PA-8B-ST Basic Rate Interface Port Adapter Installation and Configuration

Product Numbers: PA-8B-ST(=)

Platforms Supported: Cisco 7100 Series Routers, Cisco 7200 Series Routers, Cisco 7200 VXR Routers, Cisco 7301 Router, and Cisco 7401ASR Router

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PA-8B-ST Basic Rate Interface Port Adapter Installation and Configuration

CONTENTS

Preface

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

Document Revision History

The Document Revision History table below, beginning with version OL-3522-02, records technical changes to this document.

Document Version	Date	Change Summary
OL-3522-02	April, 2007	Moved into new templates.

Objectives

This document describes how to install and configure the PA-8B-ST Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) port adapter, hereafter referred to as the PA-8B-ST, which is used in the following platforms:

- Cisco 7100 series routers, consisting of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers and Cisco 7200 VXR routers, consisting of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and Cisco 7206VXR
- Cisco 7301 router
- Cisco 7401ASR router

Organization

This document contains the following chapters:

:

Section	Title	Description
Chapter 1	Overview	Describes the PA-8B-ST and its LED displays, cables, and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform before the actual installation.
Chapter 3	Removing and Installing Port Adapters	Describes the procedures for installing and removing PA-8B-ST in the supported platforms.
Chapter 4	Configuring the PA-8B-ST	Provides instructions for configuring the PA-8B-ST on the supported platforms.

Related Documentation

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

- Cisco IOS software:

  command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

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

- Cisco 7100 series routers:
  - For an online directory to quickly access documents for Cisco 7100 series routers, refer to the *Cisco 7100 Series Documentation* roadmap at the following URL:

    http://www.cisco.com/en/US/products/hw/vpndevc/ps333/products_product_index09186a00800fa142.html
  - For hardware installation and configuration information refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide*.
  - For information on setting up a Virtual Private Network, refer to the *Cisco 7100 Series VPN Configuration Guide*.

- Cisco 7200 series routers:
  - For an online directory to quickly access documents for Cisco 7200 series routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:

    http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
  - For hardware installation and configuration information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the online installation and configuration guide and quick start for your Cisco 7200 series router.
  - For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
  - For information on network processing engines or network services engines, refer to the *Network Processing Engine and Network Services Engine Installation and Configuration* document.
- Cisco 7200 VXR routers:
  - For an online directory to quickly access documents for Cisco 7200 VXR routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:

    http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
  - For hardware installation and maintenance information, refer to the *Cisco 7200 VXR Installation and Configuration Guide* or the *Cisco 7200 VXR Routers Quick Start Guide*.
- Cisco 7301 router:
  - For an online directory to quickly access documents for the Cisco 7301 router, refer to the *Cisco 7301 Internet Router Documentation Roadmap* at the following URL:

    http://www.cisco.com/en/US/products/hw/routers/ps352/products_documentation_roadmap09186a00801c0f21.html
  - For hardware installation and maintenance information, refer to the *Cisco 7301 Installation and Configuration Guide* or the *Cisco 7301 Router Quick Start Guide*.
- Cisco 7401ASR router:
  - For an online directory to quickly access documents for the Cisco 7401ASR router, refer to the *Cisco 7401ASR Router Documentation Roadmap* at the following URL:

    http://www.cisco.com/en/US/products/hw/routers/ps354/products_documentation_roadmap09186a00801c0fd5.html
  - For hardware installation and maintenance information, refer to the *Cisco 7401ASR Installation and Configuration Guide* or the *Cisco 7401ASR Router Quick Start Guide.*

- For international agency compliance, safety, and statutory information for WAN interfaces, refer to the following documents. Use the documentation roadmap for your particular router to link to the appropriate documents for your router:
  - *Regulatory Compliance and Safety Information for Cisco 7100 Series VPN Routers*
  - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
  - *Regulatory Compliance and Safety Information for the Cisco 7301 Internet Router*
  - *Regulatory Compliance and Safety Information for the Cisco 7401ASR Internet Router*

Obtaining Documentation, Obtaining Support, and Security Guidelines

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

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

CHAPTER 1

Overview

This chapter describes the PA-8B-ST port adapter and contains the following sections:

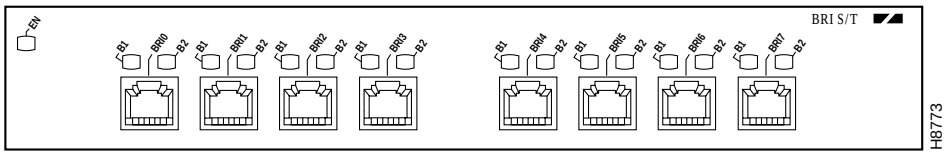
Port Adapter Overview

The PA-8B-ST, shown in Figure 1-1, provides up to eight S/T-type BRI interfaces for connecting the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco 7301 router, or Cisco 7401ASR router to an ISDN WAN through an external network terminator (NT1) device. Each PA-8B-ST interface consists of two bearer (B) channels that can transmit and receive data at the rate of 64 kilobits per second (kbps), or 56 kbps in full-duplex mode, and one data (D) channel that can transmit and receive data at the rate of 16 kbps, full-duplex. The B channels are used for transmitting user data. The D channel is used for call setup control and network connection trade-in, and provides the communication from the router to the ISDN switch. The PA-8B-ST supports dial-on-demand routing (DDR).

