CISCO SYSTEMS

PA-2H Dual-Port HSSI Port Adapter Installation and Configuration

Product Numbers: PA-2H(=)

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

CONTENTS

PA-2H Dual-Port HSSI Port Adapter Installation and Configuration

Preface

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

Objectives

This document describes how to install and configure the dual-port HSSI port adapter (PA-2H[=], Rev. B), hereafter referred to as the PA-2H, which is used in the following platforms:

- Catalyst 5000 family switches with the Route Switch Module (RSM)/second-generation Versatile Interface Processor (VIP2)
- Catalyst 6000 family FlexWAN module in the Catalyst 6000 family switches
- Cisco 7100 series routers, consisting of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers, consisting of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and the Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers, consisting of the six-slot Cisco uBR7246 and Cisco uBR7246VXR and the three-slot Cisco uBR7223
- Cisco 7301 router
- Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router
- Cisco 7401ASR router
- VIP 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 contains the following chapters:

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

Related Documentation

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

- Cisco IOS software:

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

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

- Catalyst RSM/VIP2:

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

  – *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note*

  – *Catalyst 5000 Series Route Switch Module Installation and Configuration Note*

  – The installation and configuration guide that shipped with your Catalyst 5000 family switch

- Catalyst 6000 family FlexWAN module:

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

  – *Catalyst 6000 Family FlexWAN Module Installation and Configuration Note*

  – The hardware and software publications that shipped with your Catalyst 6000 family switch

- 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 hardware installation and maintenance information, refer to the following publications:

  – *Cisco 7000 Hardware Installation and Maintenance* that shipped with 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*

- Cisco 7100 series routers:

  – For hardware installation and maintenance information, refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide* that shipped with your Cisco 7100 series router.

  – For information on setting up a Virtual Private Network, refer to the *Cisco 7100 Series VPN Configuration Guide*.

- Cisco 7200 series routers:

  – For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.

  – For hardware installation and maintenance information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the installation and configuration guide that shipped with your Cisco 7200 series router.

- Cisco 7200 VXR routers:

  For hardware installation and maintenance information, refer to the *Cisco 7200 VXR Installation and Configuration Guide* that shipped with your Cisco 7200 VXR router.

- Cisco uBR7200 series routers:

  For hardware installation and maintenance information, refer to the hardware installation and software configuration guides that shipped with your Cisco uBR7200 series router.

- Cisco 7301 routers:

  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 routers:

  For hardware installation and maintenance information, refer to the *Cisco 7304 PCI Port Adapter Carrier Card Installation and Configuration Guide*.

- Cisco 7401ASR routers:

  For hardware installation and maintenance information, refer to the *Cisco 7401ASR Installation and Configuration Guide* and the *Cisco 7401ASR Quick Start Guide*.

- Cisco 7500 series routers:

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

  – *Cisco 7500 Installation and Configuration* or the quick start guide that shipped with 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*

- For international agency compliance, safety, and statutory information for WAN interfaces:
  - *Site Preparation and Safety Guide*
  - *Regulatory Compliance and Safety Information for the Catalyst 6000 Family Switches*
  - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
  - *Regulatory Compliance and Safety Information for Cisco 7100 Series VPN Routers*
  - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
  - *"Regulatory Compliance and Safety Information"* appendix in the *Cisco uBR7200 Series Universal Broadband Router Hardware Installation guide*
  - *Cisco 7300 Series Internet Routers Regulatory Compliance and Safety Information*
  - *Cisco 7401ASR Regulatory Compliance and Safety Information*
  - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*

- To view Cisco documentation or obtain general information about the documentation, refer to the following sources:
  - "Obtaining Documentation" section on page x
  - "Obtaining Technical Assistance" section on page xii.
  - Customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding Cisco-observed holidays).
  - *Cisco Information Packet* that shipped with your router or switch.

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

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

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

International Cisco websites can be accessed from this URL:

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

Documentation CD-ROM

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

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html

All users can order monthly or quarterly subscriptions through the online Subscription Store:

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

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

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

Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can e-mail your comments to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

http://tools.cisco.com/RPF/register/register.do

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The type of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration. There is little or no impact to your business operations.
- Priority level 3 (P3)—Operational performance of the network is impaired, but most business operations remain functional. You and Cisco are willing to commit resources during normal business hours to restore service to satisfactory levels.
- Priority level 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively impacted by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.
- Priority level 1 (P1)—An existing network is "down," or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Cisco TAC Website

The Cisco TAC website provides online documents and tools to help troubleshoot and resolve technical issues with Cisco products and technologies. To access the Cisco TAC website, go to this URL:

http://www.cisco.com/tac

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

http://tools.cisco.com/RPF/register/register.do

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

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

If you have Internet access, we recommend that you open P3 and P4 cases online so that you can fully describe the situation and attach any necessary files.

Cisco TAC Escalation Center

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

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

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

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

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

  http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary, Internetworking Technology Handbook, Internetworking Troubleshooting Guide,* and the *Internetworking Design Guide.* For current Cisco Press titles and other information, go to Cisco Press online at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access *Packet* magazine at this URL:

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

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

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

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

  http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

Overview

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

Port Adapter Overview

The PA-2H dual-port HSSI port adapter (PA-2H, Rev. B), shown in Figure 1-1, provides two high-speed serial interfaces. The interfaces on the PA-2H are considered to be data terminal equipment (DTE) devices. (Port adapters have a handle attached, but this handle is occasionally not shown in figures in this document to allow a full view of detail on the port adapter faceplate.)

Figure 1-1   PA-2H—Faceplate View
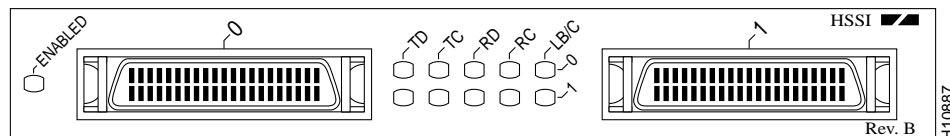
The HSSI network interfaces reside on modular port adapters, which provide a direct connection between the high-speed bus in the router or switch and the external networks.

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

The Cisco 7200 series, the Cisco uBR7246 routers, the Cisco 7301 routers, and Cisco 7401ASR routers support the OIR of all port adapter types.

The newest dual-port PA-2H can be identified by *Rev. B* in the lower right corner of its front-panel label (see Figure 1-1). The older dual-port PA-2H does *not* have *Rev. B* on its label (see Figure 1-2).

Figure 1-2   Older PA-2H—Pre-Rev. B—Faceplate View
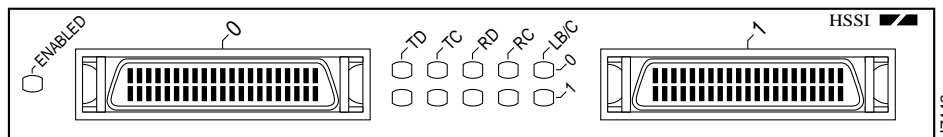
To determine which PA-2H model you currently have installed, examine the front-panel label, or use the **show diag** command. (For information on using the **show diag** command, see Chapter 4, "Configuring the PA-2H.")

Note   You should replace older PA-2H port adapters with the newer PA-2H Rev. B port adapter. Contact Cisco's Technical Assistance Center (TAC) for replacement details. (For information on the TAC, see the "Obtaining Documentation" section on page x.)

Interface Specifications

The PA-2H conforms to the BABT/TC/130, EIA/TIA-612, and EIA/TIA-613 standards for HSSI. The PA-2H provides two interfaces. Each interface provides a full-duplex high-speed synchronous serial interface (HSSI) for transmitting and receiving data at rates of up to 52 megabits per second (Mbps).

The HSSI, which has been standardized as EIA/TIA 612/613, provides access to services at T3 (45 Mbps), E3 (34 Mbps), and Synchronous Optical Network (SONET) STS-1 (51.82 Mbps) rates. The actual rate of the interface depends on the external DSU and the type of service to which it is connected.

Each HSSI port on the PA-2H is a female 50-pin SCSI-II-type receptacle. You must use an HSSI interface cable from Cisco Systems to connect the interface to an external data service unit (DSU). See the "Cables, Connectors, and Pinouts" section on page 1-3 for descriptions of HSSI cables.

The PA-2H supports both 16- and 32-bit cyclic redundancy checks (CRCs). The default is 16-bit CRCs; to enable 32-bit CRCs, you use a configuration command. (For a description of the CRC function, see Chapter 4, "Configuring the PA-2H.")

LEDs

The PA-2H has two rows of five status LEDs (one row of five for each HSSI port) and one enabled LED. (See Figure 1-3.) The green- and amber-colored LED for each port indicates port status.

Figure 1-3   LEDs on the PA-2H—Partial Front View
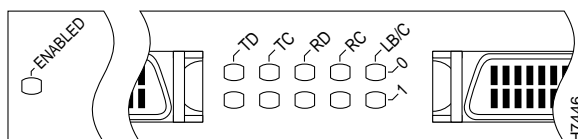
After system initialization, the enabled LED goes on to indicate that the port adapter has been enabled for operation.

The following conditions must be met before the PA-2H is enabled:

- The port adapter is correctly connected to the backplane and receiving power in Cisco 7000 series and Cisco 7500 series routers, the Catalyst 5000 family switches, the Catalyst 6000 family switches, or to the midplane and receiving power in Cisco 7200 series and Cisco uBR7200 series routers.

- The bus recognizes the port adapter or HSSI-equipped Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, the VIP, or the Cisco 7304 PCI Port Adapter Carrier Card.

- The system recognizes the PA-2H, VIP with a PA-2H, a Catalyst RSM/VIP2 with a PA-2H, the Catalyst 6000 family FlexWAN module with a PA-2H, or the Cisco 7304 PCI Port Adapter Carrier Card with a PA-2H.

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 LED colors and indications.

Table 1-1   PA-2H LEDs

LED Label	Color	State	Meaning
ENABLED	Green	On	Port adapter is enabled for operation.
TD	Green	On	DTE—Transmit data out.
			DCE—Transmit data in.
TC	Green	On	DTE—Transmit clock in.
			DCE—Transmit clock in (TXCE).
RD	Green	On	DTE—Receive data in.
			DCE—Receive data out.
RC	Green	On	DTE—Receive clock in.
			DCE—Receive clock out.
LB/CD	Green	On	Indicates DTR, DSR, RTS, CTS, or DCD is active.
	Green	Flashing	Indicates RTS, CTS, or DCD is sending and receiving data in half-duplex mode.
	Yellow	On	Indicates local loop or internal loop active.

Cables, Connectors, and Pinouts

This section provides information about the HSSI cables you should use with the PA-2H. Two types of cables are available for use with the PA-2H: the HSSI interface cable used to connect your router to an external DSU (and HSSI network), and a null modem cable with which you can connect two routers back to back. Both HSSI cables are available *only* from Cisco systems and conform to EIA/TIA-612 and EIA/TIA-613 specifications.

HSSI Interface Cable

The HSSI cable (CAB-HSI1=) connects the PA-2H with the external DSU. The HSSI cable is 10 feet (3.048 meters) long. The maximum HSSI cable length allowed is 50 feet (15.24 meters). Figure 1-4 shows the HSSI cable and the 50-pin connector used at each end of the HSSI cable. For connection instructions, see Chapter 3, "Removing and Installing Port Adapters." Table 1-2 lists the pinouts.

Figure 1-4   HSSI Interface Cable and Connectors
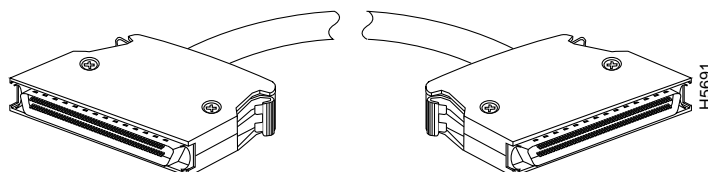
Table 1-2   HSSI Interface Cable Pinouts

Signal Name	+ Side Pin No.	– Side Pin No.	Direction[1] Router DSU
SG (signal ground)	1	26	—
RT (receive timing)	2	27	<—
CA (DCE available)	3	28	<—
RD (receive data reserved)	4	29	<—
LC (loopback circuit C)	5	30	<—
ST (send timing)	6	31	<—
SG (signal ground)	7	32	—
TA (DTE available)	8	33	—>
TT (terminal timing)	9	34	—>
LA (loopback circuit A)	10	35	—>
SD (send data)	11	36	—>
LB (loopback circuit B)	12	37	—
SG (signal ground)	13	38	—>
5 (ancillary to DCE)	14–18	39–43	—
SG (signal ground)	19	44	<—
5 (ancillary from DCE)	20–24	45–49	—
SG (signal ground)	25	50	—

1.   Router is + side (DTE). DSU is – side (DCE).

HSSI Null Modem Cable

The null modem cable (CAB-HNUL=) can connect two routers directly back to back. The null modem cable is 10 feet (3.048 meters) long. Figure 1-5 shows the null modem cable. The maximum null modem cable length allowed is 50 feet (15.24 meters). The two routers must be in the same location, and can be two Cisco 7000 series routers, two Cisco 7100 series routers, two Cisco 7200 series routers, two Cisco uBR7200 series routers, two Cisco 7301 routers, two Cisco 7401ASR routers, two Cisco 7304 routers, or two Cisco 7500 series routers, or one of each. With null modem connection, you can verify the operation of the HSSI or link the routers directly in order to build a larger node.

Figure 1-5   Null Modem Cable and Connectors
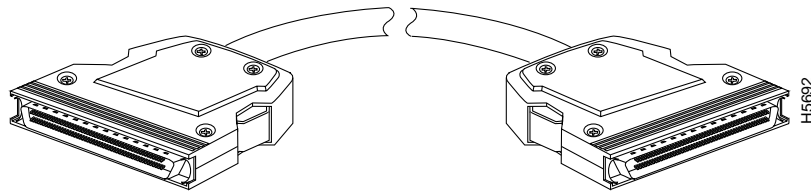
The null modem cable uses the same 50-pin connectors as the HSSI cable, but uses the pinouts listed in Table 1-2. For connection instructions, see Chapter 3, "Removing and Installing Port Adapters."

