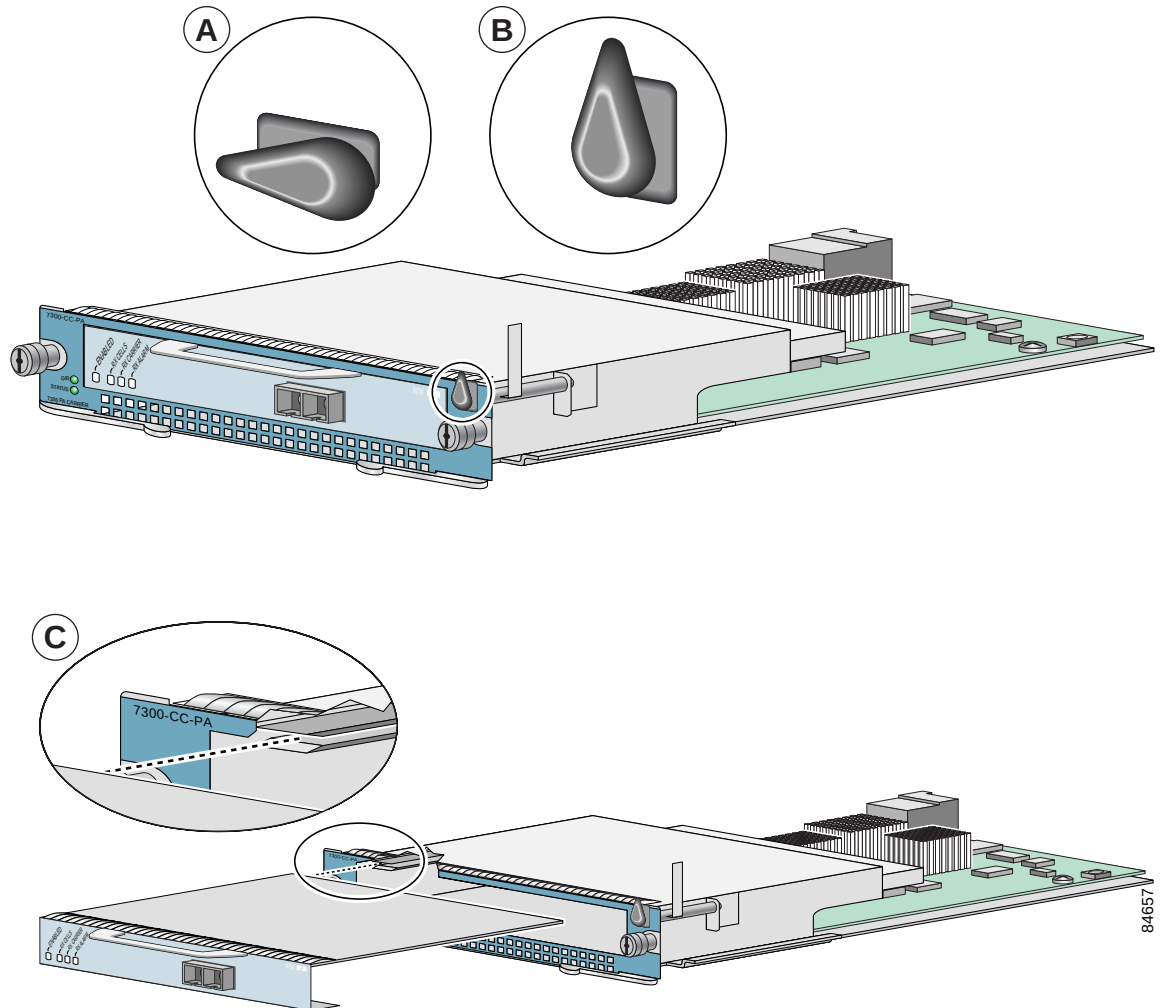
When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the Cisco 7304 PCI Port Adapter Carrier Card. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could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

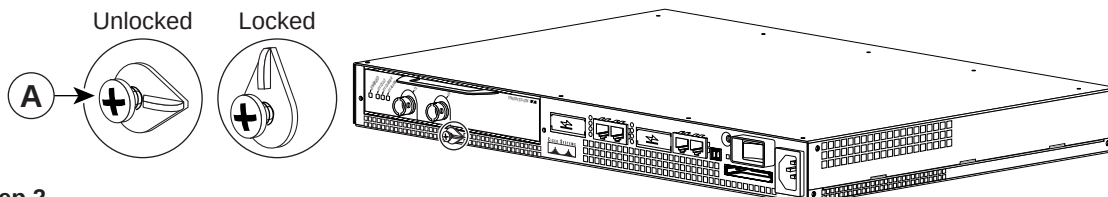
Figure 3-2 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Removal and Installation