Each PA-8B-ST interface is an RJ-45 receptacle. A standard straight-through twisted-pair cable is available from Cisco Systems and other vendors for use with the PA-8B-ST.

Note Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco 7301 routers, and Cisco 7401ASR routers support the online insertion and removal (OIR) of all port adapter types.

Figure 1-1 PA-8B-ST—Faceplate View

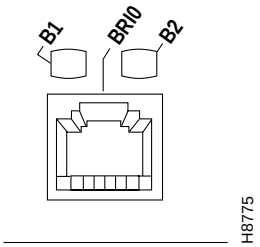


The PA-8B-ST can be installed in port adapter slot 3 in the Cisco 7120 series router, port adapter slot 4 in the Cisco 7140 series router, any of the available port adapter slots in the Cisco 7200 series routers and Cisco 7200 VXR routers, port adapter slot 1 in the Cisco 7301 router, and port adapter slot 1 in the Cisco 7401ASR router. See "Port Adapter Slot Locations on the Supported Platforms" section on page 1-3 for more details.

LEDs

The PA-8B-ST has an ENABLED LED, standard on all port adapters, and two status LEDs for each port. (See Figure 1-2.)

Figure 1-2 PA-8B-ST LEDs—Horizontal Orientation



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-8B-ST is enabled:

- The PA-8B-ST is correctly connected and is receiving power.
- A valid system software image for the port adapter has been downloaded successfully.
- The system recognizes the PA-8B-ST.

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-8B-ST LEDs

Enabled	Green	On	Port adapter is enabled for operation.
		Off	Indicates one of the following: • Port adapter is incorrectly connected to the midplane and is not receiving power. • Valid software image for the port adapter has not been successfully downloaded. • System does not recognize port adapter. • Initialization has failed for other reasons.
B1	Green	On	Indicates data traffic on channel B1.
B2	Green	On	Indicates data traffic on channel B2.

Cables, Connectors, and Pinouts

The eight S/T-type BRI interfaces on the PA-8B-ST support a standard, straight-through twisted-pair cable with an RJ-45 connector at the router (Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco 7301 router, or Cisco 7401ASR router) end and at the network end. Cisco Systems does not provide the cable; it is widely available from other vendors. Figure 1-3 shows the PA-8B-ST interface cable.

Figure 1-3 PA-8B-ST Interface Cable

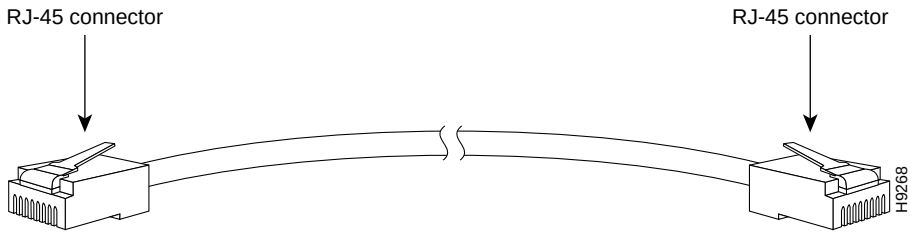


Table 1-2 lists the pinouts for PA-8B-ST interface ports.

Table 1-2 PA-8B-ST Interface Port Pinouts

8-Pin Interface Port[1]	TE[2]	NT[3]	Polarity
3	Transmit	Receive	+
4	Receive	Transmit	+
5	Receive	Transmit	–
6	Transmit	Receive	–

1. Pins 1, 2, 7, and 8 are not used.
2. TE refers to terminal terminating layer 1 aspects of TE1, TA, and NT2 functional groups.
3. NT refers to network terminating layer 1 aspects of NT1 and NT2 functional groups.

Port Adapter Slot Locations on the Supported Platforms

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

- Cisco 7100 Series Routers Slot Numbering, page 1-4
- Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering, page 1-5
- Cisco 7301 Router Slot Numbering, page 1-6
- Cisco 7401ASR Router Slot Numbering, page 1-6

Cisco 7100 Series Routers Slot Numbering

The PA-8B-ST 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 1-4 shows the slot numbering on a Cisco 7120 series router. Figure 1-5 shows the slot numbering on a Cisco 7140 series router.