Table 1-3   HSSI Null Modem Cable Pinouts

Signal Name	From Pins	Direction	To Pins	Signal Name
RT (receive timing)	2, 27	—>	9, 34	TT (terminal timing)
CA (DCE available)	3, 28	—>	8, 33	TA (DTE available)
RD (receive data)	4, 29	—>	11, 36	SD (send data)
LC (loopback C)	5, 30	—>	10, 35	LA (loopback A)
ST (send timing)	6, 31	—>	6, 31	ST (send timing)
TA (DTE available)	8, 33	—>	3, 28	CA (DCE available)
TT (terminal timing)	9, 34	—>	2, 27	RT (receive timing)
LA (loopback A)	10, 35	—>	5, 30	LC (loopback C)
SD (send data)	11, 36	—>	4, 29	RD (receive data)
GND (ground)	1, 26, 7, 32, 13, 38, 19, 44, 25, 50	—	1, 26, 7, 32, 13, 38, 19, 44, 25, 50	GND (ground)
Loopback (not connected)	12, 37	—		
			12, 37	Loopback (not connected)
Not used	14–18, 20–24, 39–43, 45–49		14–18, 20–24, 39–43, 45–49	Not used

⚠
Caution   Although the HSSI connector and the HSSI cable are similar to SCSI-II format, they are not identical. The HSSI cable specification is more restrictive than that for the SCSI-II. If a SCSI-II cable is used instead of an HSSI cable, proper operation cannot be guaranteed.

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:

Catalyst RSM/VIP2 Slot Numbering

The Catalyst RSM/VIP2 can be installed in any slot except the top slots, which contain the supervisor engine. The Catalyst RSM/VIP2 in a Catalyst 5000 family switch does not use interface processor slot numbering; therefore, slots are not numbered in Figure 1-6. The PA-2H can be installed into either port adapter slot 0 or slot 1 on a Catalyst RSM/VIP2. Figure 1-6 shows a Catalyst RSM/VIP2 with two port adapters installed.

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

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

VIP2   Route Switch Module
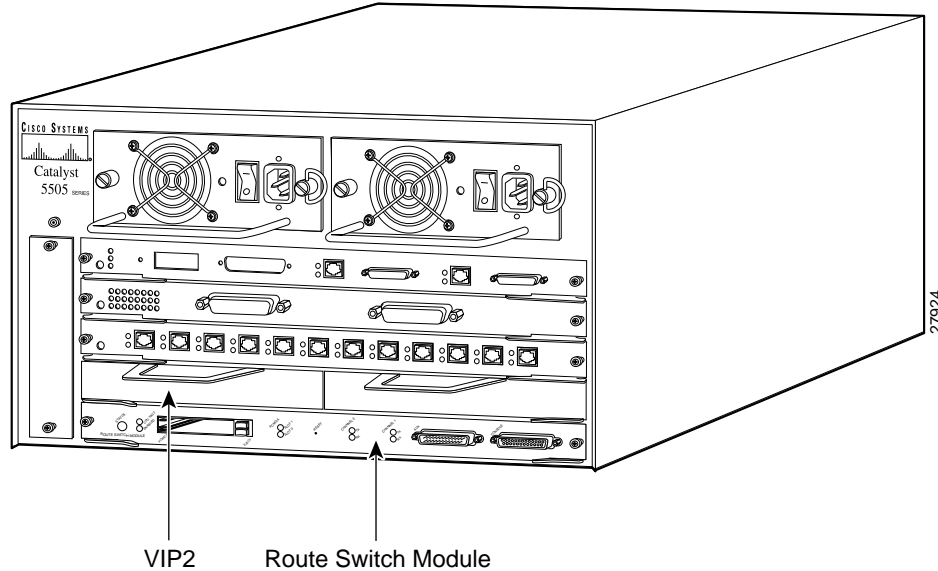
Note   For additional information, see the "Cisco 7401ASR Router Slot Numbering" section on page 1-11.

Catalyst 6000 Family FlexWAN Module Slot Numbering

The Catalyst 6000 family FlexWAN module can be installed in any slot except slot 1, which is reserved for the supervisor engine. The PA-2H can be installed into either port adapter bay 0 or bay 1 on a FlexWAN module. Figure 1-7 shows a FlexWAN module with two blank port adapters installed.

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

Figure 1-7   Catalyst 6000 Family Switch with Blank Port Adapters Installed on FlexWAN Module
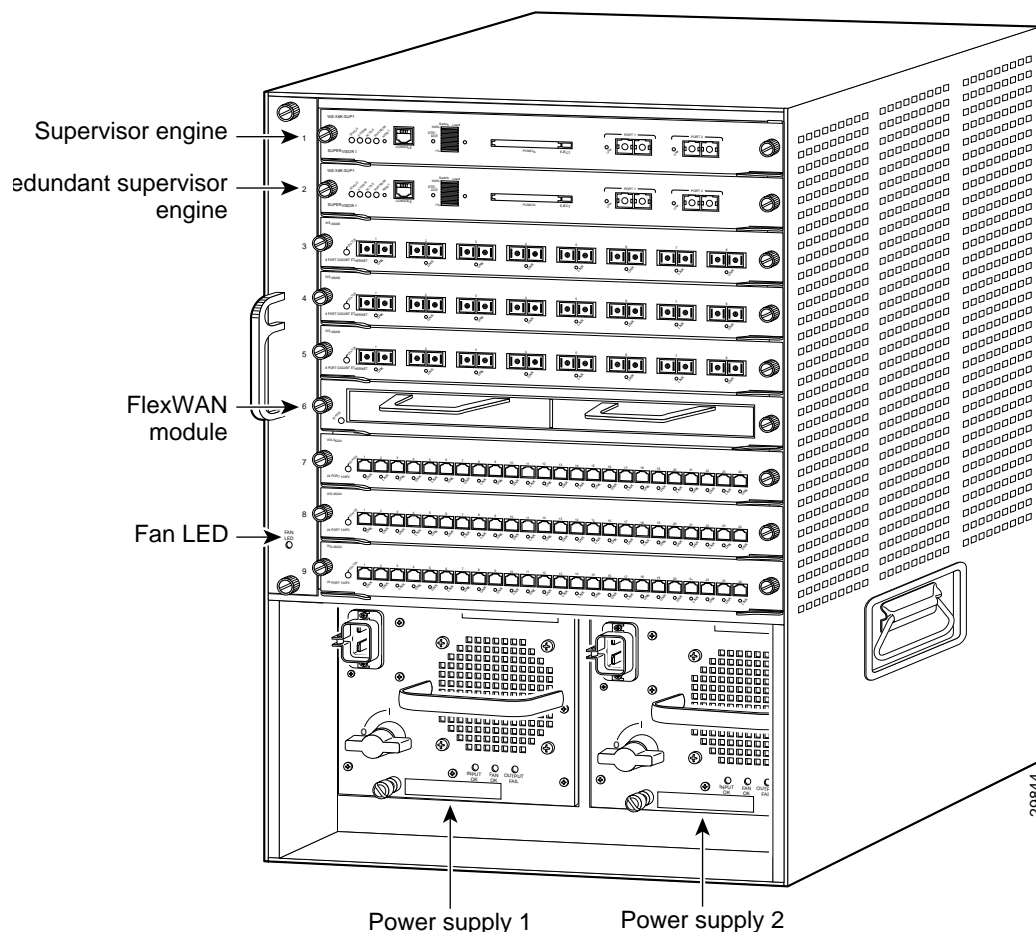
Cisco 7100 Series Routers Slot Numbering

The PA-2H can be installed in port adapter slot 3 in Cisco 7120 series routers, and in port adapter slot 4 in Cisco 7140 series routers. Figure 1-8 shows a Cisco 7120 with a port adapter installed in slot 3. Figure 1-9 shows a Cisco 7140 with a port adapter installed in slot 4.

Figure 1-8   Port Adapter Slots in the Cisco 7100 Series Router—Cisco 7120 Series
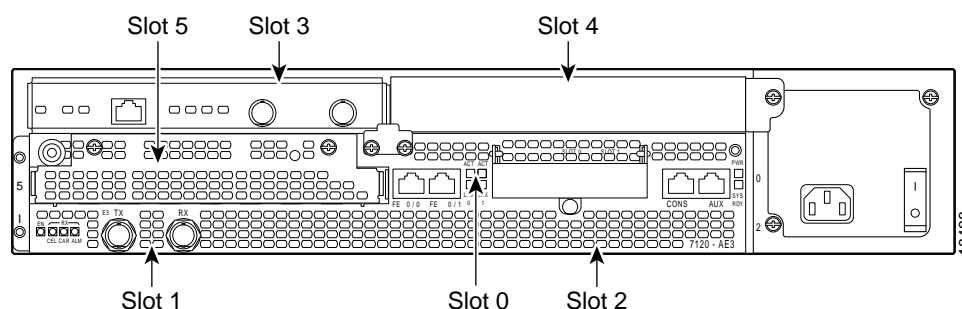
Figure 1-9   Port Adapter Slots in the Cisco 7100 Series Router—Cisco 7140 Series
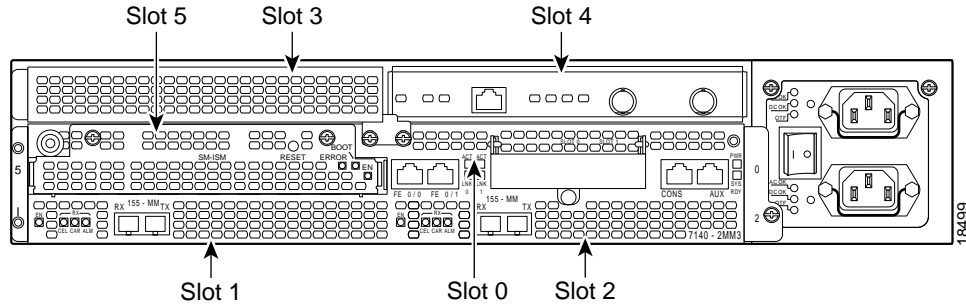
Cisco 7200 Series and Cisco uBR7200 Series Routers Slot Numbering

Figure 1-10 shows a Cisco 7206 with port adapters installed. In the Cisco 7206 (including the Cisco 7206 and Cisco 7206VXR as router shelves in a Cisco AS5800 Universal Access Server), port adapter slot 1 is in the lower left position, and port adapter slot 6 is in the upper right position. (The Cisco 7204 and Cisco 7204VXR are not shown; however, the PA-2H can be installed in any available port adapter slot.)

Figure 1-10   Port Adapter Slots in the Cisco 7206
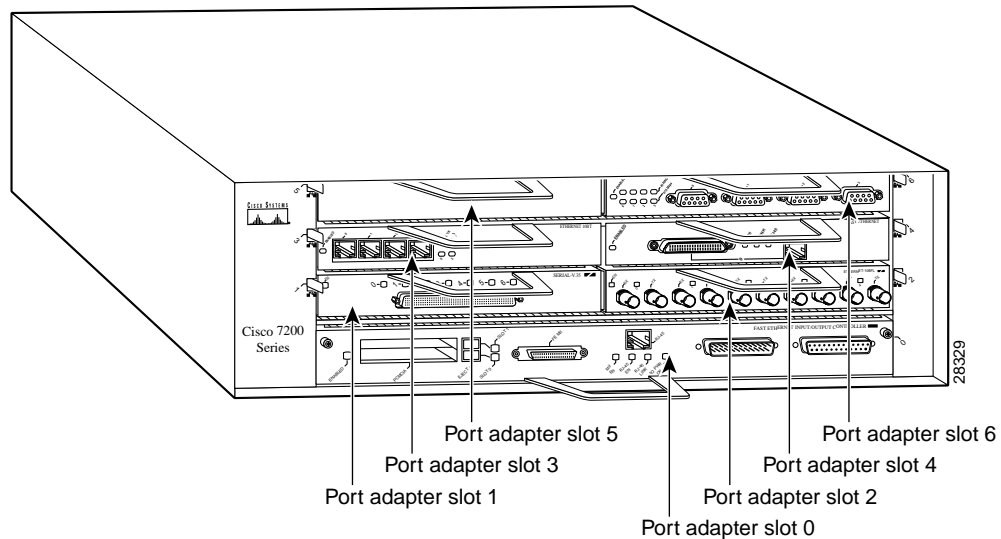
Figure 1-11 shows the slot numbering of port adapters in a Cisco uBR7200 series router. The port adapter slots are numbered slot 1 and slot 2 for the Cisco uBR7246 and Cisco uBR7246 VXR and slot 1 for the Cisco uBR7223. (Slot 0 is always reserved for the Fast Ethernet port on the I/O controller—if present.)

Figure 1-11   Port Adapter Slots in the Cisco uBR7246 and Cisco uBR7246 VXR
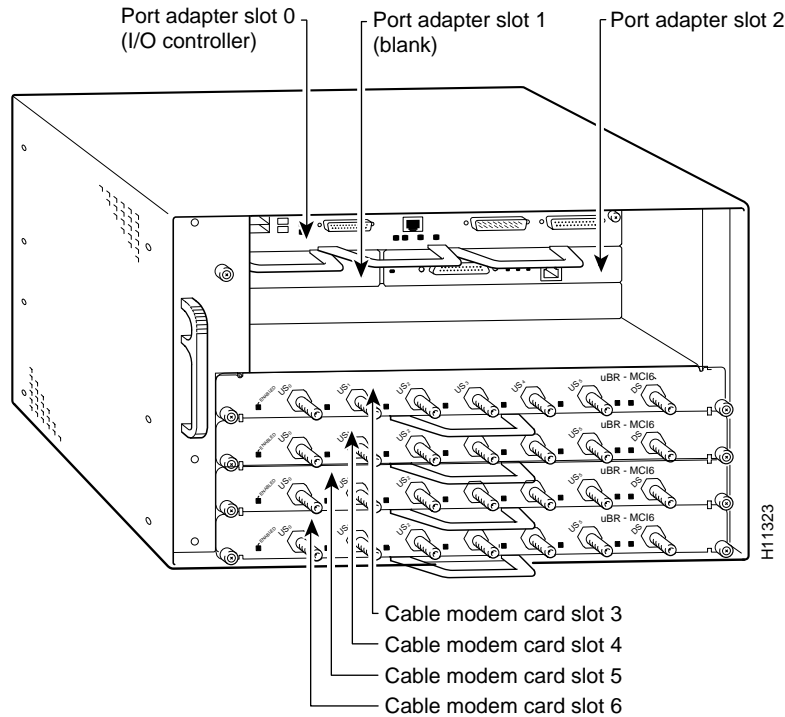
Cisco 7301 Router Slot Numbering

Figure 1-12 shows the front view of a Cisco 7301 router with a port adapter installed. There is only one port adapter slot in a Cisco 7301 router.