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

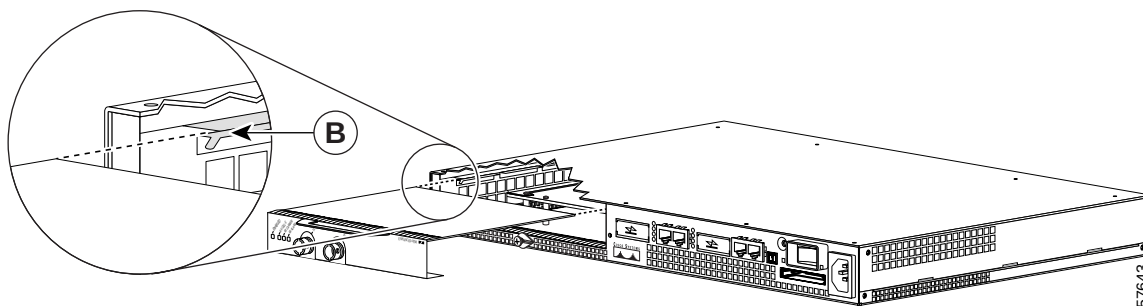
With the port adapter halfway out of the slot, disconnect all cables from the port adapter. After disconnecting the cables, pull the port adapter completely out of the chassis slot.

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

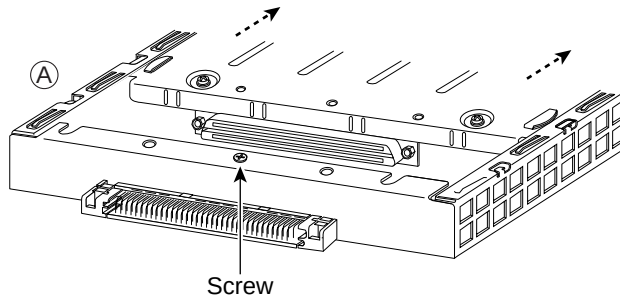
After the port adapter is properly seated, rotate the port adapter latch to the upright locked position and use a number 2 Phillips screwdriver to tighten the latch screw. If needed, loosen the latch screw to rotate the latch over the port adapter. Finish the installation by tightening the latch screw.

Cisco 7000 Series Routers and Cisco 7500 Series Routers with VIP—Removing and Installing a Port Adapter

Note: You must first remove the VIP from the chassis before removing a port adapter from the VIP4.

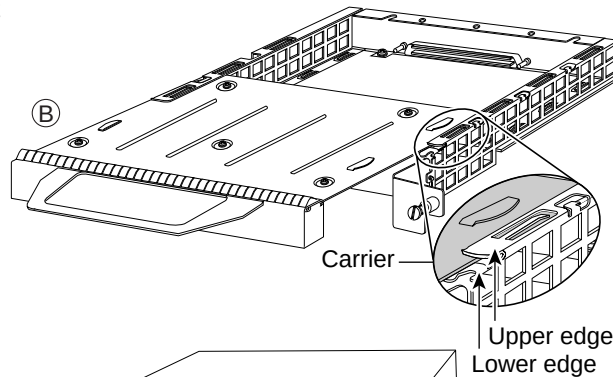
Step 1

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

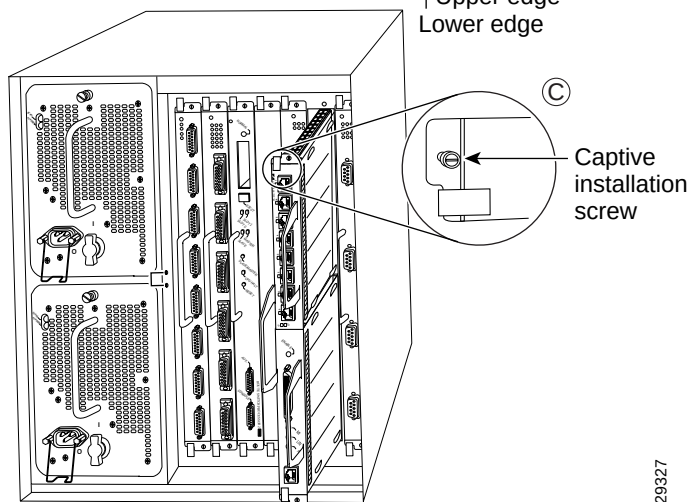
Install the screw in the rear of the port adapter slot. Do not overtighten the screw. (See A.)