Figure 1-4 Port Adapter Slots in the Cisco 7120 Series Router

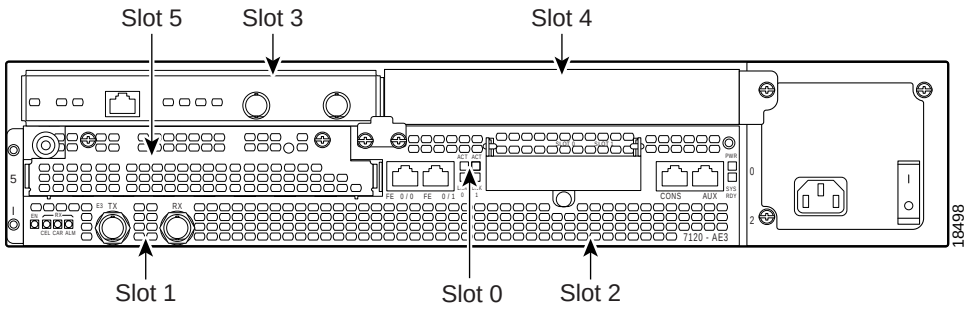
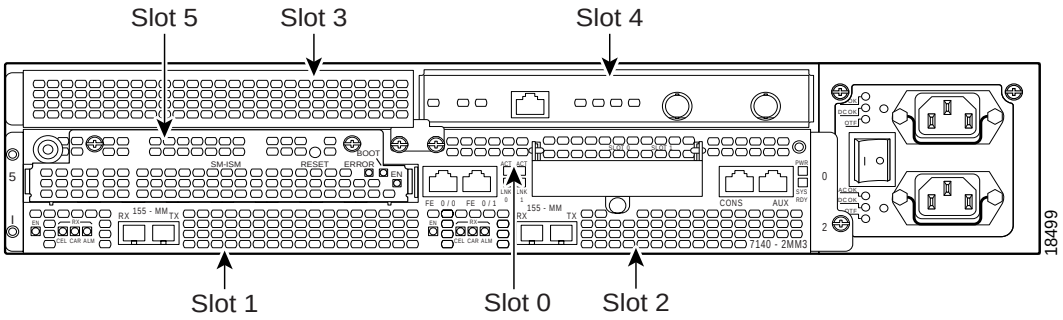


Figure 1-5 Port Adapter Slots in the Cisco 7140 Series Router



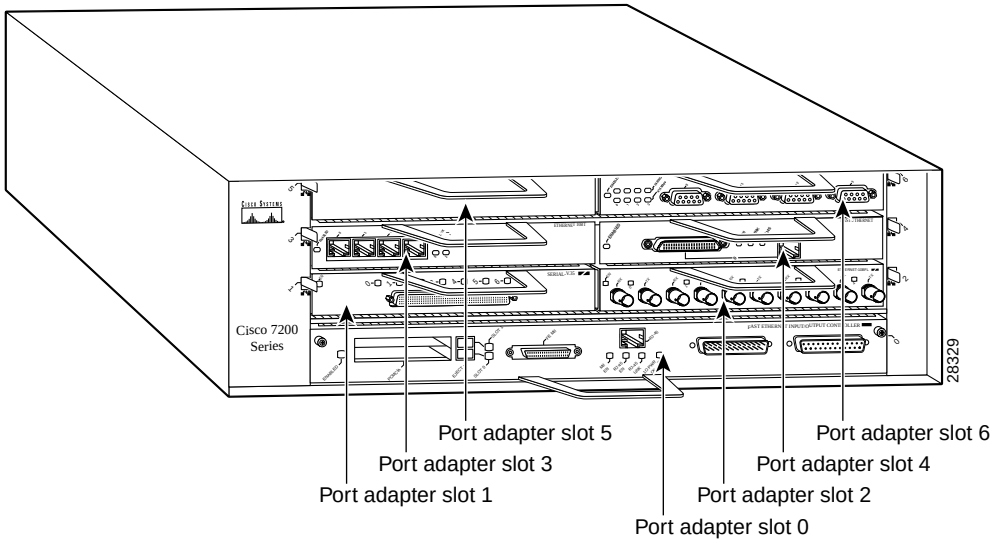
Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering

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

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

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

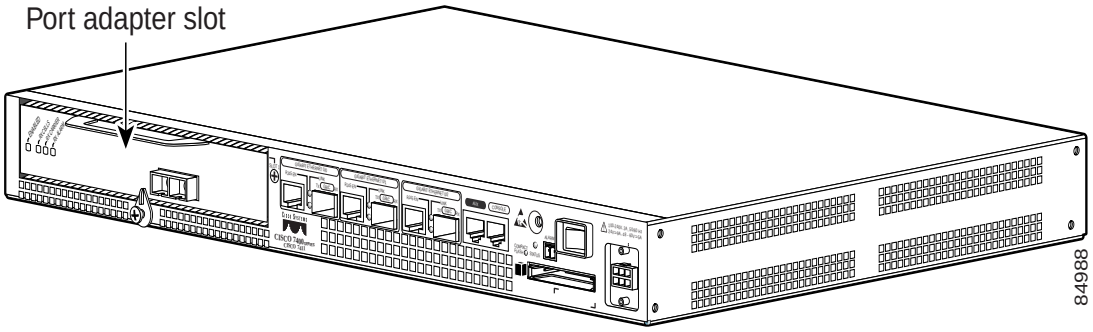
Figure 1-6 Port Adapter Slots in the Cisco 7206 Router



Cisco 7301 Router Slot Numbering

Figure 1-7 shows the front view of a Cisco 7301 router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7301 router.

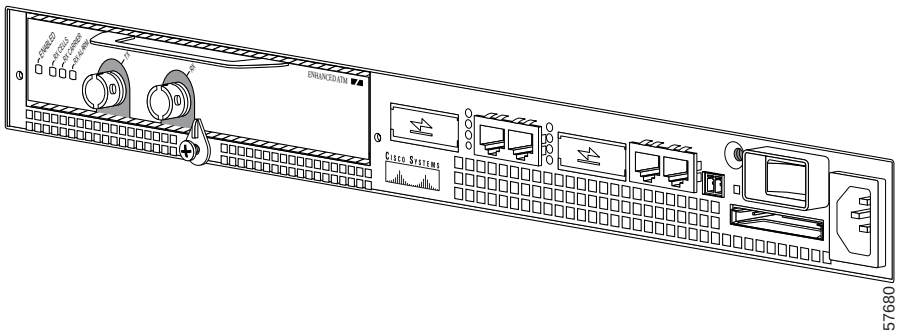
Figure 1-7 Port Adapter Slot in the Cisco 7301 Router



Cisco 7401ASR Router Slot Numbering

Figure 1-8 shows the front view of a Cisco 7401ASR router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7401ASR router.