Figure 1-12   Cisco 7301 Router with a Port Adapter Installed
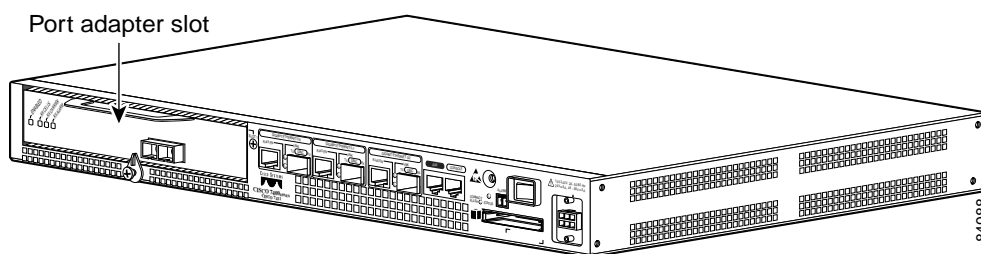
Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering

The Cisco 7304 PCI Port Adapter Carrier Card accepts one single-width port adapter. Figure 1-13 shows a Cisco 7304 PCI Port Adapter Carrier Card with a port adapter installed.

Figure 1-13   Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Installed
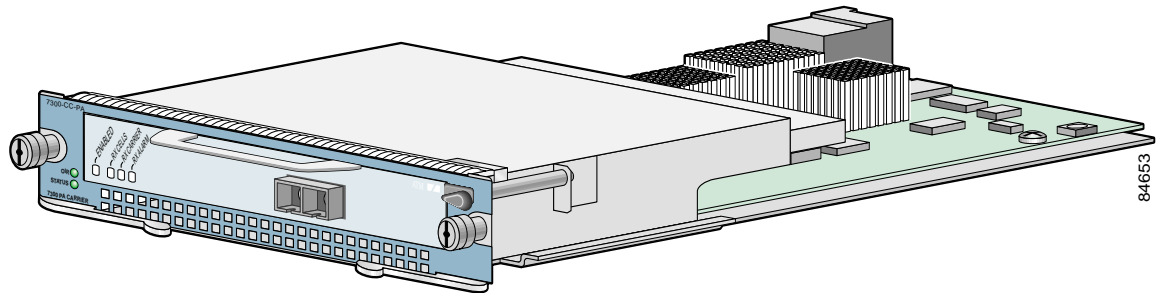
The Cisco 7304 PCI Port Adapter Carrier Card installs in Cisco 7304 router module slots 2 through 5. See Figure 1-14 for module slot numbering on a Cisco 7304 router.

Figure 1-14   Module Slots on the Cisco 7304 Router
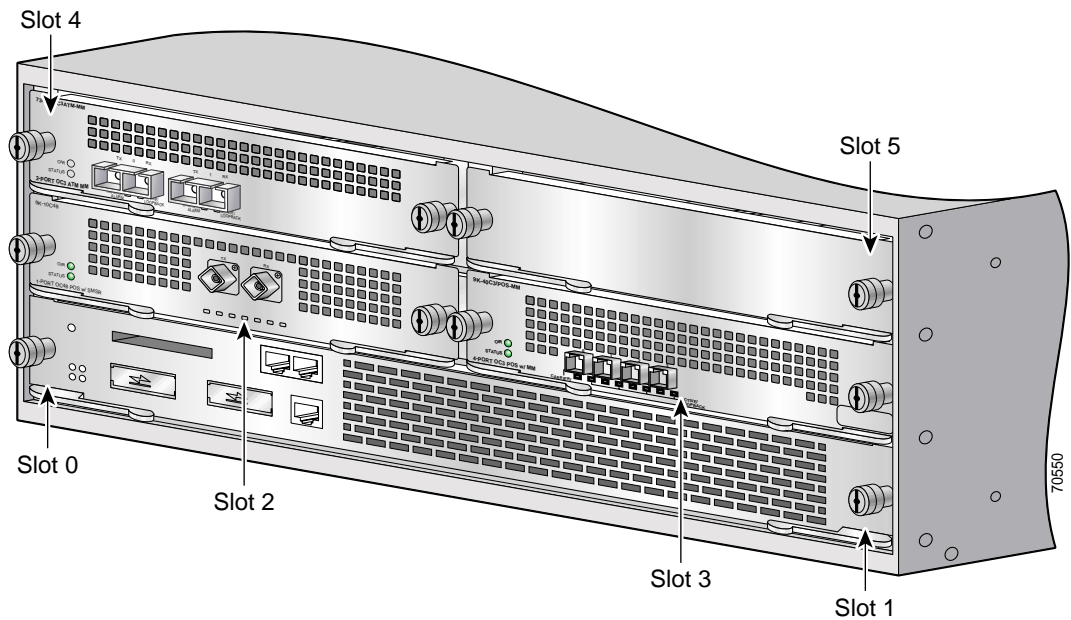
Cisco 7401ASR Router Slot Numbering

Figure 1-15 shows the front view of a Cisco 7401ASR router with a port adapter installed. There is only one port adapter slot in a Cisco 7401ASR router.

Figure 1-15   Cisco 7401ASR Router with a Port Adapter Installed
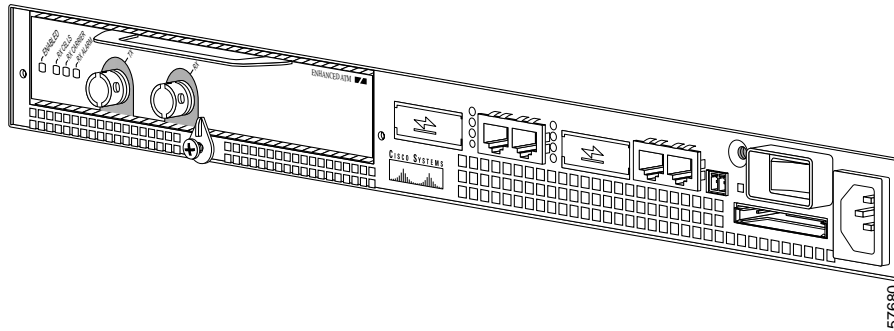
VIP Slot Numbering

Figure 1-16 shows a partial view of a VIP motherboard with installed port adapters. With the motherboard oriented as shown in Figure 1-16, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1. The slot numbering is the same for the Catalyst RSM/VIP2. The slots are always numbered 0 and 1.

Figure 1-16   VIP Motherboard with Two Port Adapters—Partial View, Horizontal Orientation

Port adapter slot 0

Port adapter slot 1

Port adapter handles not shown
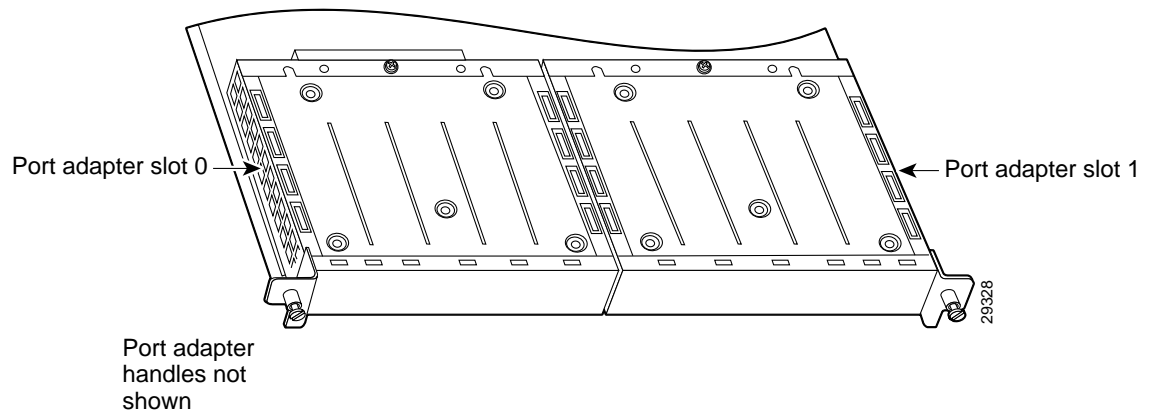
Note   In the Cisco 7000, Cisco 7507, Cisco 7513, and Cisco 7576 chassis, the VIP motherboard is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP motherboard is installed horizontally.

Figure 1-17 shows a VIP installed in an interface processor slot of a Cisco 7505 router.

Figure 1-17   Interface Slot Numbers—Cisco 7505 Shown
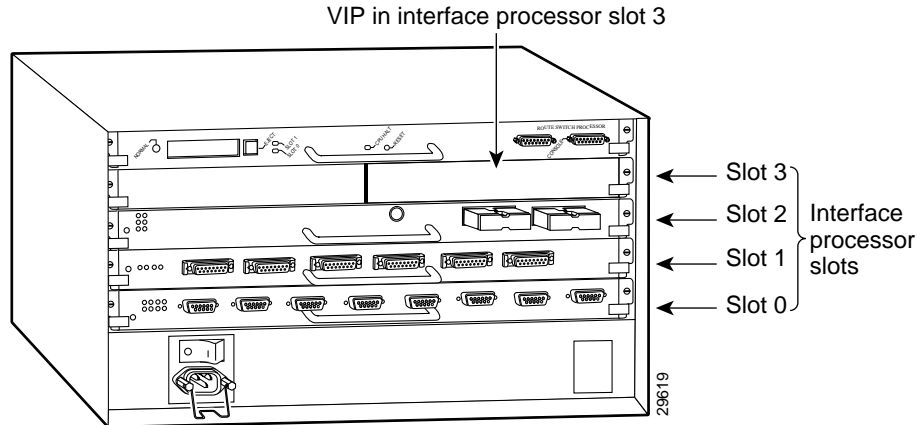
Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-2H in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on the PA-2H installed in a router or switch 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-2H 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.

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

Table 1-4 explains how to identify interface addresses.

Table 1-4   Identifying Interface Addresses

Platform	Interface Address Format	Numbers	Syntax
Catalyst RSM/VIP2 in Catalyst 5000 family switches	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 0 or 1 Interface port—0 and 1	0/1
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	Module-slot-number/port-adapter-bay-number/interface-port-number	Module slot number—2[1] through 6 or 9 (depending on the number of slots in the switch) Port adapter bay—always 0 or 1 Interface port—0 and 1	3/0/0
Cisco 7120 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 3 Interface port—0 and 1	3/1

Table 1-4   Identifying Interface Addresses (continued)

Platform	Interface Address Format	Numbers	Syntax
Cisco 7140 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 and 1	4/0
Cisco 7200 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—0 through 6 (depends on the number of slots in the router)[2] Interface port—0 and 1	1/0
Cisco uBR7223 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1[2] Interface port—0 and 1	1/0
Cisco uBR7246 and Cisco uBR7246 VXR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 or 2[2] Interface port—0 and 1	1/2
Cisco 7301 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 and 1	1/1
Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—router module slot 2 through 5 Interface port—0 and 1	3/0
Cisco 7401ASR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 and 1	1/1
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—always 0 or 1 Interface port—0 and 1	3/1/0

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

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

Catalyst RSM/VIP2 Interface Addresses

This section describes how to identify the interface addresses used for the PA-2H on the Catalyst RSM/VIP2 in Catalyst 5000 family switches. The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port number*.

See Table 1-4 for the interface address format.

Catalyst 6000 Family FlexWAN Module Interface Addresses

This section describes how to identify the interface addresses used for the PA-2H on the Catalyst FlexWAN module in the Catalyst 6000 family switches. The interface address is composed of a three-part number in the format *module-number/port-adapter-bay-number/interface-port-number*.

See Table 1-4 for the interface address format.

If the FlexWAN module is inserted in module slot 3, then the interface addresses of the PA-2H are 3/0/0 and 3/0/1 (module slot 3, port adapter bay 0, and interfaces 0 and 1). If the port adapter was in port adapter bay 1 on the FlexWAN module, these same interface addresses would be numbered 3/1/0 and 3/1/1.

> **Note** If you remove the FlexWAN module with the PA-2H from module slot 3 and install it in module slot 6, the interface addresses become 6/0/0 and 6/0/1.

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

Cisco 7100 Series Routers Interface Addresses

This section describes how to identify the interface addresses used for the PA-2H in Cisco 7100 series routers. The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See Table 1-4 for the interface address format.

Cisco 7200 Series and Cisco uBR7200 Series Routers Interface Addresses

This section describes how to identify the interface addresses used for the PA-2H in Cisco 7200 series routers or Cisco uBR700 series routers. The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See Table 1-4 for the interface address format.

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

The interface addresses of the interfaces on the PA-2H in port adapter slot 1 are 1/0 and 1/1 (port adapter slot 1 and interfaces 0 and 1). If the PA-2H was in port adapter slot 4, these same interfaces would be numbered 4/0 and 4/1 (port adapter slot 4 and interfaces 0 and 1).

In Cisco uBR7200 series routers, port adapter slots are numbered slot 1 and slot 2 for the Cisco uBR7246 and Cisco uBR7246 VXR and slot 1 for the Cisco uBR7223. (Slot 0 is always reserved for the Fast Ethernet port on the I/O controller—if present.) The individual interfaces always begin with 0. The number of additional interfaces depends on the number of interface ports on a port adapter.

The interface addresses of the interfaces on a PA-2H in port adapter slot 2 of a Cisco uBR7246 or Cisco uBR7246 VXR are 2/0 and 2/1 (port adapter slot 2 and interfaces 0 and 1). If the PA-2H was in port adapter slot 1, these same interfaces would be numbered 1/0 and 1/1 (port adapter slot 1 and interfaces 0 and 1).

Cisco 7301 Router Interface Addresses

This section describes how to identify the interface addresses for the PA-2H in a Cisco 7301 router. In the Cisco 7301 router, slot 1 is the port adapter slot you use for the PA-2H. (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 1-4 for the interface address format.

Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses

This section describes how to identify the interface addresses used for the PA-2H in the Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 routers. The interface address is made of a two-part number in the format *port-adapter-slot-number/interface-port-number*.