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 VIP motherboard in the chassis, and tighten the captive installation screw on each end of the VIP faceplate. (See C.)



29327

Installing Interface Cables

To continue your PA-4E1G installation, you must install the port adapter cables. The instructions that follow apply to all supported platforms.

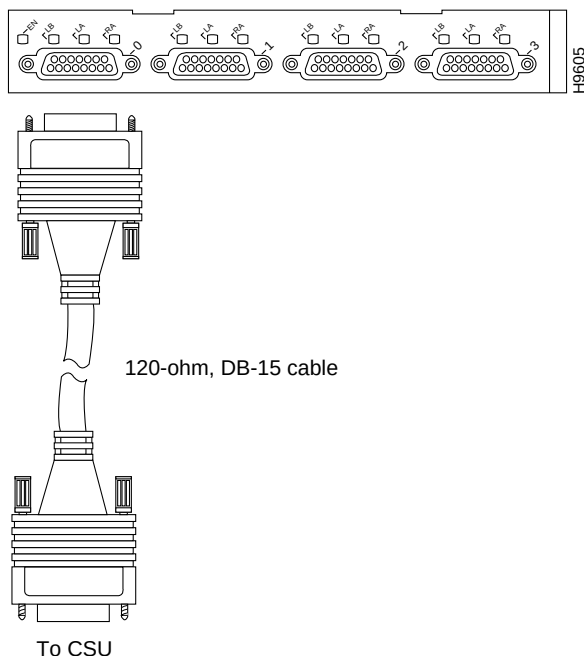
Use the following procedure to connect cables to the PA-4E1G in unbalanced mode:

-
- Step 1** Attach the DB-15 end of a 75-ohm, unbalanced coaxial cable with BNC connector to the first DB-15 port you plan to use on the unbalanced, 75-ohm PA-4E1G.
- Step 2** Attach the network end of the 75-ohm, unbalanced coaxial cable to your external E1-G.703/G.704 equipment.
- Step 3** Repeat Steps 1 and 2 for each additional interface you plan to use on the port adapter.
-

Use the following procedure to connect cables to the PA-4E1G in balanced mode:

-
- Step 1** Attach the DB-15 end of one of the following types of cables to the first DB-15 port you plan to use on the balanced, 120-ohm PA-4E1G (see [Figure 3-3](#)):
- Balanced (120-ohm) cable with an RJ-45 connection at the network end
 - Balanced (120-ohm) cable with twinaxial connectors and cables at the network end
 - Balanced (120-ohm) cable with DB-15 connectors on both ends
- Step 2** Attach the network end of the 120-ohm, balanced cable to your external E1-G.703/G.704 equipment.
- Step 3** Repeat Steps 1 and 2 for each additional interface you plan to use on the port adapter.
-

Figure 3-3 Connecting a PA-4E1G 120-Ohm DB-15 Cable—Front View (Shown Without Handle)



**Note**

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

When attaching the cable receptacle on the PA-4E1G, use the cable-management bracket that shipped with your router for extra strain relief.

This completes the procedure for attaching a balanced or unbalanced cable to the PA-4E1G. Proceed to [Chapter 4, "Configuring the PA-4E1G."](#)



CHAPTER 4

Configuring the PA-4E1G

To continue your PA-4E1G 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 Configuration, page 4-9](#)
- [Checking the Configuration, page 4-11](#)

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 to change the existing configuration of an interface. The system prompts you for a password if one has been set.

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

-
- Step 1** At the user-level EXEC prompt, enter the **enable** command. The EXEC prompts you for a privileged-level password as follows:
- ```
Router> enable
```
- Password:
- Step 2** Enter the password (the password is case sensitive). For security purposes, the password is not displayed. When you enter the correct password, the system displays the privileged-level system prompt (#):
- ```
Router#
```
-

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-4E1G 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-4E1G 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-4E1G that was previously configured, the system recognizes the new interfaces and brings them up in their existing configurations.