Figure 1-8 Port Adapter Slot in the Cisco 7401ASR Router



Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-8B-ST in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on a PA-8B-ST installed in a router maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the interface address changes to reflect the new port adapter slot number.

Interfaces on a PA-8B-ST installed in a VIP or FlexWAN module maintain the same address regardless of whether other interface processors or modules are installed or removed. However, when you move a VIP or FlexWAN module to a different slot, the interface processor or module slot number changes to reflect the new interface processor or module slot.

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

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

- Cisco 7100 Series Routers Interface Addresses, page 1-8
- Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering, page 1-5
- Cisco 7301 Router Interface Addresses, page 1-8
- Cisco 7401ASR Router Interface Addresses, page 1-8

Table 1-3 summarizes the interface address formats for the supported platforms.

Table 1-3 Identifying Interface Addresses

Platform	Interface Address Format	Numbers	Syntax
Cisco 7120 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 3 Interface port—0 through 7	`3/1`
Cisco 7140 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 through 7	`4/0`
Cisco 7200 series routers and Cisco 7200 VXR routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—1 through 6 (depends on the number of slots in the router)[1] Interface port—0 through 7	`1/0`
Cisco 7301 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 through 7	`1/0`
Cisco 7401ASR router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 through 7	`1/0`

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

Cisco 7100 Series Routers Interface Addresses

In Cisco 7120 series router, port adapters are installed in port adapter slot 3. See Figure 1-4. In the Cisco 7140 series router, port adapters are installed in port adapter slot 4. See Figure 1-5.

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number.* See Table 1-3. For example, if an eight-port PA-8B-ST is installed on a Cisco 7120 router, the interface addresses would be 3/0 through 3/7 (port adapter slot 3, and interfaces 0,1, 2, 3, 4, 5, 6, and 7). If an eight-port PA-8B-ST is installed on a Cisco 7140 router, the interface addresses would be 4/0 through 4/7 (port adapter slot 4, and interfaces 0,1, 2, 3, 4, 5, 6, and 7).

Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses

In Cisco 7200 series routers and Cisco 7200 VXR routers, port adapter slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 2 for the Cisco 7202, slot 4 for the Cisco 7204 and Cisco 7204VXR, and slot 6 for the Cisco 7206 and Cisco 7206VXR. Port adapters can be installed in any available port adapter slot from 1 through 6 (depending on the number of slots in the router). (Slot 0 is reserved for the I/O controller.) See Figure 1-6.

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number.* See Table 1-3. For example, if an eight-port PA-8B-ST is installed in slot 1of a Cisco 7200 series router, the interface addresses would be 1/0 through 1/7 (port adapter slot 1 and interfaces 0 through 7).

Cisco 7301 Router Interface Addresses

In the Cisco 7301 router, only one slot accepts port adapters and it is numbered as slot 1. See Figure 1-7.

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number.* See Table 1-3. For example, if an eight-port PA-8B-ST is installed in a Cisco 7301 router, the interface addresses would be 1/0 through 1/7.

Cisco 7401ASR Router Interface Addresses

In the Cisco 7401ASR router, only one slot accepts port adapters and it is numbered as slot 1. See Figure 1-8.

The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number.* See Table 1-3. For example, if an eight-port PA-8B-ST is installed in a Cisco 7401ASR router, the interface addresses would be 1/0 through 1/7.

CHAPTER 2

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-8B-ST. This chapter contains the following sections:

Required Tools and Equipment

You need the following tools and parts to install a PA-8B-ST. If you need additional equipment, contact a service representative for ordering information.

- PA-8B-ST
- Interface cables (see the "Cables, Connectors, and Pinouts" section on page 1-3.)
- 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 recommended minimum Cisco IOS software release required to use the PA-8B-ST in supported router or switch platforms.

Table 2-1 PA-8B-ST Software Requirements

Platform	Recommended Minimum Cisco IOS Release
Cisco 7100 series routers	
• Cisco 7120 series and Cisco 7140 series	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0T
Cisco 7200 series routers	
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0T Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(9)CA1 or a later release of Cisco IOS Release 11.1CA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
• Cisco 7202	Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3AA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
Cisco 7301 router	Cisco IOS Release 12.2(11)YZ or a later release of Cisco IOS Release 12.2(31)SB
Cisco 7401ASR router	Cisco IOS Release 12.2(1)DX or a later release of Cisco IOS Release 12.2DX

For configuration guidelines on port adapters in the Cisco 7200 series, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* at the following URL:

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

Checking Hardware and Software Compatibility

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

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

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

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

Safety Warnings

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

Warning **This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Waarschuwing **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.**

Varoitus **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).**

Attention **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.**

Warnung **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.**

Avvertenza **Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.**

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

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

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

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

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

Telephone Wiring Guidelines

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

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

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

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed board component-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

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

FCC Class B Compliance

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

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

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

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

CHAPTER 3

Removing and Installing Port Adapters

This chapter describes how to remove the PA-8B-ST from supported platforms and also how to install a new or replacement port adapter. This chapter contains the following sections:

Handling Port Adapters

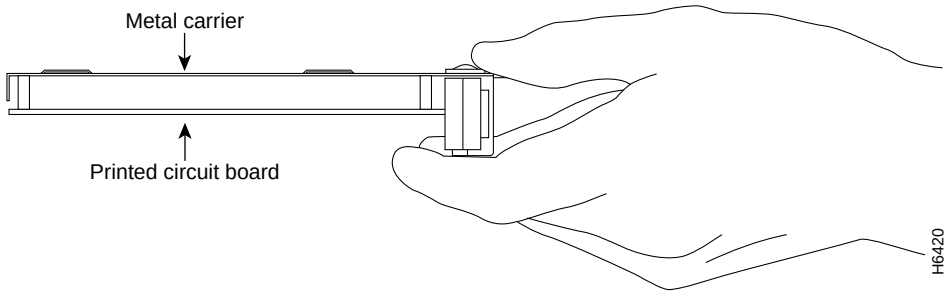
Each port adapter circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

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

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

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

Figure 3-1 Handling a Port Adapter



Online Insertion and Removal

Several platforms support online insertion and removal (OIR) of port adapters; therefore, you do not have to power down routers when removing and replacing a PA-8B-ST in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco 7301 router, and Cisco 7401ASR router.

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

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

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

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

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

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

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

1. Rapidly scans the system for configuration changes.
2. Initializes newly inserted port adapters or administratively shuts down any vacant interfaces.

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

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

Warnings and Cautions

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

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

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

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

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

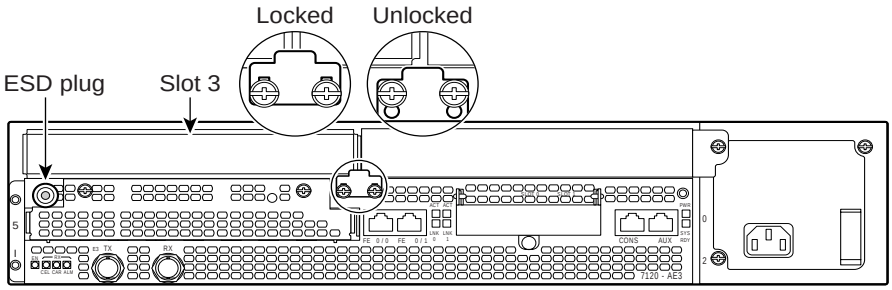
Port Adapter Removal and Installation

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

Cisco 7100 Series Routers—Removing and Installing a Port Adapter

Step 1

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



Step 2

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

Step 3

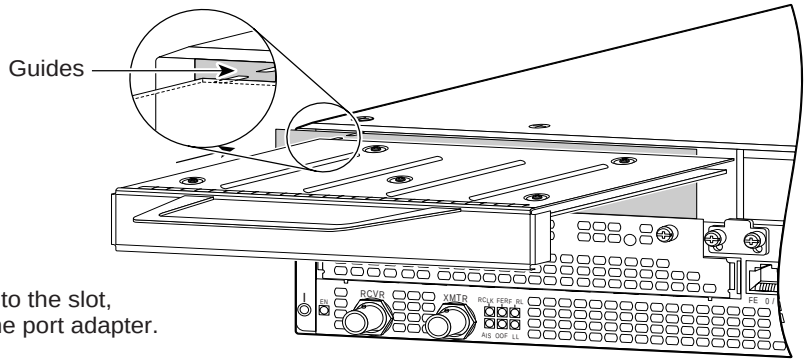
With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

Step 4

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

Step 5

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



Step 6

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

Step 7

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

Step 8

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

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

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

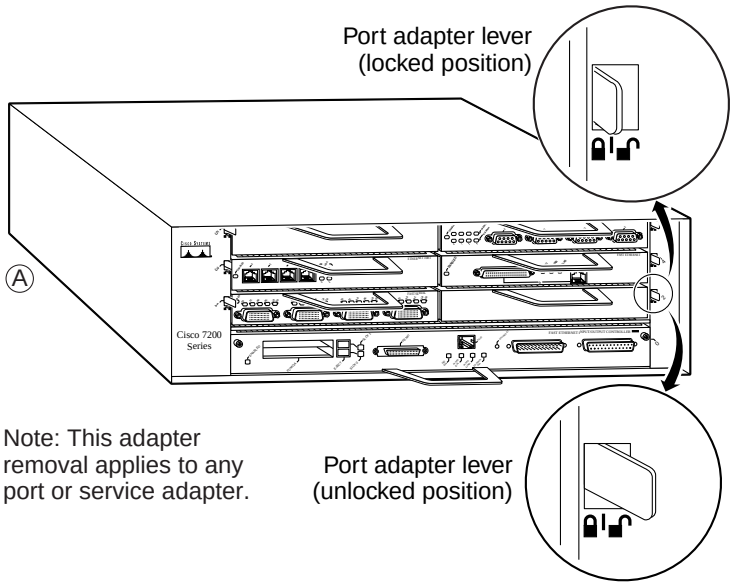
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