The Cisco 7304 PCI Port Adapter Carrier Card installs into Cisco 7304 router module slots 2 through 5 (See Figure 1-14.) The port-adapter-slot-number is the Cisco 7304 router module slot number. For example, the interface address of port 0 on a PA-2H, in which the Cisco 7304 PCI Port Adapter Carrier Card is installed in Cisco 7304 router module slot 3, would be numbered 3/0.

Cisco 7401ASR Router Interface Addresses

This section describes how to identify the interface addresses for the PA-2H in a Cisco 7401ASR router. In the Cisco 7401ASR router, slot 1 is the port adapter slot you use for the PA-2H. (See 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 1-4 for the interface address format.

VIP Interface Addresses

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

Note   Although the processor slots in the 7-slot Cisco 7000 and Cisco 7507 and 13-slot Cisco 7513 and Cisco 7576 are vertically oriented and those in the 5-slot Cisco 7010 and Cisco 7505 are horizontally oriented, all Cisco 7000 series and Cisco 7500 series routers use the same method for slot and port numbering.

See Table 1-4 for the interface address format. The interface address is composed of a three-part number in the format *interface-processor-slot-number/port-adapter-slot-number/interface-port-number*.

If the VIP is inserted in interface processor slot 3, then the interface addresses of the PA-2H are 3/1/0 and 3/1/1 (interface processor slot 3, port adapter slot 1, and interfaces 0 and 1). If the PA-2H was in port adapter slot 0 on the VIP, these same interface addresses would be numbered 3/0/0 and 3/0/1.

Note   If you remove the VIP with the PA-2H from interface processor slot 3 and install it in interface processor slot 2, the interface addresses become 2/1/0 and 2/1/1.

Preparing for Installation

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

- Required Tools and Equipment, page 2-1
- Software and Hardware Requirements, page 2-2
- Checking Hardware and Software Compatibility, page 2-4
- Safety Guidelines, page 2-4
- FCC Class A Compliance, page 2-10

Required Tools and Equipment

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

- Catalyst RSM/VIP2 (for installation in Catalyst 5000 family switches). For information about the specific Catalyst RSM/VIP2 models that support the PA-2H, see the "Software and Hardware Requirements" section on page 2-2.
- Catalyst 6000 family FlexWAN module (for installation in the Catalyst 6000 family switches).
- VIP (for installation in Cisco 7000 series or Cisco 7500 series chassis only).
- Cisco 7304 PCI Port Adapter Carrier Card (for installation in a Cisco 7304 router).
- PA-2H(=) Rev. B port adapter.
- HSSI cables appropriate for the PA-2H interfaces: CAB-HSI1= and CAB-HNUL=. (These HSSI cables are available *only* from Cisco Systems; they are *not* available from outside commercial cable vendors.)

⚠

Caution   Although the port adapter HSSI receptacle and the HSSI cable are similar to SCSI-II format, they are not identical. The HSSI cable specification is more restrictive than that for SCSI-II. If a SCSI-II cable is used instead of an HSSI cable, proper operation cannot be guaranteed.

- Number 1 Phillips and a 3/16-inch flat-blade screwdriver (for VIP and Catalyst RSM/VIP2 installation only).
- 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.

Software and Hardware Requirements

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

Table 2-1   PA-2H Software Requirements

Platform	Recommended Minimum Cisco IOS Release
Catalyst 5000 family switches with Catalyst RSM/VIP2[1][2][3]	Cisco IOS Release 11.2(15A)P or later release of Cisco IOS Release 11.2 P
• With Catalyst RSM/VIP2-15(=)	Cisco IOS Release 11.2(15A)P or later release of Cisco IOS Release 11.2 P
• With Catalyst RSM/VIP2-40(=)	
Catalyst 6000 family switches with Catalyst 6000 family FlexWAN module	
• Catalyst 6000 family MSFC[4]	Cisco IOS Release 12.1(1)E or later
• Supervisor engine software	Catalyst 6000 family supervisor engine software release 5.4(1)CSX or later
Cisco 7100 series	
• Cisco 7120 series and Cisco 7140 series	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0 T
Cisco 7200 series	
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0 T Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(15)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
• Cisco 7202	Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1 CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3 AA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
Cisco uBR7200 series	
• Cisco uBR7246, Cisco uBR7246 VXR, and Cisco uBR7223	Cisco IOS Release 11.3(7)NA or a later release of Cisco IOS Release 11.3 NA Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0 T Cisco IOS Release 12.0(7)SC or a later release of Cisco IOS Release 12.0 SC Cisco IOS Release 12.0(7)XR or a later release of Cisco IOS Release 12.0 XR
Cisco 7301 router	Cisco IOS Release 12.2(11)YZ
Cisco 7304 routers	
• With Cisco 7304 PCI Port Adapter Carrier Card	Cisco IOS Release 12.2(14)SZ or a later release of Cisco IOS Release 12.2SZ

Table 2-1   PA-2H Software Requirements (continued)

Platform	Recommended Minimum Cisco IOS Release
Cisco 7401ASR routers	Cisco IOS Release 12.2(1)DX or a later release of Cisco IOS Release 12.2 DX Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
VIP in the Cisco 7000 series and Cisco 7500 series[5 6 7 8 9]	Cisco IOS Release 11.1(12)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.2(9)P or a later release of Cisco IOS Release 11.2 P Cisco IOS Release 11.1(15)CA or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.2(11)P or a later release of Cisco IOS Release 11.2 P Cisco IOS Release 12.0(10)S or a later release of Cisco IOS Release 12.0 S Cisco IOS Release 12.0(10)S or a later release of Cisco IOS Release 12.0 S

1. The specific Catalyst RSM/VIP2 model recommended for the PA-2H is the VIP2-40(=), which has 2 MB of SRAM and 32 MB of DRAM. The PA-2H is also supported by the VIP2-15(=) with 1 MB of SRAM and 16 MB of DRAM, but we do not recommend its use with this model.

2. If you are using the High-Speed Serial Interface (HSSI) single- or dual-port adapter in the Catalyst 5000, 5500, 5505, or 5509 switch, you must install the port adapter on the Catalyst Versatile Interface Processor 2 (VIP2-15 or VIP2-40) Revision 2 (board part number 73-3468-XX, where XX is the version number). Do not use this port adapter in the Catalyst 5000, 5505, or 5509 switch if you are installing it on a Catalyst VIP2 (either VIP2-15 or VIP2-40) module that is not Revision 2. If you fail to comply with this restriction, your system will shut down because of an overload on the power supply.

3. You can have only two HSSI single- or dual-port adapters per chassis installed on a Catalyst VIP2-15 or VIP2-40 Revision 1 module used in the Catalyst 5500 switch.

4. MSFC = Multilayer Switch Feature Card

5. The PA-2H can be used in the VIP2 in all Cisco 7500 series routers using a Route Switch Processors (RSP), and in Cisco 7000 series routers using the RSP7000 and RSP7000CI.

6. The specific VIP2 models recommended for the PA-2H in all Cisco 7500 series routers, and in Cisco 7000 series routers using the RSP7000 and RSP7000CI, are VIP2-40(=), which has 2 MB of SRAM and 32 MB of DRAM, and VIP2-50(=), which has 4 to 8 MB of SRAM and 32 to 128 MB of SDRAM; however, the PA-2H is also supported by the VIP2-10, VIP2-15(=) and VIP2-20 models, but we do not recommend its use with these VIP2 models.

7. The PA-2H can be used in the VIP4 in all Cisco 7500 series routers using a Route Switch Processors (RSP), and in Cisco 7000 series routers using the RSP7000 and RSP7000CI.

8. The specific VIP4 model recommended for the PA-2H in all Cisco 7500 series routers, and in Cisco 7000 series routers using the RSP7000 and RSP7000CI, is the VIP4-80(=), which provides 64 or 128 MB of 100-MHz synchronous dynamic random-access memory (SDRAM) as the central processing unit (CPU) memory, and 64 or 128 MB of 100-MHz SDRAM as the packet memory.

9. The PA-2H is also supported by the VIP6-80.

Note   In the Cisco 7200 series routers, there are specific configuration guidelines that must be observed for high-bandwidth port adapters such as the PA-2H Rev. B. For port adapter hardware and memory configuration guidelines for the Cisco 7200 series routers (including a Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server), refer to the publication *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* that shipped with your Cisco 7200 series router.

Caution   The PA-2H cannot be used with a PA-A1 (Asynchronous Transfer Mode [ATM]) port adapter installed in the adjacent port adapter slot of a VIP or Catalyst RSM/VIP2. All other port adapters are compatible with the PA-2H when installed in the adjacent port adapter slot of your VIP or Catalyst RSM/VIP2.

Checking Hardware and Software Compatibility

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

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

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

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

Safety Guidelines

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

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, 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 ELÕÍRÁSOK

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

Megjegyzés ÕRIZZE 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。

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.

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-2H 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.

C H A P T E R **3**

Removing and Installing Port Adapters

This chapter describes how to remove the PA-2H port adapter from supported platforms, how to install a new or replacement port adapter, and how to connect cables. This chapter contains the following sections:

- Handling Port Adapters, page 3-1
- Online Insertion and Removal, page 3-2
- Warnings and Cautions, page 3-3
- Port Adapter Removal and Installation, page 3-4
- Connecting PA-2H Interface Cables, page 3-16

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

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

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

Handling Port Adapters

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

Figure 3-1   Handling a Port Adapter

Metal carrier

Printed circuit board

H6420
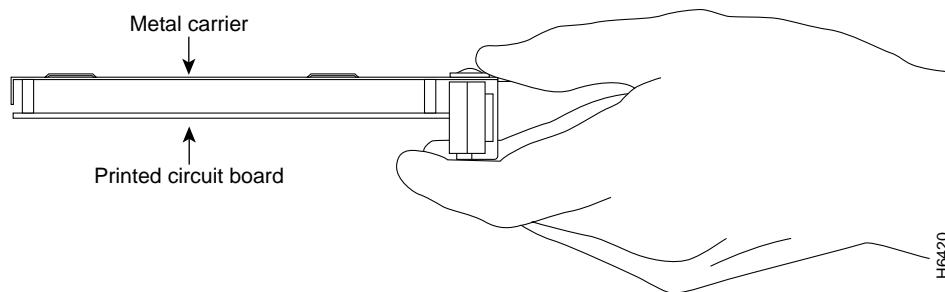
Online Insertion and Removal

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-2H on Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series routers, Cisco 7301 routers, or Cisco 7401ASR routers.

Although the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, and the Catalyst RSM/VIP2 support online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, or Catalyst RSM/VIP2 from the chassis and then install or replace port adapters as required. If a blank port adapter is installed on the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, or Catalyst RSM/VIP2 on which you want to install a new port adapter, you must first remove the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, or Catalyst RSM/VIP2 from the chassis and then remove the blank port adapter.

⚠

Caution   To prevent system problems, do not remove port adapters from the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, or Catalyst RSM/VIP2 motherboard or attempt to install other port adapters on the motherboard when the system is operating. To install or replace port adapters, first remove the Cisco 7304 PCI Port Adapter Carrier Card, the VIP, the Catalyst 6000 family FlexWAN module, or Catalyst RSM/VIP2 from its interface processor slot.

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

✎

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

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

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

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

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

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

1. Rapidly scans the system for configuration changes.

2. Initializes newly inserted port adapters or administratively shuts down any vacant interfaces.

3. Brings all previously configured interfaces on the module back to their previously installed state. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar module type is reinserted into a slot, its ports are configured and brought online up to the port count of the originally installed module of that type.

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

Warnings and Cautions

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

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

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

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

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

Port Adapter Removal and Installation

In this section, the illustrations that follow give step-by-step instructions on how to remove and install port adapters in each of the following supported platforms:

Catalyst RSM/VIP2—Removing and Installing a Port Adapter

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

Step 1

To remove the port adapter, remove the screw that secures the port adapter (or blank port adapter). (See A.)
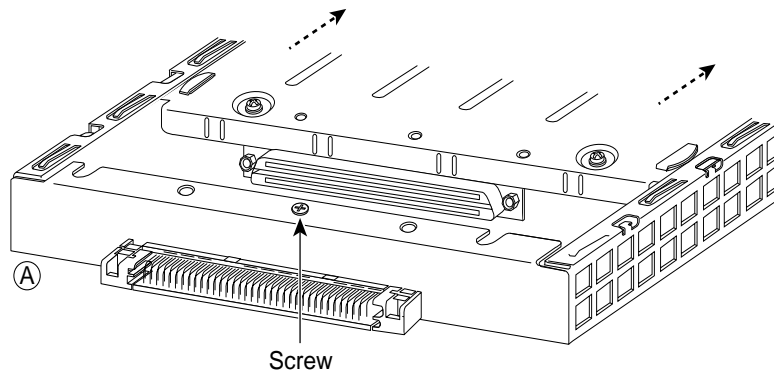
Step 2

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

Step 3

To install the port adapter, carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)
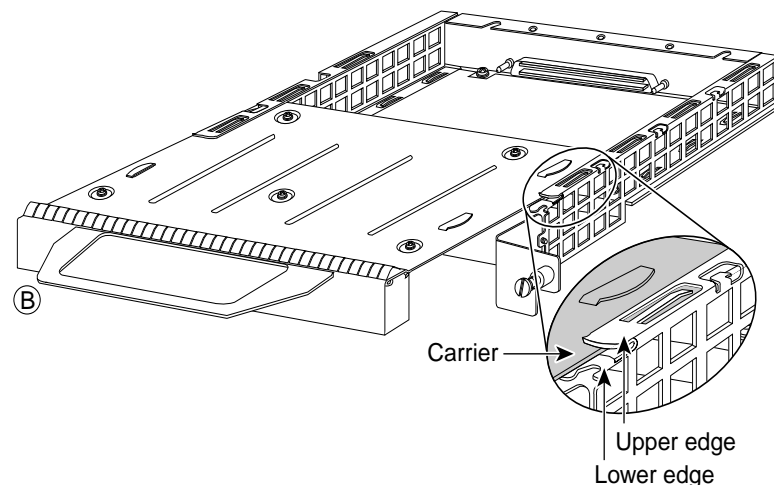
Step 4

