CISCO ™

PA-4B-U Basic Rate Interface Port Adapter Installation and Configuration

Product Number: PA-4B-U(=)
Platforms Supported: Cisco 7100 Series Routers, Cisco 7200 Series Routers, Cisco 7200 VXR Routers, Cisco 7301 Router

The following information is for FCC compliance of Class A devices: 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.

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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.)

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C O N T E N T S

Preface

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

- Document Revision History, page v
- Objectives, page v
- Organization, page vi
- Related Documentation, page vi
- Obtaining Documentation, Obtaining Support, and Security Guidelines, page vii

Document Revision History

The Document Revision History table below, beginning with version OL-3521-02, records technical changes to this document.

Document Version	Date	Change Summary
OL-3521-02	April, 2007	Restructured to parallel other port adapter documentation.

Objectives

This configuration note describes how to install and configure the four-port Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) port adapter (PA-4B-U), hereafter referred to as the PA-4B-U, in the following platforms:

- Cisco 7100 series routers—which consist of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers and Cisco 7200 VXR routers—which consist of the two-slot Cisco 7202, the four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and Cisco 7206VXR).
- Cisco 7301 router—which consists of a single-slot, one rack unit (RU) router

For complete descriptions of interface subcommands and the configuration options available for Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, and the Cisco 7301 router, which support the PA-4B-U functionality, refer to the appropriate software configuration publication listed in the section "Related Documentation" section on page vi.

Organization

This document is organized into the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the PA-4B-U port adapter 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-4B-U port adapters in the supported platforms.
Chapter 4	Configuring the PA-4B-U Interfaces	Provides instructions for configuring the PA-4B-U 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.

- 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_index09186a008 00fa142.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*.

- 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*

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

Overview

This chapter describes the PA-4B-U synchronous serial port adapter and contains the following sections:

Port Adapter Overview

The PA-4B-U, shown in Figure 1-1, provides up to four U-type BRI interfaces for connecting the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, and the Cisco 7301 router to an ISDN WAN through its internal network terminator (NT1) device. Each PA-4B-U 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, full duplex, 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 teardown, and provides the communication from the router to the ISDN switch. The PA-4B-U supports dial-on-demand routing (DDR).

Each PA-4B-U 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-4B-U.

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

Figure 1-1 *PA-4B-U Port Adapter—Faceplate View*
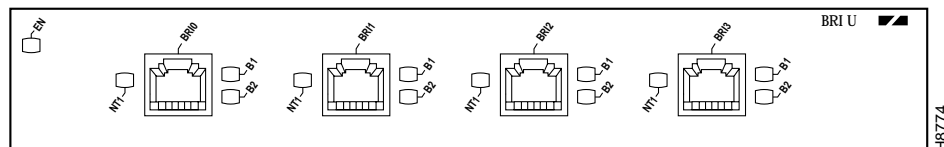
The PA-4B-U can be installed in any of the available port adapter slots in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, or Cisco 7301 router. Figure 1-2 shows a PA-4B-U installed in port adapter slot 1 of a Cisco 7206 router.

Figure 1-2   Cisco 7206 Router with a PA-4B-U Port Adapter in Port Adapter Slot 1
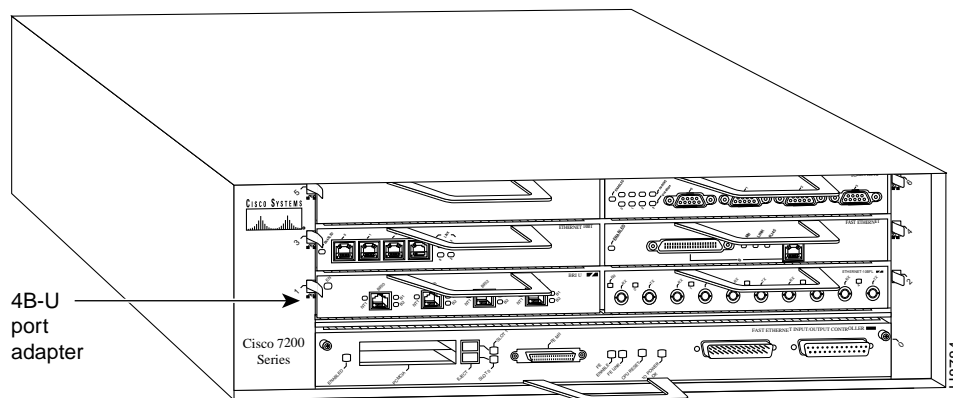
LEDs