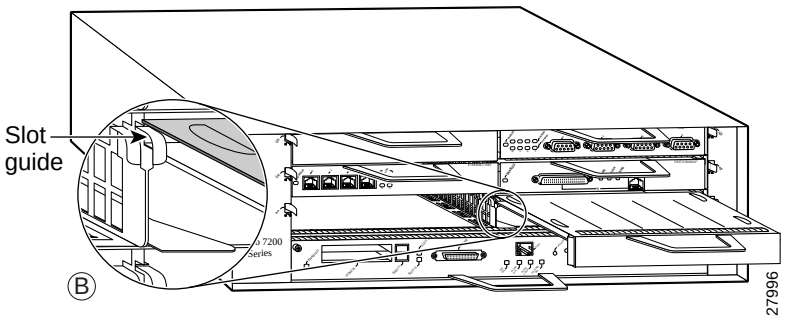
Step 6

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

Step 7

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





Cisco 7301 Router—Removing and Installing a Port Adapter

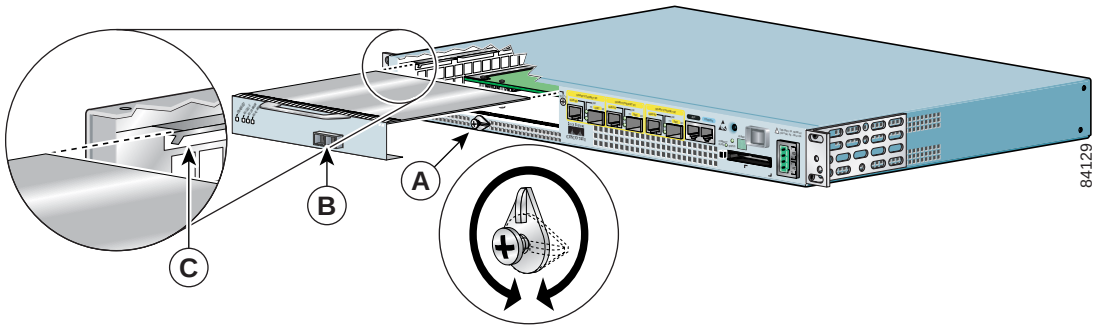
Step 1
Use an ESD wrist strap to ground yourself to the router.

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.



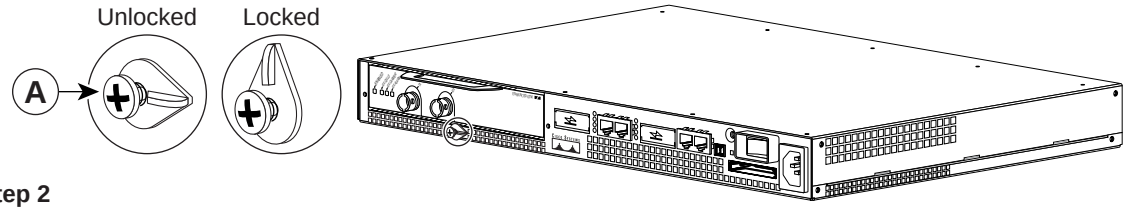
Step 5
To insert the port adapter, carefully align the port adapter carrier in the slot guides. (See C.) Slide the new port adapter halfway into the chassis.

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 7401ASR Router—Removing and Installing a Port Adapter

Step 1
To remove the port adapter, use a number 2 Phillips screwdriver to loosen the screw on the port adapter latch. Rotate the port adapter latch until it clears the faceplate of the port adapter. (See A.) The latch can rotate 360˚.

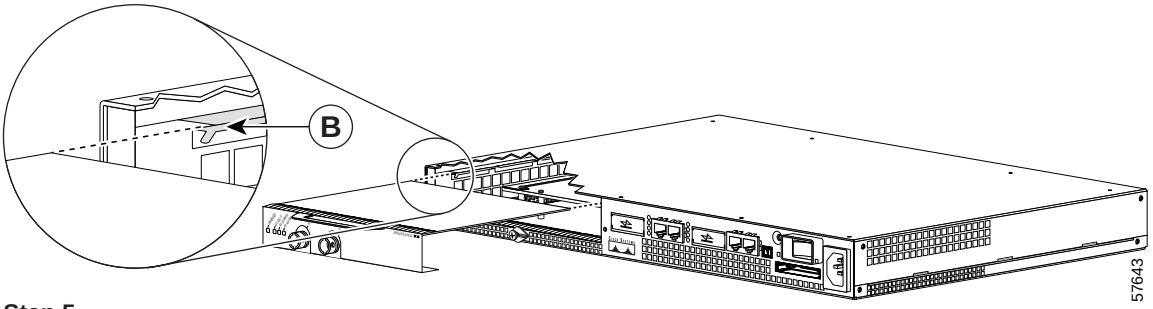


Step 2
Pull the port adapter from the router, about halfway out of its slot. (If you remove a blank port adapter, keep the blank port adapter for use in the router if you should ever remove the port adapter. The port adapter slot must always be filled.)

Step 3
With the port adapter halfway out of the slot, disconnect all cables from the port adapter. After disconnecting the cables, pull the port adapter completely out of the chassis slot.

Step 4
To insert the port adapter, locate the port adapter slot guides inside the Cisco 7401ASR router. They are near the top, and are recessed about 1/2 inch. (See B.)

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



Step 5
Insert the port adapter in the slot guides halfway, and then reconnect the port adapter cables.

Step 6
After the cables are connected, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane. When installed, the port adapter input/output panel should be flush with the face of the router.