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

Step 5

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

Step 6

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

Screw

Carrier

Upper edge
Lower edge

Slot
guide

5505

26521
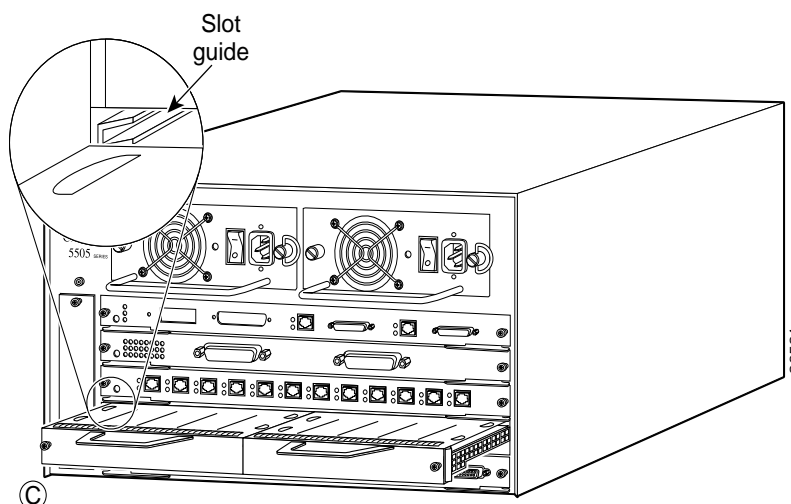
Catalyst 6000 Family FlexWAN Module—Removing and Installing a Port Adapter

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

Step 1

To remove the port adapter, remove the screw that secures the port adapter (or blank port adapter). (See A.)
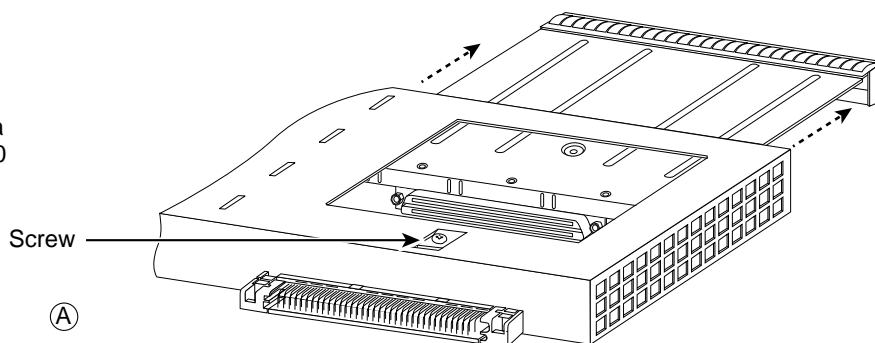
Step 2

With the screw removed, grasp the handle on the front of the port adapter (or blank port adapter) and carefully pull it out of its bay, away from the edge connector at the rear of the bay. (See A.)
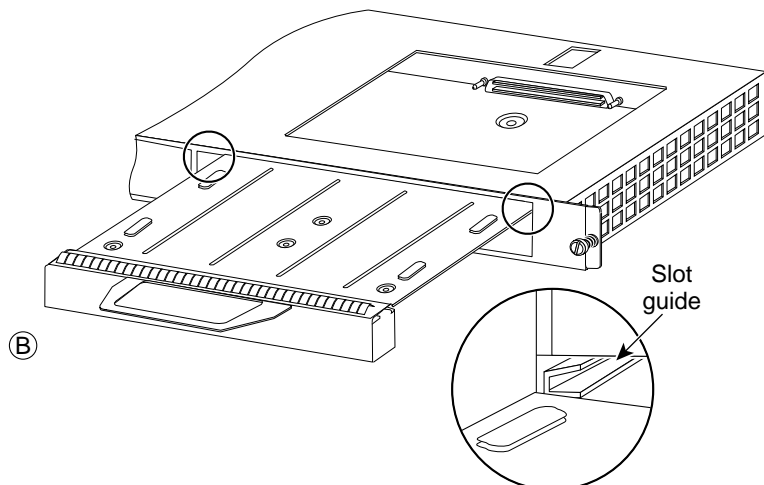
Step 3

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

Step 4

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

Step 5

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

Step 6

Reinstall the Catalyst 6000 FlexWAN module in the chassis, and tighten the captive installation screw on each side of the Catalyst 6000 FlexWAN module faceplate. (See C.)
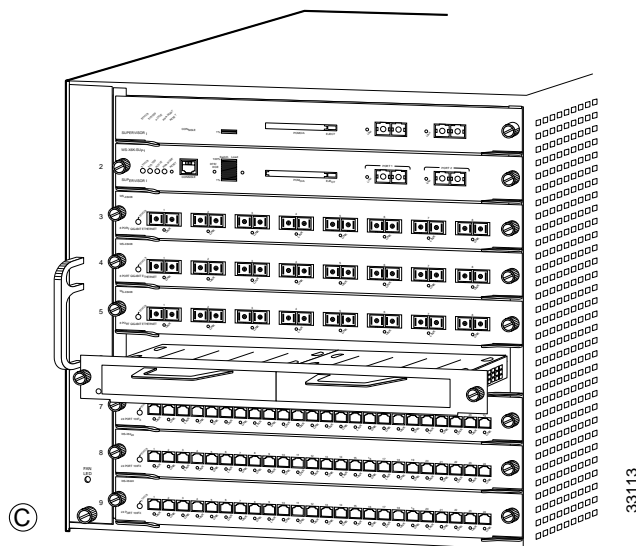
Cisco 7100 Series—Removing and Installing a Port Adapter

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.
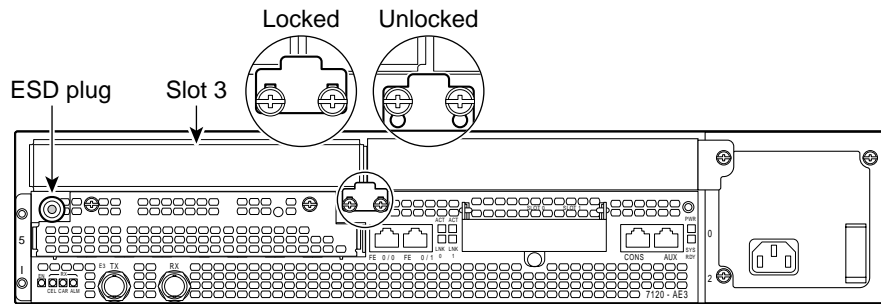
Step 2

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.
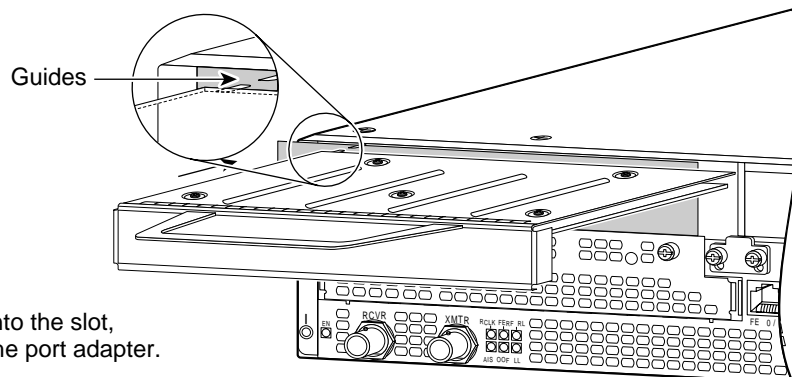
Step 6

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.

Cisco 7200 Series—Removing and Installing a Port Adapter

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

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

Step 6

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

Step 7

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

Port adapter lever
(locked position)

A

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

Port adapter lever
(unlocked position)

Slot guide

B
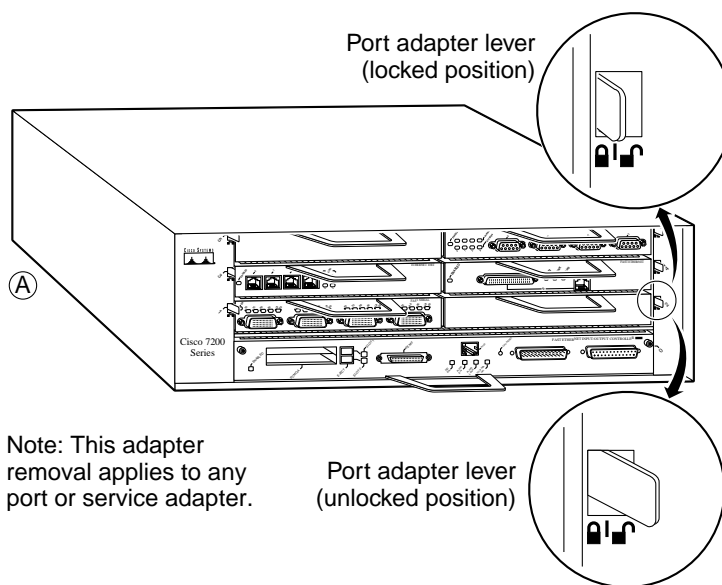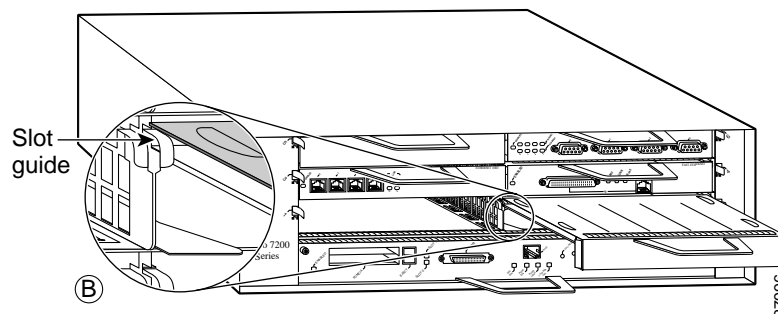
27996

Cisco uBR7200 Series—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.

Port adapters

Port adapter lever (locked position)

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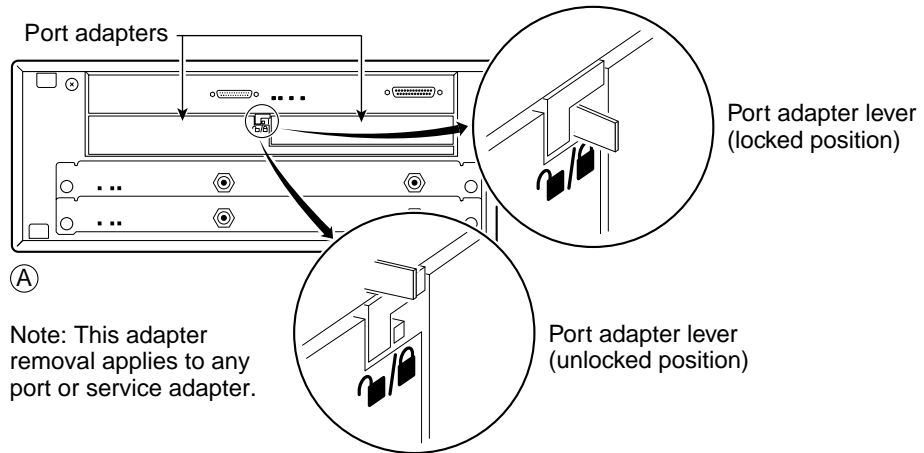
Place the port adapter lever (Cisco uBR7223, see A), or the port adapter retention clip (Cisco uBR7246 and Cisco uBR7246 VXR, see B) in the unlocked position. Either mechanism remains in the unlocked position.

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

Port adapter retention clip (locked position)

Port adapters

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.

Port adapter retention clip (unlocked position)
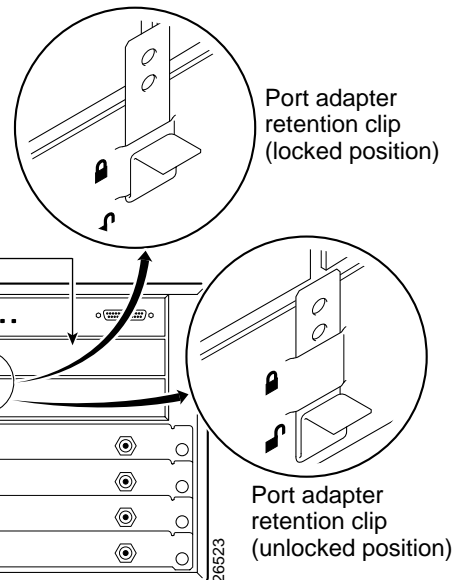
Cisco uBR7200 Series—Installing a Port Adapter

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 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, diconnect 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.
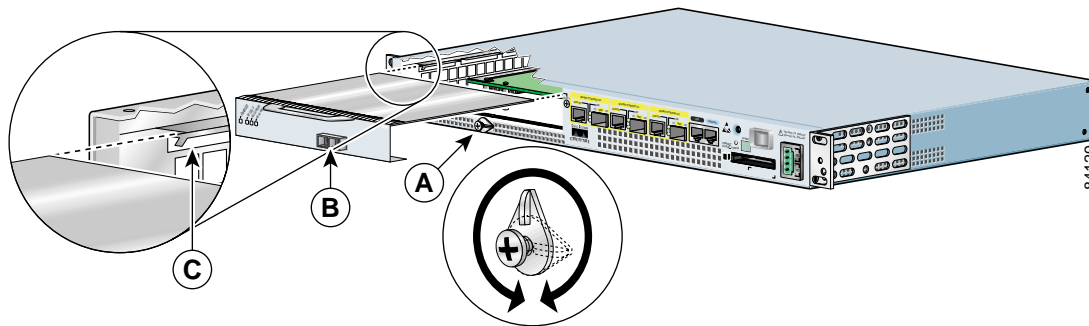
Step 5
To insert the port adapter, carefully align the port adapter carrier in the slot guides. (See C.) Slide the new port adapter halfway into the chassis.