For a summary of the configuration options available and instructions for configuring interfaces on a PA-4E1G, 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 4-7](#)

Shutting Down an Interface

Before you remove an interface that you will not replace, or replace port adapters, use the **shutdown** command to shut down (disable) the interfaces to prevent anomalies when you reinstall the new or reconfigured port adapter. 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                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco 7120 series routers                            | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 3.<br><br>Router(config-if)# <b>interface serial 3/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 3/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |
| Cisco 7140 series routers                            | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 4.<br><br>Router(config-if)# <b>interface serial 4/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 4/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |
| Cisco 7200 series routers and Cisco 7200 VXR routers | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 6.<br><br>Router(config-if)# <b>interface serial 6/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 6/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |
| Cisco 7201 router                                    | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.<br><br>Router(config-if)# <b>interface serial 1/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 1/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |
| Cisco uBR7223 router                                 | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.<br><br>Router(config-if)# <b>interface serial 1/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 1/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |
| Cisco uBR7246 router                                 | <b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)<br><br><b>shutdown</b> | The example is for interface 0 and interface 1 on a port adapter in port adapter slot 2.<br><br>Router(config-if)# <b>interface serial 2/0</b><br>Router(config-if)# <b>shutdown</b><br>Router(config-if)# <b>interface serial 2/1</b><br>Router(config-if)# <b>shutdown</b><br><b>Ctrl-Z</b><br>Router# |

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

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

| Platform                                             | Command                                                                                                       | Example                                                                                                                                                                                                                                            |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco 7120 series routers                            | <b>show interfaces serial</b> , 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.<br>Router# <b>show interfaces serial 3/0</b><br><br>Serial 3/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |
| Cisco 7140 series routers                            | <b>show interfaces serial</b> , 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.<br>Router# <b>show interfaces serial 4/0</b><br><br>Serial 4/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |
| Cisco 7200 series routers and Cisco 7200 VXR routers | <b>show interfaces serial</b> , 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.<br>Router# <b>show interfaces serial 6/0</b><br><br>Serial 6/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |
| Cisco 7201 router                                    | <b>show interfaces serial</b> , 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.<br>Router# <b>show interfaces serial 1/0</b><br><br>Serial 1/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |
| Cisco uBR7223 router                                 | <b>show interfaces serial</b> , 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.<br>Router# <b>show interfaces serial 1/0</b><br><br>Serial 1/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |

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

| Platform                                                        | Command                                                                                                                                                    | Example                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco uBR7246 router                                            | <b>show interfaces serial</b> , 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.<br><br>Router# <b>show interfaces serial 2/0</b><br><br>Serial 2/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example]                                                                           |
| Cisco 7301 router                                               | <b>show interfaces serial</b> , 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.<br><br>Router# <b>show interfaces serial 1/0</b><br><br>Serial 1/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example]                                                                           |
| Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router | <b>show interfaces serial</b> , 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.<br><br>Router(config-if)# <b>show interfaces serial 3/0</b><br><br>Serial 3/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example] |
| Cisco 7401ASR router                                            | <b>show interfaces serial</b> , 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.<br><br>Router# <b>show interfaces serial 1/0</b><br><br>Serial 1/0 is administratively down, line protocol is down<br><br>[Additional display text omitted from this example]                                                                           |
| VIP in Cisco 7000 series routers and Cisco 7500 series routers  | <b>show interfaces serial</b> , 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.<br><br>Router# <b>show interfaces serial 1/1/0</b><br><br>Serial 1/1/0 is administratively down, line protocol is down<br><br>[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 and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For 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 subcommand **interface serial** subcommand, followed by the interface address of the interface you plan to configure.