The PA-4B-U has an ENABLED LED, standard on all port adapters, and three status LEDs for each port. (See Figure 1-3.)

Figure 1-3   PA-4B-U LEDs
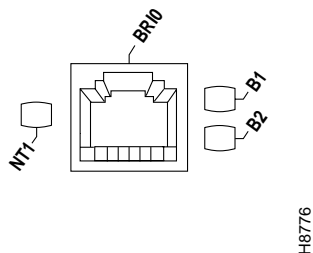
After system initialization, the ENABLED LED goes on to indicate that the port adapter has been enabled for operation.

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

- The port adapter is correctly connected to the midplane and receiving power.
- A valid system software image for the port adapter has been downloaded successfully.
- The system recognizes the port adapter.

If any of the above conditions are not met, or if the initialization fails for other reasons, the enabled LED will not go on. Table 1-1 lists port LED status indications.

Table 1-1   PA-4B-U Port LEDs

Port LED	Status
NT1	This green LED comes on and remains on when the integrated NT1 device is connected to an ISDN switch.
B1	This green LED comes on when there is data traffic on channel B1.
B2	This green LED comes on when there is data traffic on channel B2.

Cables and Pinouts

The four U-type BRI interfaces on the PA-4B-U support a standard, straight-through twisted pair cable with an RJ-45 connector at the router (Cisco 7200 series) end and at the network end. Cisco Systems does not provide the cable; it is widely available from other vendors. Figure 1-4 shows the PA-4B-U interface cable.

Figure 1-4   PA-4B-U Interface Cable
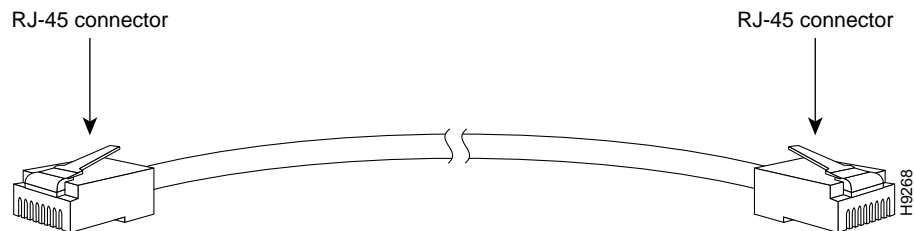
Table 1-2 lists the pinouts for the PA-4B-U interface cable.

Table 1-2   PA-4B-U Interface Cable Pinouts

NT [1]RJ-45 8-Pin[2] Connector	Wire	LT[3] RJ-45 8-Pin[4] Connector
4	Signal[5]	4
5	Signal	5

1. NT refers to the network terminating layer 1 aspects of NT1 and NT2 functional groups.

2. Pins 1, 2, 3, 6, 7, and 8 are not used.

3. LT refers to the line termination point (for example, at the wall jack).

4. Pins 1, 2, 3, 6, 7, and 8 are not used.

5. Signal represents Tip or Ring.

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 1-5

Cisco 7100 Series Routers Slot Numbering

Slots in Cisco 7120 series routers are numbered as shown in Figure 1-5. The fixed LAN interface is slot 0, the fixed WAN interface is slot 1, and the port adapter interface is slot 3. Slots 2 and 4 are not used. Slot 5 is the service adapter.