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 theCisco 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
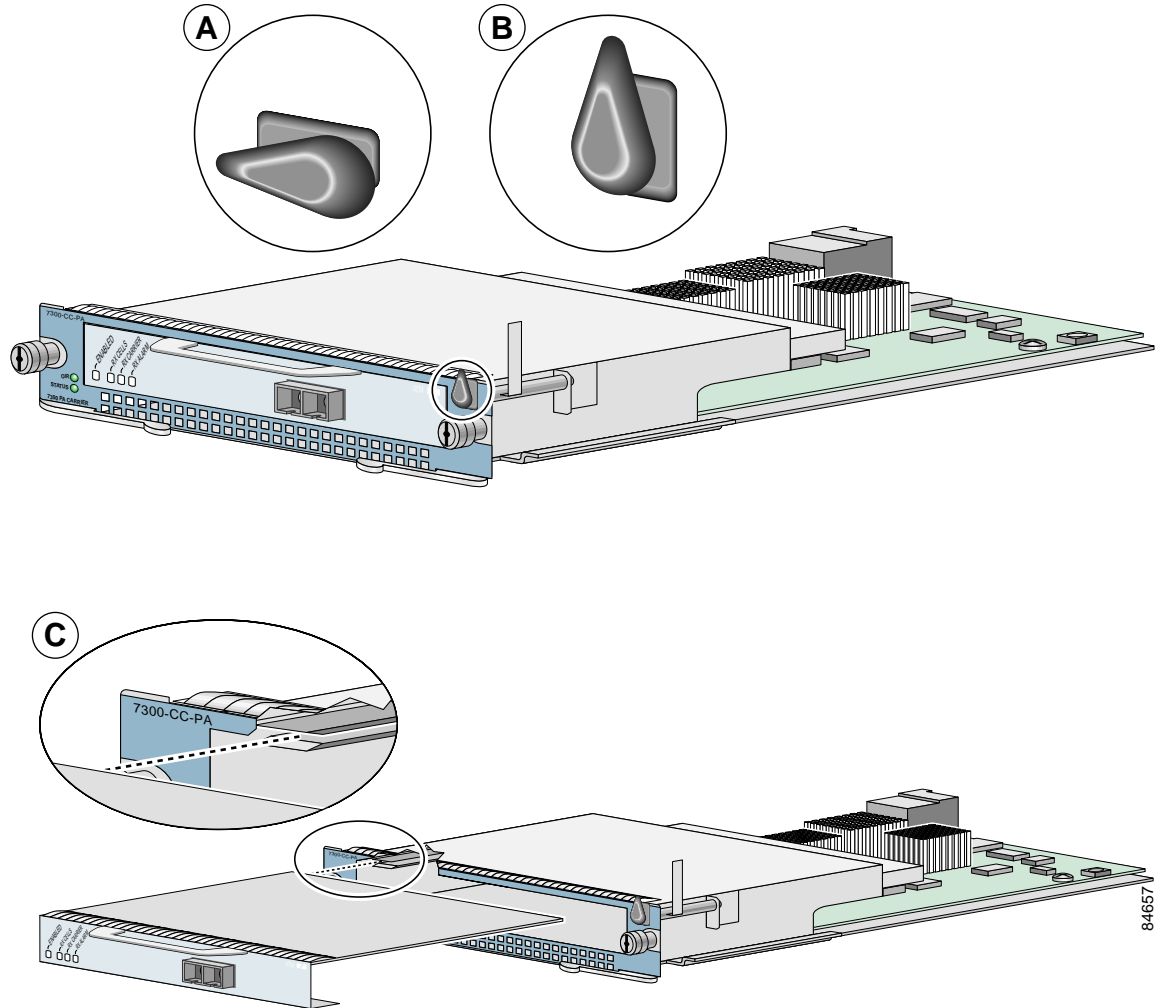
Cisco 7401ASR Router—Removing and Installing a Port Adapter

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˚.
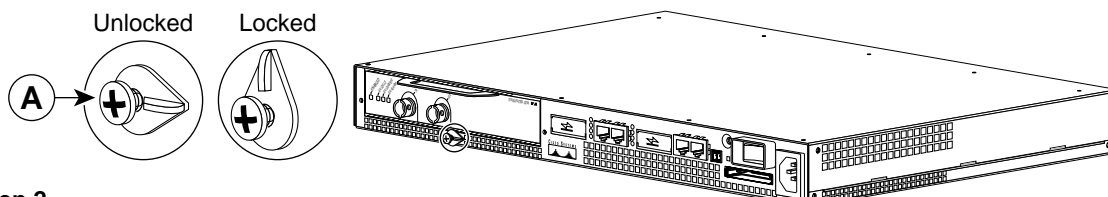
Step 2

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.)
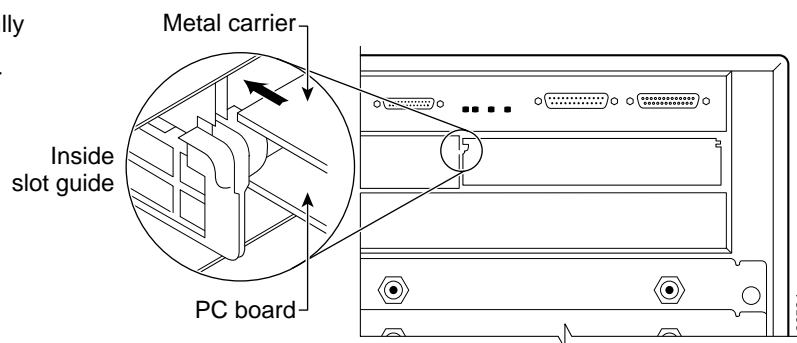
Step 3

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.
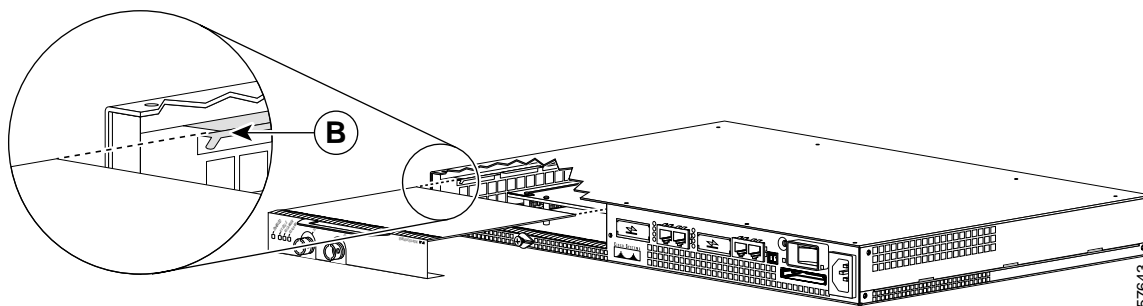
Step 5

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 adpater all the way into the slot until the port adapter is seated in the router midplane. When installed, the port adapter input/output panel should be flush with the face of the router.

Step 7

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

VIP—Removing and Installing a Port Adapter

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

Step 1

To remove the port adapter, remove
the screw that secures the port
adapter (or blank port adapter).
(See A.)
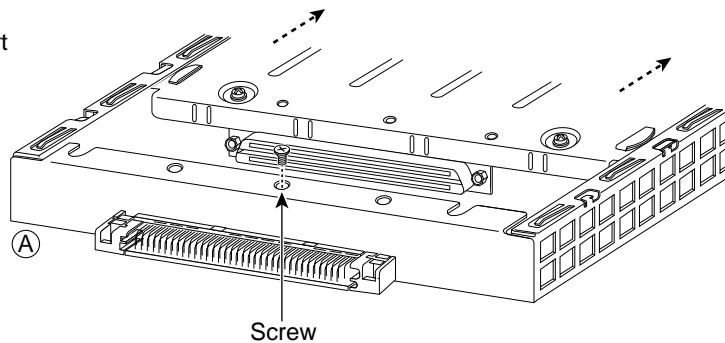
Step 2

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

Step 3

To insert the port adapter, carefully align
the port adapter carrier between the
upper and the lower edges of the port
adapter slot. (See B.)
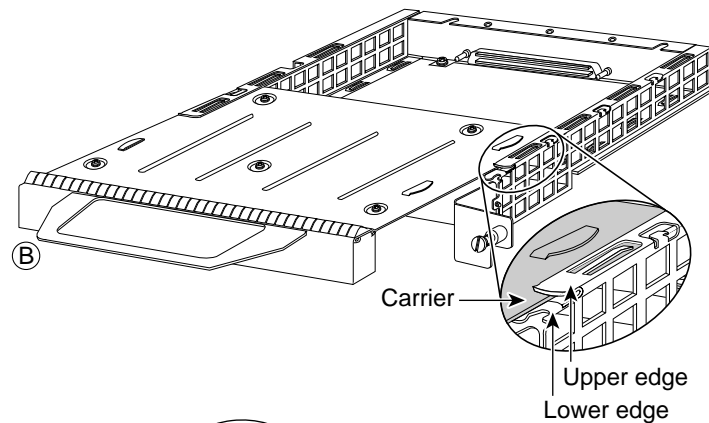
Step 4

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

Step 5

Install the screw in the rear of the port
adapter slot on the VIP. Do not
overtighten the screw. (See A.)
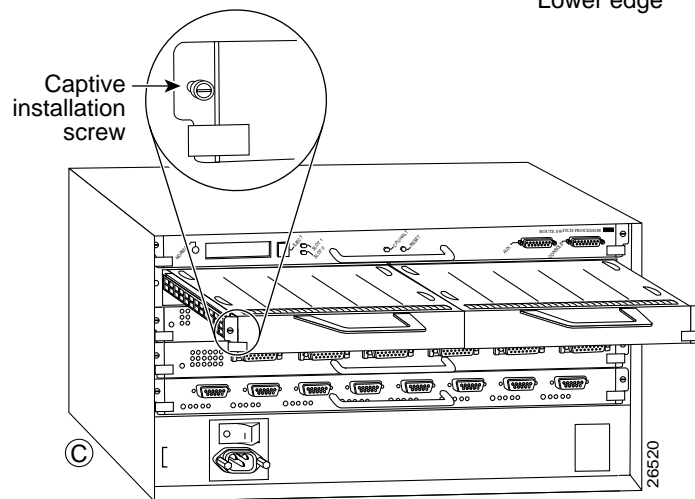
Step 6

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

Connecting PA-2H Interface Cables

This section describes the procedures for connecting HSSI cables and null modem cables to the PA-2H.

Connecting the HSSI Cables

This section describes the procedure for connecting HSSI cables to a PA-2H port adapter.

On a single PA-2H, you can use up to two HSSI connections. HSSI cables are available only from Cisco Systems; they are not available from outside commercial cable vendors.

⚠

Caution   Although the HSSI connector and the HSSI cable are similar to the SCSI-II format, they are not identical. The HSSI cable specification is more restrictive than that for the SCSI-II. If a SCSI-II cable is used instead of an HSSI cable, proper operation cannot be guaranteed

Use the following procedure to connect HSSI cables to a PA-2H:

Step 1   Attach the HSSI cable directly to each port on the PA-2H. (See Figure 3-3.)

✎

Note   Port adapters have a handle attached, but this handle is not shown in Figure 3-3. The HSSI cable plug and HSSI port receptacle are keyed for proper connection. Use the HSSI cable strain relief slide locks whenever HSSI cables are connected to the receptacles on the PA-2H.

Figure 3-3   Connecting HSSI Cables—Front View, PA-2H Shown Without Handle
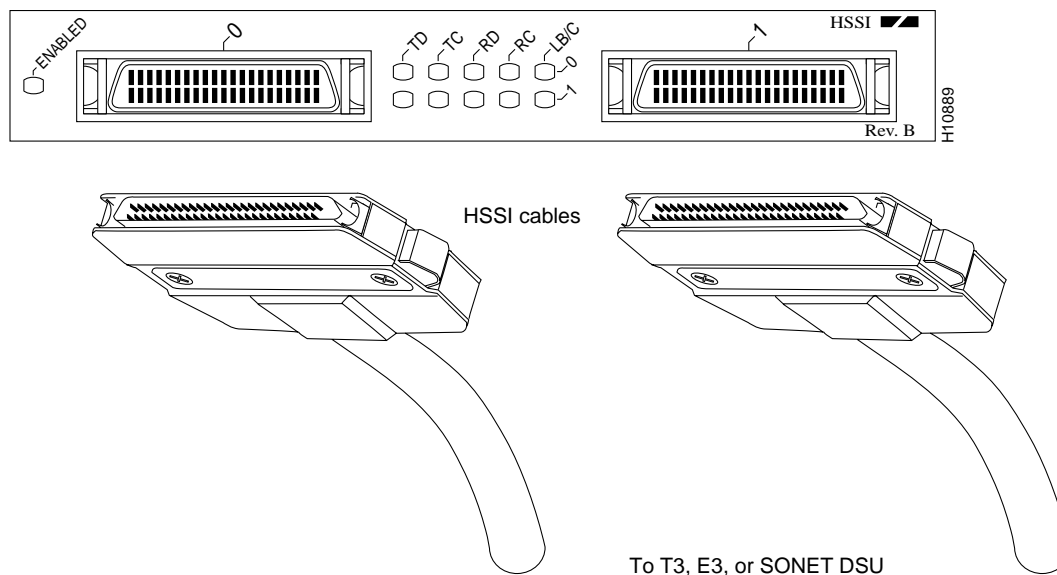
Step 2   Attach the network end of your HSSI cables to your T3, E3, or SONET DSU, or other external HSSI equipment.

This completes the procedure for attaching HSSI cables to the PA-2H. If you require a null modem cable for your HSSI connection, see the "Connecting a Null Modem Cable" section that follows; otherwise, proceed to the Chapter 4, "Configuring the PA-2H."

Connecting a Null Modem Cable

This section describes the procedure for connecting a null modem cable to a PA-2H port adapter.

The null modem cable can connect two routers directly back to back. The two routers must be in the same location, and can be two Cisco 7000 series routers, two Cisco 7100 series routers, two Cisco 7200 series routers, two Cisco uBR7200 series routers, two Cisco 7301 routers, two Cisco 7304 routers, two Cisco 7401ASR routers, two Cisco 7500 series routers, or one of each. In this setup, you can verify the operation of the HSSI or to directly link the routers in order to build a larger node. The null modem cable uses the same 50-pin connectors as the HSSI cable, but uses the pinouts listed in Table 1-3 in the "HSSI Null Modem Cable" section on page 1-5.

To connect two routers, attach a null modem cable between an HSSI port on each router. Enable the internal transmit clock in both routers by entering the command **hssi internal-clock**. All router platforms use the same **hssi internal-clock** command to enable the internal transmit clock on the HSSI.