[Table 4-3](#) gives examples 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                                                                                                                                                   |
|---------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco 7120 series routers | <b>interface serial</b> , followed by <i>slot/port</i><br>(port-adapter-slot-number/<br>interface-port-number) | The example is for the first interface of a port adapter in port adapter slot 3.<br><br>Router(config)# <b>interface serial 3/0</b><br>Router(config-if)# |
| Cisco 7140 series routers | <b>interface serial</b> , followed by <i>slot/port</i><br>(port-adapter-slot-number/<br>interface-port-number) | The example is for the first interface of a port adapter in port adapter slot 4.<br><br>Router(config)# <b>interface serial 4/0</b><br>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            | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 6/0</b><br>Router(config-if)#                                                                |
| Cisco 7201 router                                               | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 1/0</b><br>Router(config-if)#                                                                |
| Cisco uBR7223 router                                            | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 1/0</b><br>Router(config-if)#                                                                |
| Cisco uBR7246 router                                            | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 2/0</b><br>Router(config-if)#                                                                |
| Cisco 7301 router                                               | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 1/0</b><br>Router(config-if)#                                                                |
| Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 3/0</b><br>Router(config-if)# |
| Cisco 7401ASR router                                            | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 1/0</b><br>Router(config-if)#                                                                |
| VIP in Cisco 7000 series routers and Cisco 7500 series routers  | <b>interface serial</b> , 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.<br><br>Router(config)# <b>interface serial 1/1/0</b><br>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.

## Customizing the Configuration

Use the privileged-level **configure** command to perform an advanced interface configuration. You will need the following information to perform this configuration:

- Timing source for each new interface (a line-derived or internal clock signal)
- Whether you will use framed or unframed mode on the interfaces
- The cyclic redundancy check (CRC) you want to use



### Caution

Always issue a **clear interface** command after altering the configuration of an interface, particularly after changing a time slot or CRC4 setting.

---

This section contains the following topics:

- [Configuring Framed and Unframed Mode, page 4-9](#)
- [Configuring Timing \(Clock\) Signals, page 4-10](#)
- [Configuring Cyclic Redundancy Checks, page 4-10](#)

## Configuring Framed and Unframed Mode

The PA-4E1G supports both framed (G.704) and unframed (G.703) modes of operation; the default is unframed operation.

To enable framed operation, you must specify the start and stop slots, separated by a hyphen, as follows:

```
timeslot 0/start-slot-31/stop-slot
```

Following is an example of using the **timeslot** command with a start slot of 1 and a stop slot of 13:

```
Router# timeslot 1-13
```

Nonconfigurable combinations of start and stop slots will be ignored, and the interface will be left unchanged.

In framed mode, the system default is not to use time slot 16 for data. To use slot 16 for data, use the **ts16** command in addition to the **timeslot 1-17** command, as follows:

```
Router# timeslot 1-17
Router# ts16
```

To restore the system default, use the **no ts16** command.

## Configuring Timing (Clock) Signals

Each PA-4E1G operates either with an external clock signal that it recovers from the received data stream or its own internal clock signal. The default is the external clock source line.

To specify the clock source, use the **clock source {line | internal}** command.

To change the default and use the internal clock, use the **clock source internal** command.

To return the interface to the default state, use the **clock source line** command. (The **no clock source internal** command also returns the interface to the default state.)

**Note**

All E1-G.703/G.704 interfaces operate at a default clock rate of 2.048 Mbps; you cannot configure the clock rate.

## Configuring Cyclic Redundancy Checks

The 4-bit cyclic redundancy check (CRC4) is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. By default, CRC4 is not enabled. 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.

**Note**

The E1-G.703/G.704 interface on the PA-4E1G is compliant with BABT 221. The E1-G.703/G.704 interface supports CRC4 in framed mode only.

Table 4-4 summarizes cyclic redundancy check (CRC) commands.

**Table 4-4** CRC Commands

| Command         | Function                         | Example                                                                                                                                                                                 |
|-----------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>crc 4</b>    | Enable 4-bit CRC.                | The example enables 4-bit CRC on a serial interface:<br><br>Router(config)# <b>interface serial 3/0</b><br>Router(config-if)# <b>crc 4</b>                                              |
| <b>no crc 4</b> | Return to default, CRC disabled. | The example disables 4-bit CRC on a serial interface and returns to the default, CRC disabled:<br><br>Router(config)# <b>interface serial 3/0</b><br>Router(config-if)# <b>no crc 4</b> |

Enable CRC4 using the **crc 4** command. Before you can enable 4-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 4-bit CRC. This command functions in the same way on all supported platforms.

In the example that follows, 4-bit CRC is specified:

```
Router(config-if)# crc 4
```

The preceding command example applies to all systems in which the PA-4E1G is supported. Use the **no crc 4** command to disable CRC4 and return the interface to the default CRC disabled 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*.