Step 7
After the port adapter is properly seated, rotate the port adapter latch to the upright locked position and use a number 2 Phillips screwdriver to tighten the latch screw. If needed, loosen the latch screw to rotate the latch over the port adapter. Finish the installation by tightening the latch screw.

Connecting a PA-8B-ST Interface Cable

To continue your PA-8B-ST port adapter installation, you must install the port adapter cables. The instructions that follow apply to all supported platforms.

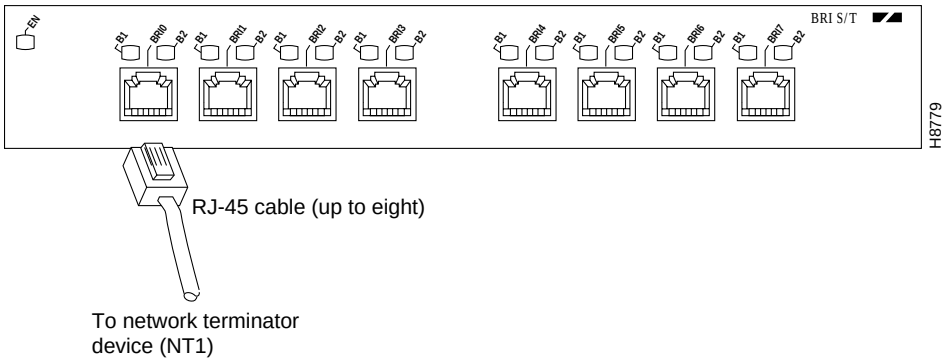
On a single PA-8B-ST, you can use up to eight BRI connections.

Connect a PA-8B-ST interface cable as follows:

Step 1 Attach the cable directly to the receptacle on the PA-8B-ST. (See Figure 3-2.)

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

Figure 3-2 Connecting a PA-8B-ST Interface Cable—PA-8B-ST Front View (Shown Without Handle)



Step 2 Attach the network end of the cable to your network terminator device.

This completes the procedure for attaching a PA-8B-ST interface cable.

CHAPTER 4

Configuring the PA-8B-ST

To continue your PA-8B-ST installation, you must configure the BRI 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

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-8B-ST 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 and encapsulations you plan to use on the new interfaces
- Protocol-specific information, such as IP addresses if you configure the interfaces for IP routing
- ISDN switch type (Table 4-1 lists ISDN service provider switch types)

Note Configuration commands are executed from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain access.

Table 4-1 ISDN Service Provider Switch Types

Keywords by Area	Switch Type
Australia	
• basic-ts013	Australian TS013 switches
Europe	
• basic-1tr6	German 1TR6 ISDN switches
• basic-nwnet3	Norwegian NET3 ISDN switches (phase 1)
• basic-net3	NET3 ISDN switches (U.K., Denmark, and other nations); covers the Euro-ISDN E-DSSI signaling system).
• basic-net5	NET5 switches (U.K. and Europe)
• primary-net5	European ISDN PRI switches (U.K. and Europe
• vn2	French VN2 ISDN switches
• vn3	French VN3 ISDN switches
Japan	
• ntt	Japanese NTT ISDN switches
• primary-ntt	Japanese ISDN PRI switches

Table 4-1 ISDN Service Provider Switch Types (continued)

Keywords by Area	Switch Type
North America	
• basic-5ess	AT&T basic rate switches
• basic-dms100	NT DMS-100 basic rate switches
• basic-ni1	National (North American) ISDN-1 switches
• primary-4ess	AT&T 4ESS switch type for the U.S. (ISDN PRI only)
• primary-5ess	AT&T 5ESS switch type for the U.S. (ISDN PRI only)
• primary-dms100	NT DMS-100 switch type for the U.S. (ISDN PRI only)
New Zealand	
• basic-nznet3	New Zealand NET3 switches

If you installed a new PA-8B-ST 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-8B-ST that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configurations.

For a summary of the configuration options available and instructions for configuring interfaces on a PA-8B-ST, refer to the appropriate configuration publications listed in the "Related Documentation" section on page vi.

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

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

Follow these steps to shut down an interface:

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

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

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

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

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

Table 4-2 shows the **shutdown** command syntax for the supported platforms.

Table 4-2 Syntax of the shutdown Command for the Supported Platforms

Platform	Command	Example

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

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

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

Table 4-2 Syntax of the shutdown Command for the Supported Platforms (continued)

Platform	Command	Example

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

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

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

Step 4 Write the new configuration to NVRAM as follows:

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

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

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

Table 4-3 provides examples of the **show interfaces bri** command for the supported platforms.

Table 4-3 Examples of the show interfaces bri Command for the Supported Platforms

Platform	Command	Example

Cisco 7120 series routers	**show interfaces bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 3.
		`Router# show interfaces bri 3/0`
		`BRI 3/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Cisco 7140 series routers	**show interfaces bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 4.
		`Router# show interfaces bri 4/0`
		`BRI 4/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Cisco 7200 series routers and Cisco 7200 VXR routers	**show interfaces bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 6.
		`Router# show interfaces bri 6/0`
		`BRI 6/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Cisco 7301 router	**show interfaces bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1.
		`Router# show interfaces bri 1/0`
		`BRI 1/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Cisco 7401ASR router	**show interfaces bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1.
		`Router# show interfaces bri 1/0`
		`BRI 1/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Step 6 Re-enable interfaces by doing the following:

a. Repeat Step 3 to re-enable 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** command.

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 vi.