You define Cisco 7000 series and Cisco 7500 series interfaces by type and *interface-processor-slot-number/port-adapter-slot-number/interface-port* locations. You define Cisco 7100 series, Cisco 7200 series, Cisco uBR7200 series, Cisco 7301 router, Cisco 7304 router and Cisco 7401ASR router interfaces by type and *port-adapter-slot-number/interface-port* locations. You define the Catalyst RSM/VIP2 in Catalyst 5000 family switches by *port-adapter-slot-number/interface-port* locations. (The output of the **show interfaces** command displays the logical unit number on all supported platforms and the *interface-processor-slot-number/port-adapter-slot-number/interface-port* location in the Cisco 7000 series and Cisco 7500 series, or the *port-adapter-slot-number/interface-port* location in the Cisco 7100 series, Cisco 7200 series, Cisco 7301 router, Cisco 7304 router, Cisco 7401ASR router, and Cisco uBR7200 series routers, and the Catalyst RSM/VIP2.)

Note   In the Cisco 7206 and Cisco 7206VXR router shelves, you define interfaces by type and *physical-shelf/port-adapter/port* locations. For information on Cisco 7206 and Cisco 7206VXR router shelf physical port addresses, see the "Identifying Interface Addresses" section on page 1-13 in Chapter 1.

The following examples show the configuration commands needed to prepare for a null modem cable connection in all supported platforms:

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

Enter configuration commands...
```

 • For Cisco 7000 series and Cisco 7500 series routers with VIP:

```
Router(config)# interface hssi 1/0/0
Router(config-if)# hssi internal-clock
Router(config-if)# Ctrl-Z
```

- For Catalyst 5000 family switches with Catalyst RSM/VIP2:

```
Router(config)# interface hssi 0/0
Router(config-if)# hssi internal-clock
Router(config-if)# Ctrl-Z
```

- For Catalyst 6000 family switches with Catalyst 6000 FlexWAN module:

```
Router(config)# interface hssi 3/0/0
Router(config-if)# hssi internal-clock
Router(config-if)# Ctrl-Z
```

- For Cisco 7100 series:

```
Router(config)# interface hssi 3/0
Router(config-if)# hssi internal-clock
Router(config-if)# Ctrl-Z
```

- For Cisco 7200 series, Cisco uBR7200 series, Cisco 7301 routers, Cisco 7304 routers, and Cisco 7401ASR routers:

```
Router(config)# interface hssi 1/0
Router(config-if)# hssi internal-clock
Router(config-if)# Ctrl-Z
```

Note For the Cisco 7206 and Cisco 7206VXR router shelves, the interface address specified in the Cisco 7200 series example above would be preceded by a shelf number. For example, the command **interface hssi 5/1/0** specifies the first interface of the port adapter in slot 1 of Cisco 7206 or Cisco 7206VXR router shelf 5.

Be sure to configure the HSSI port on both routers for an internal transmit clock. When the internal clock is enabled, the TC LED on the PA-2H goes on. When the internal clock is enabled in both routers, the TC and RC LEDs on both of the connected HSSI ports go on.

When you disconnect the null modem cable, you must also disable the internal transmit clock with the command **no hssi internal-clock.** Use this command to turn off the transmit clock for each interface on both routers.

This completes the procedure for attaching a null modem cable to your PA-2H.

Proceed to Chapter 4, "Configuring the PA-2H."

4

Configuring the PA-2H

To continue your PA-2H port adapter installation, you must configure the HSSI 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
- Checking the Configuration, page 4-10

Using the EXEC Command Interpreter

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

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

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

```
Router> enable

Password:
```

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

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

```
Router#
```

To configure the new interfaces, proceed to the "Configuring the Interfaces" section on page 4-2.

Configuring the Interfaces

After you verify that the new PA-2H 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

If you installed a new PA-2H 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-2H that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configuration.

For a summary of the configuration options available and instructions for configuring interfaces on a PA-2H, 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 Configuration, page 4-6
- Configuring Cyclic Redundancy Checks, page 4-8

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 interface processor. When you shut down an interface, it is designated *administratively down* in the **show** command displays.

Follow these steps to shut down an interface:

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

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

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

Step 3   Shut down interfaces by entering the **interface hssi** subcommand (followed by the interface address of the interface), and then enter the **shutdown** command. Table 4-1 shows the command syntax.

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   Syntax of the shutdown Command

Platform	Command	Example

Catalyst RSM/VIP2 in Catalyst 5000 family switches	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.
		
		```Router(config-if)# interface hssi 1/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 1/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	**interface**, followed by the *type* (**hssi**) and *mod_num/bay/port* (module-slot-number/ port-adapter-bay-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3.
		
		```Router(config-if)# interface hssi 3/0/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 3/0/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7120 series routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 3.
		
		```Router(config-if)# interface hssi 3/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 3/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7140 series routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 4.
		
		```Router(config-if)# interface hssi 4/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 4/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7200 series routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 6.
		
		```Router(config-if)# interface hssi 6/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 6/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco uBR7223 router	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.
		
		```Router(config-if)# interface hssi 1/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 1/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

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

Platform	Command	Example

Cisco uBR7246 and Cisco uBR7246 VXR routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 2.
		
		```Router(config-if)# interface hssi 2/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 2/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7301 routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.
		
		```Router(config-if)# interface hssi 1/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 1/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	**interface**, followed by the *type* (**hssi**) and *slot/port* (module-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router.
		
		```Router(config-if)# interface hssi 3/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 3/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Cisco 7401ASR routers	**interface**, followed by the *type* (**hssi**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 1.
		
		```Router(config-if)# interface hssi 1/0```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 1/1```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

VIP in Cisco 7000 series or Cisco 7500 series routers	**interface**, followed by the *type* (**hssi**) and *slot/port-adapter/port* (interface-processor-slot-number port-adapter-slot-number/ interface-port-number)	The example is for interface 1 and interface 0 on a port adapter in port adapter slot 1 of a VIP installed in interface processor slot 1.
		
		```Router(config-if)# interface hssi 1/1/1```
		```Router(config-if)# shutdown```
		```Router(config-if)# interface hssi 1/1/0```
		```Router(config-if)# shutdown```
		```Ctrl-Z```
		```Router#```

Note   If you need to shut down additional interfaces, enter the **interface hssi** 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 the 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.

Table 4-2   Examples of the show interfaces Command

Platform	Command	Example

Catalyst RSM/VIP2 in Catalyst 5000 family switches	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1.
		
		`Router(config)# show interfaces hssi 1/0`
		`Router(config-if)#`

Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	**show interfaces hssi**, followed by *mod_num/bay/port* (module-slot-number/ port-adapter-bay-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter bay 0 of a FlexWAN module in module slot 3.
		
		`Router# show interfaces hssi 3/0/0`
		
		`Serial 3/0/0 is administratively down, line protocol is down`
		
		`[Additional display text omitted from this example]`

Cisco 7120 series router	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 3.
		
		`Router(config)# show interfaces hssi 3/0`
		`Router(config-if)#`

Cisco 7140 series router	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 4.
		
		`Router(config)# show interfaces hssi 4/0`
		`Router(config-if)#`

Cisco 7200 series routers	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 6.
		
		`Router(config)# show interfaces hssi 6/0`
		`Router(config-if)#`

Cisco uBR7223 router	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot- number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1.
		
		`Router(config)# show interfaces hssi 1/0`
		`Router(config-if)#`

Cisco uBR7246 and Cisco uBR7246 VXR routers	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 2.
		
		`Router(config)# show interfaces hssi 2/0`
		`Router(config-if)#`

Cisco 7301 router	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1.
		
		`Router(config)# show interfaces hssi 1/0`
		`Router(config-if)#`

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

Platform	Command	Example
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	**show interfaces hssi**, followed by *slot/port* (module-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. `Router# `**`show interfaces hssi 3/0`** `Router(config-if)#`
Cisco 7401ASR router	**show interfaces hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1. `Router(config)# `**`show interfaces hssi 1/0`** `Router(config-if)#`
VIP in Cisco 7000 series or Cisco 7500 series routers	**show interfaces hssi**, followed by *slot/port-adapter/port* (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1 of a VIP in interface processor slot 1. `Router(config)# `**`show interfaces hssi 1/1/0`** `Router(config-if)#`

Step 6 Reenable the interfaces by doing the following:

a. Repeat Step 3 to reenable an interface. Substitute the **no shutdown** command for the **shutdown** command.

b. Repeat Step 4 to write the new configuration to memory.
Use the **copy running-config startup-config**

c. 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 Configuration

Following are instructions for a basic configuration: enabling an interface and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available for hssi 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 interface to configure by entering the **interface hssi** subcommand, followed by the interface address of the interface you plan to configure. Table 4-3 provides examples.

Table 4-3   Examples of the interface hssi Subcommand

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1. `Router(config)# `**`interface hssi 1/0`** `Router(config-if)#`
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	**interface hssi,** followed by *mod_num/bay/port* (module-slot-number/ port-adapter-bay-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter bay 0 of a FlexWAN module in module slot 3. `Router(config)# `**`interface hssi 3/0/0`** `Router(config-if)#`
Cisco 7120 series router	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 3. `Router(config)# `**`interface hssi 3/0`** `Router(config-if)#`
Cisco 7140 series router	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 4. `Router(config)# `**`interface hssi 4/0`** `Router(config-if)#`
Cisco 7200 series routers	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 6. `Router(config)# `**`interface hssi 6/0`** `Router(config-if)#`
Cisco uBR7223 router	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1. `Router(config)# `**`interface hssi 1/0`** `Router(config-if)#`
Cisco uBR7246 and Cisco uBR7246 VXR routers	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 2. `Router(config)# `**`interface hssi 2/0`** `Router(config-if)#`
Cisco 7301 router	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1. `Router(config)# `**`interface hssi 1/0`** `Router(config-if)#`
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	**interface hssi**, followed by *slot/port* (module-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. `Router(config-if)# `**`interface hssi 3/0`** `Router(config-if)#`

Table 4-3   Examples of the interface hssi Subcommand (continued)

Platform	Command	Example
Cisco 7401ASR router	**interface hssi**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1. `Router(config)# `**`interface hssi 1/0`** `Router(config-if)#`
VIP in Cisco 7000 series or Cisco 7500 series routers	**interface hssi**, followed by *slot/port-adapter/port* (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a PA-2H in port adapter slot 1 of a VIP in interface processor slot 1. `Router(config)# `**`interface hssi 1/1/0`** `Router(config-if)#`

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

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

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

Step 5   Reenable 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.

Configuring Cyclic Redundancy Checks

Table 4-4 summarizes cyclic redundancy check (CRC) commands. For more information, see the remainder of this section.

Table 4-4   CRC Commands

Purpose	Command	Example	Further Information

Enable 32-bit CRC.	**crc** *size*	The example enables 32-bit CRC on a serial interface:
		
		`Router(config)# interface hssi 3/0`
		`Router(config-if)# crc 32`
			"Configuring Cyclic Redundancy Checks"

Return to default 16-bit CRC.	**no crc** *size*	The example disables 32-bit CRC on a serial interface and returns to the default 16-bit CRC:
		
		`Router(config)# interface hssi 3/0`
		`Router(config-if)# no crc 32`
			"Configuring Cyclic Redundancy Checks"

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. All interfaces use a 16-bit CRC (CRC-CITT) by default but also support a 32-bit CRC. The sender of a data frame calculates the frame check sequence (FCS). Before it sends the 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 calculation, the receiver assumes that a transmission error occurred and sends a request to the sender to resend the frame.

Enable 32-bit CRC using the **crc32** command. Before you can enable 32-bit CRC, you must use the **interface hssi** command (followed by the interface address of the interface) to select the interface on which you want to enable 32-bit CRC. This command functions in the same way on all supported platforms.

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

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

The preceding command example applies to all systems in which the PA-2H is supported. Use the **no crc 32** command to disable CRC-32 and return the interface to the default CRC-16 (CRC-CITT) setting.

When you have finished, press **Ctrl-Z**–hold down the **Control** key while you press **Z**–or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt. Then write the new configuration to NVRAM using the **copy running-config startup-config** command.

For complete descriptions, refer to the *Configuration Fundamentals Configuration Guide* publication. For more information, see the "Obtaining Documentation" section on page x *and the* "Obtaining Technical Assistance" section on page xii.

Note   When enabling a 32-bit CRC on an interface, ensure that the remote device is also configured for a 32-bit CRC. Both the sender and the receiver must use the same CRC setting.

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 4-10
- Using the ping Command to Verify Network Connectivity, page 4-20

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-2H appears in them correctly. Sample displays of the output of selected **show** commands appear in the sections that follow. For complete command descriptions and examples, refer to the publications listed in the "Related Documentation" section on page viii.

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

Table 4-5   Using show Commands

Command	Function	Example
show version or **show hardware**	Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images	Router# **show version**
show controllers	Displays all the current interface processors and their interfaces	Router# **show controllers**
show diag *slot* Note The *slot* argument is not required with Catalyst 5000 family switches.	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	Router# **show diag 2**
show interfaces hssi 0 or **1/***interface-port-number*	Displays status information about a specific interface on a PA-2H in a Catalyst RSM/VIP2	Router# **show interfaces hssi 1/0**
show interfaces hssi *module-slot-number/port-adapter-bay-number/interface-port-number*	Displays status information about a specific interface on a PA-2H in a Catalyst 6000 family FlexWAN module	Router# **show interfaces hssi 3/0/0**
show interfaces hssi 3/*interface-port-number*	Displays status information about a specific interface on a PA-2H in a Cisco 7120 series router	Router# **show interfaces hssi 3/1**

Table 4-5   Using show Commands (continued)

Command	Function	Example
show interfaces hssi 4/*interface-port-number*	Displays status information about a specific interface on a PA-2H in a Cisco 7140 series router	Router# **show interfaces hssi 4/1**
show interfaces hssi *port-adapter-slot-number/ interface-port-number*	Displays status information about a specific interface on a PA-2H in a Cisco 7200 series router, Cisco 7301 router, and Cisco 7401ASR router	Router# **show interfaces hssi 1/0**
show interfaces hssi 1/*interface-port-number*	Displays status information about a specific interface on a PA-2H in a Cisco uBR7223 router	Router# **show interfaces hssi 1/1**
show interfaces hssi 1 or **2**/ *interface-port-number*	Displays status information about a specific interface on a PA-2H in a Cisco uBR7246 or Cisco uBR7246 VXR routers	Router# **show interfaces hssi 2/0**
show interfaces hssi 2 or **3** or **4** or **5**/ *interface-port-number*	Displays status information about a specific interface on a PA-2H on a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	Router# **show interfaces hssi 3/0**
show interfaces hssi *interface-processor-slot-number/port-adapter-slot-number/ interface-port-number*	Displays status information about a specific interface on a PA-2H on a VIP in a Cisco 7000 series or Cisco 7500 series router	Router# **show interfaces hssi 3/1/0**
show protocols	Displays protocols configured for the entire system and for specific interfaces	Router# **show protocols**
show running-config	Displays the running configuration file	Router# **show running-config**
show startup-config	Displays the configuration stored in NVRAM	Router# **show startup-config**

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

Choose the subsection appropriate for your system. Proceed to the "Using the ping Command to Verify Network Connectivity" section on page 4-20 when you have finished using the **show** commands.

Using the show version or show hardware Commands

Display the configuration of the system hardware, the number of each interface type installed, the Cisco IOS software version, the names and sources of configuration files, and the boot images, using the **show version** (or **show hardware**) command. The following examples show some platform-specific output examples using the **show version** 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.

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches

> **Caution**   If you are using the PA-2H in the Catalyst 5000, 5500, 5505, or 5509 switch, you must install the port adapter on the Catalyst RSM/VIP2-15 or -40 Revision 2 (Part Number 73-3468-XX, where XX is the version number). Do not use the PA-2H in the Catalyst 5000, 5505, or 5509 switch if you are installing it on a Catalyst RSM/VIP2-15 or -40 that is *not* Revision 2. If you fail to comply with this restriction, your system will shut down because of an overload of the power supply.

> **Caution**   You can only have two PA-2H port adapters per chassis when they are installed on a Catalyst RSM/VIP2-15 or -40 module Revision 1 and used in the Catalyst 5500 switch.

Following is an example of the **show version** command from a Catalyst 5000 family switch with the PA-2H:

```
Switch# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (C5RSM-JV-MZ), Released Version 11.2(15)A
Copyright (c) 1986-1995 by cisco Systems, Inc.
Compiled Fri 06-Oct-95 12:22 by mpo
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 5.3(5)
ROM: GS Bootstrap Software (RSP-BOOT-M), Version 11.1(12), RELEASED SOFTWARE

Switch uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "slot0:c5rsm-jv-mz", booted via slot0
```

```
cisco RSP2 (R4700) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.