## 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 4-11](#)
- [Using the ping Command to Verify Network Connectivity, page 4-24](#)
- [Using loopback Commands, page 4-25](#)

## 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-4E1G 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 publication 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                                   |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>show version</b> or<br><b>show hardware</b>                | 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# <b>show version</b>               |
| <b>show controllers</b>                                       | Displays all the current interface processors and their interfaces                                                                                                         | Router# <b>show controllers</b>           |
| <b>show diag slot</b>                                         | Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot                     | Router# <b>show diag 2</b>                |
| <b>show interfaces type</b><br><b>3/interface-port-number</b> | Displays status information about a specific type of interface (for example, serial) in a Cisco 7120 series router                                                         | Router# <b>show interfaces serial 3/1</b> |

**Table 4-5**      **Using show Commands (continued)**

| Command                                                                                                    | Function                                                                                                                                                                                                 | Example                                     |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| <b>show interfaces type 4/interface-port-number</b>                                                        | Displays status information about a specific type of interface (for example, serial) in a Cisco 7140 series router                                                                                       | Router# <b>show interfaces serial 4/1</b>   |
| <b>show interfaces type port-adapter-slot-number/interface-port-number</b>                                 | 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, or Cisco 7401ASR router | Router# <b>show interfaces serial 1/0</b>   |
| <b>show interfaces type 1/interface-port-number</b>                                                        | Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7223 router                                                                                           | Router# <b>show interfaces serial 1/1</b>   |
| <b>show interfaces type 1 or 2/interface-port-number</b>                                                   | Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7246 router                                                                                           | Router# <b>show interfaces serial 2/0</b>   |
| <b>show interfaces type 2 or 3 or 4 or 5/interface-port-number</b>                                         | Displays status information about a specific type of interface (for example, serial) on a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router                                                | Router# <b>show interfaces serial 3/0</b>   |
| <b>show interfaces type interface-processor-slot-number/port-adapter-slot-number/interface-port-number</b> | 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# <b>show interfaces serial 3/1/0</b> |
| <b>show protocols</b>                                                                                      | Displays protocols configured for the entire system and for specific interfaces                                                                                                                          | Router# <b>show protocols</b>               |
| <b>show running-config</b>                                                                                 | Displays the running configuration file                                                                                                                                                                  | Router# <b>show running-config</b>          |
| <b>show startup-config</b>                                                                                 | Displays the configuration stored in NVRAM                                                                                                                                                               | Router# <b>show startup-config</b>          |

If the interface is down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the 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 4-13](#)
- [Using the show diag Command, page 4-17](#)
- [Using the show interfaces Command, page 4-19](#)

## Using the show version or show hardware Commands

Display the configuration of the system hardware, the number and type 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 offer some platform-specific output examples using the **show version** command:

- [Cisco 7100 Series Routers—Example Output of the show version Command, page 4-13](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command, page 4-14](#)
- [Cisco 7201 Router—Example Output of the show version Command, page 4-14](#)
- [Cisco 7401ASR Router—Example Output of the show version Command, page 4-15](#)
- [VIP in Cisco 7000 Series and Cisco 7500 Series Routers—Example Output of the show version Command, page 4-16](#)

### 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-4E1G 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.
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.

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-4E1G installed:

```

Router# show version

Cisco Internetwork Operating System Software
IOS (c) 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
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 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.
4 Serial network interfaces.

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
c7201alpha1 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 222222222222
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-4E1G 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
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 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.
4 Serial network interfaces.

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 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 routers with a PA-4E1G installed:

```
Router# show version
```

```
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Version 11.1(14)CA [biff 184]
Synced to mainline version: 11.1(13)
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Wed 08-Oct-98 00:37 by biff
Image text-base: 0x600108A0, data-base: 0x609DC000

ROM: System Bootstrap, Version 5.3(16645) [biff 571]
ROM: GS Software (RSP-BOOT-M), Version 11.1(618) [biff 191]

Router uptime is 3 hours, 14 minutes
System restarted by reload
System image file is "biff/rsp-jv-mz.g703", booted via tftp from 1.1.1.253

cisco RSP2 (R4600) processor with 32768K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 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 VIP2 controllers (4 Serial).
4 Serial network interfaces.