Figure 1-5   Port Adapter Slot in the Cisco 7120 Series Router

Slots in Cisco 7140 series routers are numbered as shown Figure 1-6. The fixed LAN interface is slot 0, the fixed WAN interfaces are slots 1 and 2, and the port adapter interface is slot 4. Slot 3 is not used. Slot 5 is the service adapter.

Figure 1-6   Port Adapter Slot 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 router are not shown.

Cisco 7206 routers and Cisco 7206VXR routers have six slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 6. You can place a port adapter in any of the six slots (slot 1 through slot 6). Slot 0 is always reserved for the I/O controller. Figure 1-7 shows a Cisco 7206 router with port adapters installed. The Cisco 7206VXR router is not shown.

Figure 1-7   Port Adapter Slots in the Cisco 7206 Router (with a PA-4B-U Installed)

4B-U port adapter
(port numbers 1/0, 1/1
1/2, 1/3, from left to right)
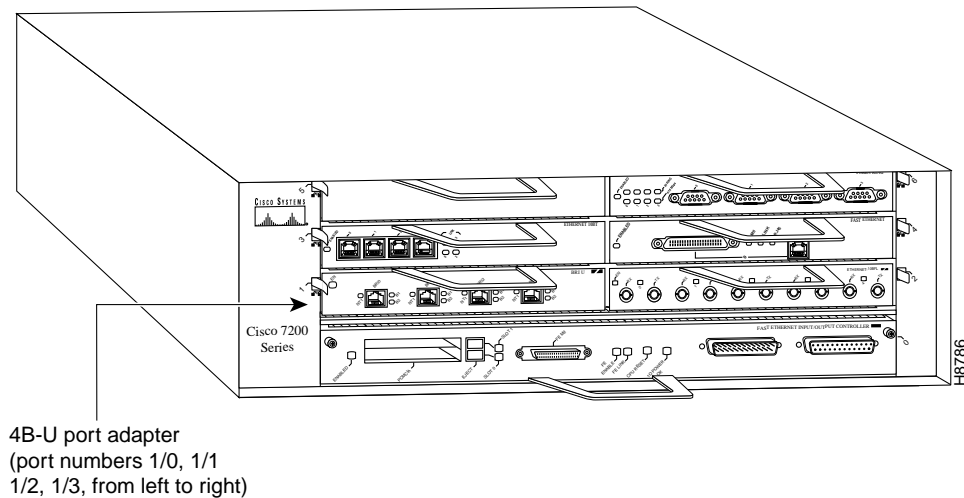
Cisco 7301 Router Slot Numbering

Figure 1-8 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 1-8   Port Adapter Slot in the Cisco 7301 Router

Port adapter slot
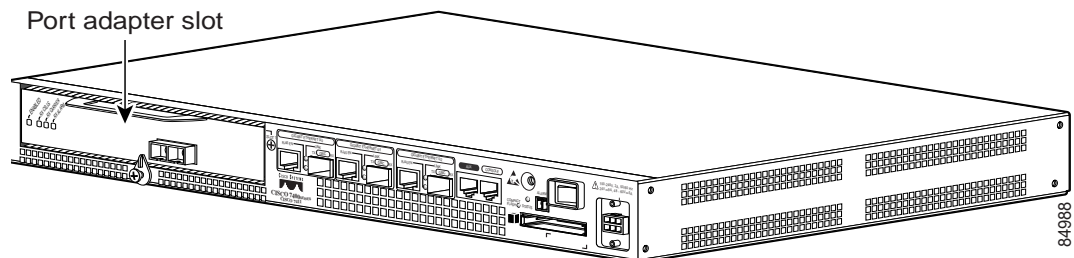
Identifying Interface Addresses

This section describes how to identify the interface addresses for the PA-4B-U in supported platforms.

Physical port addresses specify the actual physical location of each interface port on the router. This address is composed of a two-part number format *port adapter slot number/interface port number*, as follows:

- The first number identifies the chassis slot in which the PA-4B-U is installed.
- The second number identifies the interface ports on each PA-4B-U, which are always numbered in sequence as interface 0 through 3.