Performing a Basic Interface Configuration

Following are instructions for a basic configuration, which include enabling an interface and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available for *BRI* 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 Identify the ISDN switch type. In the following example, the switch basic-net3 (a switch for the European Union) is identified as the switch type:

```
Router(config)# isdn switch-type basic-net3
```

Note The ISDN switch type that you identify is for all ISDN interface ports installed in the router.

Step 3 Specify the first interface to configure by entering the **interface bri** subcommand, followed by the interface address of the interface you plan to configure.

Table 4-4 provides examples of the **interface bri** subcommand for the supported platforms.

Table 4-4 Examples of the interface bri Subcommand for the Supported Platforms

Platform	Command	Example

Cisco 7120 series routers	**interface bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 3.
		`Router(config)# interface bri 3/0`
		`Router(config-if)#`

Cisco 7140 series routers	**interface bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 4.
		`Router(config)# interface bri 4/0`
		`Router(config-if)#`

Cisco 7200 series routers and Cisco 7200 VXR routers	**interface bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 6.
		`Router(config)# interface bri 6/0`
		`Router(config-if)#`

Cisco 7301 router	**interface bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1.
		`Router(config)# interface bri 1/0`
		`Router(config-if)#`

Cisco 7401ASR router	**interface bri**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1.
		`Router(config)# interface bri 1/0`
		`Router(config-if)#`

Step 4 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 5 Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

Step 6 Re-enable the interfaces using the **no shutdown** command. (See the "Shutting Down an Interface" section on page 4-3.)

Step 7 Configure all additional port adapter interfaces as required.

Step 8 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 9 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.

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** command to check connectivity. This section includes the following subsections:

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-8B-ST appears in them correctly. Some 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 vi.

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

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*	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	`Router# show diag 2`
show interfaces *type* **3***/interface-port-number*	Displays status information about a specific type of interface (for example, BRI) in a Cisco 7120 series router	`Router# show interfaces bri 3/1`
show interfaces *type* **4***/interface-port-number*	Displays status information about a specific type of interface (for example, BRI) in a Cisco 7140 series router	`Router# show interfaces bri 4/1`
show interfaces *type port-adapter-slot-number/ interface-port-number*	Displays status information about a specific type of interface (for example, BRI) in a Cisco 7200 series router, Cisco 7200 VXR router, Cisco 7301 router, and Cisco 7401ASR router	`Router# show interfaces bri 1/0`
show isdn status	Displays the status of all ISDN interfaces, including ISDN switch type	`Router# show isdn status`
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`

Choose the subsection appropriate for your system. Proceed to the "Using the ping Command to Verify Network Connectivity" section on page 4-13 when you have finished using the **show** commands.

Using the show version or show hardware Commands

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

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

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

Following is an example of the **show version** command from a Cisco 7200 series router with a PA-8B-ST installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 11.1(9)CA1
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 04-Aug-96 06:00 by rmontino
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 11.1(5) RELEASED SOFTWARE
ROM: 7200 Software (C7200-BOOT-M), RELEASED SOFTWARE 11.1(9)CA1

Router uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "c7200-j-mz", booted via slot0
cisco 7206 (NPE150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Basic Rate ISDN software, version 1.0.
Chassis Interface.
12 Ethernet/IEEE 802.3 interfaces.
1 FastEthernet/IEEE 802.3 interface.
8 ISDN Basic Rate interfaces.
1 Compression port adapter.
Integrated NT1 for ISDN Basic Rate interface
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

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

Using the show isdn status Command

Display all the ISDN interfaces installed in the router and the ISDN switch type for the interfaces, using the **show isdn status** 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.

Following is an example of the **show isdn status** command for a PA-8B-ST in port adapter slot 1, with the ISDN switch type basic-5ess:

```
Router# show isdn status
The current ISDN Switchtype = basic-5ess
ISDN BRI1/0 interface
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 94, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        1 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 1
        CCB:callid=8001, sapi=0, ces=1, B-chan=1
ISDN BRI1/1 interface
    Layer 1 Status:
        DEACTIVATED
    Layer 2 Status:
        Layer 2 NOT Activated
    Layer 3 Status:
        No Active Layer 3 Call(s)
    Activated dsl 1 CCBs = 0
(Display text omitted.)
```

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 routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco 7301 router, or Cisco 7401ASR router.

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.

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

Following is an example of the **show diag** command that shows a PA-8B-ST in port adapter slot 1 of a Cisco 7200 series router:

```
Router# show diag 1
Slot 1:
        BRI (S/T) port adapter, 8 ports
        Port adapter is analyzed
        Port adapter insertion time 04:34:56 ago
        Hardware revision 255.255               Board revision UNKNOWN
        Serial number     4294967295    Part number    255-65535-255
        Test history      0xFF          RMA number     255-255-255
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 3E FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

Using the show interfaces Command

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

For complete descriptions of interface subcommands and the configuration options available the individual platforms, refer to the publications listed in the "Related Documentation" section on page vi.

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.

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

Following is an example of the **show interfaces bri** command, which shows all of the information specific to interface port 0 on a PA-8B-ST installed in port adapter slot 1:

```
Router# show interfaces bri 1/0
BRI1/0 is administratively down, line protocol is down
  Hardware is BRI
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
     Conversations  0/0 (active/max active)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

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 vi for detailed command descriptions and examples.

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

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

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

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