125K 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).
No slave installed in slot 7.
Configuration register is 0x2
```

## 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 a Cisco 7100 series router, Cisco 7200 series router, Cisco 7200 VXR router, Cisco uBR7200 series router, Cisco 7201 router, Cisco 7301 router, and 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 a Cisco 7000 series router or Cisco 7500 series router with a VIP.



### 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 offer some platform-specific output examples using the **show diag** command:

- [Cisco 7100 Series Routers—Example Output of the show diag Command, page 4-17](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command, page 4-17](#)
- [Cisco 7201 Router—Example Output of the show diag Command, page 4-18](#)
- [Cisco 7401ASR Router—Example Output of the show diag Command, page 4-18](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command, page 4-19](#)

### Cisco 7100 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-4E1G installed in port adapter slot 3 of a Cisco 7120 series router:

```
Router# show diag 3
Slot 3:
Mx serial (ME1-UNBAL) port adapter, 4 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-4E1G installed in port adapter slot 6 of a Cisco 7200 series router:

```
Router# show diag 6
Slot 6:
Mx serial (ME1-UNBAL) port adapter, 4 ports
Port adapter is analyzed
Port adapter insertion time 00:48:28 ago
Hardware revision 255.255 Board revision UNKNOWN
Serial number 4294967295 Part number 255-65535-255
```

```

Test history 0xFF RMA number 255-255-255
EEPROM format version 255
EEPROM contents (hex):
 0x20: FF 41 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

```

## 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-4E1G installed in port adapter slot 1 of a Cisco 7401ASR router:

```

Router# show diag 1
Slot 1:
 Mx serial (ME1-UNBAL) port adapter, 4 ports
 Port adapter is analyzed
 Port adapter insertion time 00:48:28 ago
 Hardware revision 255.255 Board revision UNKNOWN
 Serial number 4294967295 Part number 255-65535-255
 Test history 0xFF RMA number 255-255-255
 EEPROM format version 255
 EEPROM contents (hex):
 0x20: FF 41 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

```

## 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-4E1G installed in port adapter slot 1 of a VIP2 in interface processor slot 9:

```
Router# show diag 9
Slot 9:
 Physical slot 9, ~physical slot 0x6, logical slot 9, CBus 0
 Microcode Status 0x4
 Master Enable, LED, WCS Loaded
 Board is analyzed
 Pending I/O Status: None
 EEPROM format version 1
 VIP2 controller, HW rev 2.3, board revision A0
 Serial number: 03515977 Part number: 73-1684-03
 Test history: 0x00 RMA number: 00-00-00
 Flags: cisco 7000 board; 7500 compatible

 EEPROM contents (hex):
 0x20: 01 15 02 03 00 35 A6 49 49 06 94 03 00 00 00 00
 0x30: 50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

 Slot database information:
 Flags: 0x4 Insertion time: 0x3C68 (03:16:49 ago)

 Controller Memory Size: 16 MBytes DRAM, 1024 KBytes SRAM

 PA Bay 1 Information:
 G703 Serial PA, 4 ports
 EEPROM format version 255
 HW rev FF.FF, Board revision UNKNOWN
 Serial number: 4294967243 Part number: 255-65535-255
```

## 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 the individual platforms, 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 some platform-specific output examples using the **show interfaces** command:

- [Cisco 7100 Series Routers—Example Output of the show interfaces Command, page 4-20](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command, page 4-21](#)
- [Cisco 7201 Router—Example Output of the show interfaces Command, page 4-22](#)
- [Cisco 7401ASR Router—Example Output of the show interfaces Command, page 4-22](#)
- [VIP in Cisco 7000 Series Routers or Cisco 7500 Series Routers—Example Output of the show interfaces Command, page 4-23](#)

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

Following are examples of the **show interfaces serial** command used with a Cisco 7120 series router and a Cisco 7140 series router.