1 VIP2 controllers (2 HSSI).
2 HSSI network interfaces.
125K bytes of non-volatile configuration memory.

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

Catalyst 6000 Family FlexWAN Module

Following is an example of the **show version** command from a Catalyst 6000 family switch with the PA-2H:

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

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

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

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

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

Cisco 7100 Series, Cisco 7200 Series, and Cisco uBR7200 Series Routers

Following is an example of the **show version** command from a Cisco 7200 series router with a PA-2H:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Released Version 12.0(3)T
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 09-Aug-96 21:14 by biff
Image text-base: 0x60010890, data-base: 0x605F0000

ROM: System Bootstrap, Version 12.0(3), RELEASED SOFTWARE
ROM: 7200 Software (C7200-J-M), Version 12.0(3), RELEASED SOFTWARE

Router uptime is 23 hours
System restarted by reload
System image file is "c7200-j-mz", booted via tftp from 10.0.0.10

cisco 7200 (R4700) processor with 22528K/10240K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).

(additional display text omitted from this example)

2 HSSI network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash internal SIMM (Sector size 256K).
   Configuration register is 0x0
```

Cisco 7401ASR Routers

Following is an example of the **show version** command from a Cisco 7401ASR router with a PA-2H:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7401ASR Software (C7401ASR-J-M), Released Version 12.0(3)T
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 09-Aug-96 21:14 by biff
Image text-base: 0x60010890, data-base: 0x605F0000

ROM: System Bootstrap, Version 12.0(3), RELEASED SOFTWARE
ROM: 7401ASR Software (C7401ASR-J-M), Version 12.0(3), RELEASED SOFTWARE

Router uptime is 23 hours
System restarted by reload
System image file is "c7401ASR-j-mz", booted via tftp from 10.0.0.10

cisco 7401ASR (R4700) processor with 22528K/10240K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).

(additional display text omitted from this example)
```

```
2 HSSI network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash internal SIMM (Sector size 256K).
   Configuration register is 0x0
```

VIP in Cisco 7000 Series or Cisco 7500 Series Routers

Following is an example of the **show version** command from a Cisco 7000 series router with a PA-2H:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-MZ), Released Version 11.1(12)CA
Copyright (c) 1986-1995 by cisco Systems, Inc.
Compiled Mon 10-May-99 12:22 by biff
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 5.3(5)
ROM: GS Bootstrap Software (RSP-BOOT-M), Version 11.1(12), RELEASED SOFTWARE

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

cisco RSP7000 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.

1 VIP2 controllers (2 HSSI).
2 HSSI network interfaces.
125K bytes of non-volatile configuration memory.

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

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, Cisco 7200 series, Cisco uBR7200 series router, a Cisco 7301 router, and a Cisco 7401ASR router and the *interface processor slot* in a Cisco 7000 series or Cisco 7500 series router with a VIP. (The *slot* argument is not required with Catalyst 5000 family switches and the Catalyst RSM/VIP.) The following examples show some platform-specific output examples using the **show diag** 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.

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches

Following is an example of the **show diag** command that shows a PA-2H in a Catalyst 5000 family switch:

```
Switch# show diag
Slot 0:
HSSI-B port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 2d13h ago
Hardware revision 1.17        Board revision A0
Serial number    12345678      Part number    73-1801-05
Test history      0x0          RMA number     00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 74 01 11 00 44 F1 94 49 07 09 05 00 00 00 00
0x30:50 00 00 00 97 04 21 00 FF FF FF FF FF FF FF FF

        Slot database information:
        Flags: 0x4     Insertion time: 0x14E8 (3d00h ago)

        VIP Controller Memory Size: Unknown

        PA Bay 0 Information:
                HSSI-B PA, 1 ports
                EEPROM format version 1
                HW rev 1.3, Board revision A0
                Serial number: 04551053   Part number: 73-2914-01
```

Catalyst 6000 Family FlexWAN Module

Following is an example of the **show diag** command that shows the PA-2H on a Catalyst 6000 family FlexWAN module:

```
Router# show diag

(additional display text omitted from this example)

Slot 7: Logical_index 15
Board is analyzed ipc ready FlexWAN controller

    Slot database information:
    Flags: 0x2004Insertion time: unknown

    CWAN Controller Memory Size: Unknown

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

Cisco 7100 Series, Cisco 7200 Series and Cisco uBR7200 Series Routers

Following is an example of the **show diag** *slot* command that shows a PA-2H in port adapter slot 2 of a Cisco 7200 series router:

```
Router# show diag 2
Slot 2:
    HSSI-B port adapter, 2 ports
    Port adapter is analyzed
    Port adapter insertion time 2d13h ago
    Hardware revision 1.3          Board revision A0
```

```
    Serial number     12345678      Part number 73-2914-01
    Test history      0x0           RMA number      00-00-00
    EEPROM format version 1
    EEPROM contents (hex):
      0x20: 01 74 01 01 00 44 F1 94 49 07 09 05 00 00 00 00
      0x30: 50 00 00 00 97 04 21 00 FF FF FF FF FF FF FF FF
```

Note Port adapters used with the Cisco 7200 VXR and Cisco uBR7246 VXR routers require the correct base hardware revision in order to function. The following error message will occur on bootup if the incorrect hardware revision is used:

```
PA-3-REVNOTSUPPORTED:PA in slot 1 (Mx HSSI-B) requires base h/w revision of (1.3) for this
chassis
```

Use the **show diag** command to display the hardware revision.

Cisco 7401ASR Routers

Following is an example of the **show diag** *slot* command that shows a PA-2H in port adapter slot 1 of a Cisco 7401ASR router:

```
Router# show diag 1
Slot 1:
      HSSI-B port adapter, 2 ports
      Port adapter is analyzed
      Port adapter insertion time 2d13h ago
      Hardware revision 1.3          Board revision A0
      Serial number     12345678      Part number 73-2914-01
      Test history      0x0           RMA number      00-00-00
      EEPROM format version 1
      EEPROM contents (hex):
        0x20: 01 74 01 01 00 44 F1 94 49 07 09 05 00 00 00 00
        0x30: 50 00 00 00 97 04 21 00 FF FF FF FF FF FF FF FF
```

VIP in Cisco 7000 Series or Cisco 7500 Series Routers

Following is an example of the **show diag** *slot* command for a PA-2H on a VIP4 in interface processor slot 8 of a Cisco 7500 series router:

```
Router# show diag 8
Slot 8:
      Physical slot 8, ~physical slot 0x7, logical slot 8, CBus 0
      Microcode Status 0x4
      Master Enable, LED, WCS Loaded
      Board is analyzed
      Pending I/O Status:None
      EEPROM format version 2
      VIP4 RM7000 controller, HW rev 2.01, board revision A0
      Serial number:12345678   Part number:211-18700-71
      Test history:0x02        RMA number:00-00-00
      Flags: unknown flags 0x7F; 7500 compatible

      EEPROM contents (hex):
        0x20:02 22 02 01 00 AF 7B C9 D3 49 0C 47 02 00 00 00
        0x30:02 3A 0C FF FF FF FF FF FF FF FF FF FF FF FF FF

      Slot database information:
      Flags:0x4     Insertion time:0x3EC4FE0 (00:02:08 ago)

      Controller Memory Size:64 MBytes DRAM, 65536 KBytes SRAM
```

```
            PA Bay 0 Information:
                    Mx HSSI PA, 2 ports
                    EEPROM format version 1
                    HW rev 1.03, Board revision A0
                  Serial number:12345678 Part number:73-2914-02
```

Using the show interfaces Command

The **show interfaces** command displays status information (including the physical slot and interface address) for the interfaces you specify. All of the examples that follow specify HSSI interfaces. The following examples show some platform-specific output examples using the **show interfaces** command.

Note The syntax for the **show interfaces** command is given in Table 4-2 for all supported platforms.

For complete descriptions of interface subcommands and the configuration options available for Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7100 series, Cisco 7200 series, Cisco uBR7200 series, Cisco 7301 routers, Cisco 7401ASR routers, and VIP interfaces, refer to the publications listed in the "Related Documentation" section on page viii.

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

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches

Following is an example of the **show interfaces hssi** command for a PA-2H in a Catalyst 5000 family switch:

```
Switch# show interfaces hssi 0/0
Hssi0/0 is up, line protocol is up
 Hardware is HSSI-B
  Internet address is 10.1.1.10
  MTU 4470 bytes, BW 45045 Kbit, DLY 200 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input 2d22h, output 00:00:19, output hang never
  Last clearing of "show interface" counters 2d20h
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     4084 packets output, 1298712 bytes, 0 underruns
     0 output errors, 0 applique, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

Catalyst 6000 Family FlexWAN Module

Following is an example of the **show interfaces hssi** command for a PA-2H in a Catalyst 6000 family FlexWAN module:

```
Router# show interfaces hssi 7/0/0
Hssi7/0/0 is administratively up, line protocol is up
  Hardware is HSSI
```

```
        MTU 4470 bytes, BW 45045 Kbit, DLY 200 usec,
            reliability 255/255, txload 1/255, rxload 1/255
        Encapsulation HDLC, crc 16, loopback not set
        Keepalive not set
        Last input never, output never, output hang never
        Last clearing of "show interface" counters never
        Queueing strategy: fifo
        Output queue 0/40, 0 drops; input queue 0/75, 0 drops
        5 minute input rate 0 bits/sec, 0 packets/sec
        5 minute output rate 0 bits/sec, 0 packets/sec
            0 packets input, 0 bytes, 0 no buffer
            Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
                    0 parity
            0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
            0 packets output, 0 bytes, 0 underruns
            0 output errors, 0 applique, 0 interface resets
            0 output buffer failures, 0 output buffers swapped out
            0 carrier transitions
            LC=down  CA=down  TM=down LB=down TA=down LA=down
```

Cisco 7100 Series, Cisco 7200 Series and Cisco uBR7200 Series Routers

Following is an example of the **show interfaces hssi** command for a PA-2H in a Cisco 7200 series router:

```
Router# show interfaces hssi 2/0
Hssi2/0 is up, line protocol is up
Hardware is HSSI-B
  Internet address is 10.1.1.10
  MTU 4470 bytes, BW 45045 Kbit, DLY 200 usec, rely 252/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
             0 parity
     0 input errors, 1 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     1 packets output, 24 bytes, 0 underruns
     0 output errors, 0 applique, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions    TM=down  CA=up  LC=down
```

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

Cisco 7401ASR Routers

Following is an example of the **show interfaces hssi** command for a Cisco 7401ASR router:

```
Router# show interfaces hssi 1/0
POS1/0 is up, line protocol is up
Hardware is Packet over Sonet
Internet address is 1.1.1.2/8
MTU 4470 bytes, BW 155000 Kbit, DLY 100 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, crc 16, loopback not set
Keepalive not set
Scramble disabled
Last input 00:00:16, output never, output hang never
```

```
            Last clearing of "show interface" counters never
            Queueing strategy:fifo
            Output queue 0/40, 0 drops; input queue 0/75, 0 drops
            5 minute input rate 0 bits/sec, 0 packets/sec
            5 minute output rate 0 bits/sec, 0 packets/sec
            7 packets input, 1158 bytes, 0 no buffer
            Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
            0 parity
            10 input errors, 10 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
            7 packets output, 1158 bytes, 0 underruns
            0 output errors, 0 applique, 1 interface resets
            0 output buffer failures, 0 output buffers swapped out
            0 carrier transitions
```

VIP in Cisco 7000 Series or Cisco 7500 Series Routers

Following is an example of the **show interfaces hssi** command for a PA-2H in a Cisco 7000 series or Cisco 7500 series router:

```
Router# show interfaces hssi 1/0/0
Hssi1/0/0 is up, line protocol is up
 Hardware is HSSI-B
  Internet address is 10.1.1.10
  MTU 4470 bytes, BW 45045 Kbit, DLY 200 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input 2d22h, output 00:00:19, output hang never
  Last clearing of "show interface" counters 2d20h
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     4084 packets output, 1298712 bytes, 0 underruns
     0 output errors, 0 applique, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

Using the ping Command to Verify Network Connectivity

Using the **ping** command, you can verify that an interface port is functioning properly. This section provides a brief description of this command. Refer to the publications listed in the "Related Documentation" section on page viii for detailed command descriptions and examples.

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

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

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

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

This completes the PA-2H interface configuration.