In these examples, the four serial interfaces (0 to 3) 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 4ME1-UNBAL
 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 4ME1-UNBAL
 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 4ME1-UNBAL
 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 omitted from this example]
```

```
Router# show interfaces serial 3/3
Serial3/3 is up, line protocol is up
 Hardware is 4ME1-UNBAL
 Internet address is 10.0.0.3
 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]
```



### 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, and 3/3 with 4/0, 4/1, 4/2, and 4/3, respectively.

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface 0 on a PA-4E1G 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 4ME1-UNBAL
 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 runs, 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 for Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers. In these examples, the four serial interfaces (0 to 3) 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 4ME1-UNBAL
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 1/1
Serial1/1 is up, line protocol is up
Hardware is 4ME1-UNBAL
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 1/2
Serial1/2 is up, line protocol is up
Hardware is 4ME1-UNBAL
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 omitted from this example]

```

```

Router# show interfaces serial 1/3
Serial1/3 is up, line protocol is up
Hardware is 4ME1-UNBAL
Internet address is 10.0.0.3
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]

```

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface port 0 on a PA-4E1G installed in port adapter slot 1:

```

Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
 Hardware is 4ME1-UNBAL
 Internet address is 5.0.0.2/8
 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 00:00:00, output never, output hang never
 Last clearing of "show interface" counters 00:32:21
 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 0/0 (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
 33 packets input, 10824 bytes, 0 no buffer
 Received 66 broadcasts, 0 runts, 0 giants
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 0 packets output, 0 bytes, 0 underruns
 0 output errors, 0 collisions, 0 interface resets
 0 output buffer failures, 0 output buffers swapped out
 0 carrier transitions
 0 alarm indications, 0 remote alarms, 0 rx LOF, 0 rx LOS
 DCD up, BER inactive, NELR inactive, FELR inactive
```

### Cisco 7201 Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command for 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 for a Cisco 7401ASR router. This example shows all of the information specific to interface port 0 on a PA-4E1G installed in port adapter slot 1:

```
Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
 Hardware is 4ME1-UNBAL
 Internet address is 5.0.0.2/8
 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 00:00:00, output never, output hang never
Last clearing of "show interface" counters 00:32:21
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 0/0 (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
 33 packets input, 10824 bytes, 0 no buffer
 Received 66 broadcasts, 0 runts, 0 giants
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 0 packets output, 0 bytes, 0 underruns
 0 output errors, 0 collisions, 0 interface resets
 0 output buffer failures, 0 output buffers swapped out
 0 carrier transitions
 0 alarm indications, 0 remote alarms, 0 rx LOF, 0 rx LOS
DCD up, BER inactive, NELR inactive, FELR inactive

```

### 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 serial** command used with the VIP2. In these examples, the four serial interfaces (0 to 3) 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 omitted from this example]

```

```

Router# show interfaces serial 3/1/3
Serial3/1/3 is up, line protocol is up
Hardware is cyBus Serial
Internet address is 10.0.0.3
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]

```

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 10.0.0.3
 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 00:44:43, output 00:00:54, output hang never
 Last clearing of "show interface" counters 01:53:04
 Queueing strategy: fifo
 Output queue 0/40, 0 drops; input queue 0/75, 0 drops
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
 2 packets input, 140 bytes, 0 no buffer
 Received 2 broadcasts, 0 runts, 0 giants
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 113 packets output, 37064 bytes, 0 underruns
 0 output errors, 0 collisions, 1 interface resets
 0 output buffer failures, 0 output buffers swapped out
 6 carrier transitions
 0 alarm indications, 0 remote alarms, 0 rx LOF, 0 rx LOS
 DCD up, BER inactive, NELR inactive, FELR inactive
```

Proceed to the next section [“Using the ping Command to Verify Network Connectivity”](#) to check network connectivity of the PA-4E1G 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 the **ping** 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); then repeat the **ping** command.

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

## Using loopback Commands

With the loopback test, you can detect and isolate equipment malfunctions by testing the connection between the PA-4E1G interface and a remote device such as a modem or CSC/DSU. The **loopback** subcommand places an interface in loopback mode, which enables test packets that are generated from the **ping** command to loop through a remote device or compact serial cable. If the packets complete the loop, the connection is good. If not, you can isolate a fault to the remote device or compact serial cable in the path of the loopback test.

The E1-G.703/G.704 interface supports the same local loopback test as other (data communications) interfaces. Using the loopback functions, you can check the integrity of the physical data path between the motherboard (or chassis system) and the PA-4E1G with the **loopback** command. The loopback signal follows this path regardless of whether or not a cable is attached to the port.

Figure 4-1 shows the signal path of the loopback function. The **no loopback** command disables all loopback tests on the interface.



### Note

Because each E1-G.703/G.704 interface uses a default clock rate of 2.048 Mbps, you do not have to configure a clock signal on the interface before performing a loopback test.

**Figure 4-1**      **Loopback Path**