Interface ports on a PA-4B-U 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 address changes to reflect the new slot number.

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

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 or 1	`3/0`
Cisco 7140 series router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 or 1	`4/0`
Cisco 7200 series routers and Cisco 7200 VXR routers (Cisco 7202, Cisco 7204, Cisco 7206, Cisco 7204VXR, Cisco 7206VXR)	Port-adapter-slot-number/interface-port-number	Port adapter slot—1 through 6 (depends on the number of slots in the router) Interface port—0 or 1	`1/0`
Cisco 7301 router	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 1 Interface port—0 or 1	`1/0`

Cisco 7100 Series Routers Interface Addresses

In the Cisco 7120 series router, port adapters are installed in port adapter slot 3. See Figure 1-5. In the Cisco 7140 series router, port adapters are installed in port adapter slot 4. 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 a four-port PA-4B-U is installed on a Cisco 7120 router, the interface addresses would be 3/0 through 3/3. If a four-port PA-4B-U is installed on a Cisco 7140 router, the interface addresses would be 4/0 through 4/3.

Cisco 7200 Series Routers and Cisco 7200 VXR Routers Interface Addresses

In Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204 and Cisco 7204VXR, and slot 6 for the Cisco 7206 and Cisco 7206VXR. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present. Figure 1-7 shows the interface ports of an PA-4B-U in slot 1 of a Cisco 7206 router.

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 a four-port PA-4B-U is installed in slot 1of a Cisco 7200 series router, the interface addresses would be 1/0 through 1/3.

Cisco 7301 Router Interface Addresses

In the Cisco 7301 router, only one slot accepts port adapters and it is numbered as slot 1. See Figure 1-8.

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 a four-port PA-4B-U is installed in a Cisco 7301 router, the interface addresses would be 1/0 through 1/3.

C H A P T E R**2**

Preparing for Installation

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

- Required Tools and Parts, page 2-1
- Software and Hardware Requirements, page 2-2
- Checking Hardware and Software Compatibility, page 2-3
- Safety Guidelines, page 2-3
- FCC Class B Compliance, page 2-6

Required Tools and Parts

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

- PA-4B-U
- Interface cables (see the "Cables and Pinouts" section on page 1-3")
- Your own electrostatic discharge (ESD) prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares

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2-1

Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the PA-4B-U in supported router platforms.

Table 2-1   PA-4B-U Port Adapter Software Requirements

Router Platform	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 and Cisco 7200 VXR 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 12.2B
• 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 7206 router shelf	Cisco IOS Release 11.3(2)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 12.2YZ

Following are specific hardware and software prerequisites to ensure proper operation of the PA-4B-U:

• The PA-4B-U is used in Cisco 7200 series routers and can be installed in any available port adapter slot.

Note   Cisco 7200 series routers do not support a combination of installed ISDN Primary Rate Interface (PRI) and ISDN Basic Rate Interface (BRI) interfaces. The ISDN switch type (PRI or BRI) that you identify during an ISDN configuration is for all ISDN interface ports installed in the router.

• The Cisco 7204 router requires a minimum of 32 MB of DRAM to support up to four installed PA-4B-Us. The Cisco 7206 router requires a minimum of 32 MB of DRAM to support up to six installed PA-4B-Us.

Note   For port adapter hardware and memory configuration guidelines for Cisco 7200 series routers, refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* at the following URL:
http://www.cisco.com/en/US/products/hw/modules/ps2033/products_configuration_guide_book09186a00801056ef.html.

Checking Hardware and Software Compatibility

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

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

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

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

Safety Guidelines

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

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, 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 component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.

- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

- Never attempt to remove the printed circuit board from the metal carrier.

⚠

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

C H A P T E R 3

Removing and Installing Port Adapters

This chapter describes how to remove the PA-4B-U port adapter from supported platforms and also how to install a new or replacement port adapter. This chapter contains the following sections:

Handling Port Adapters

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.

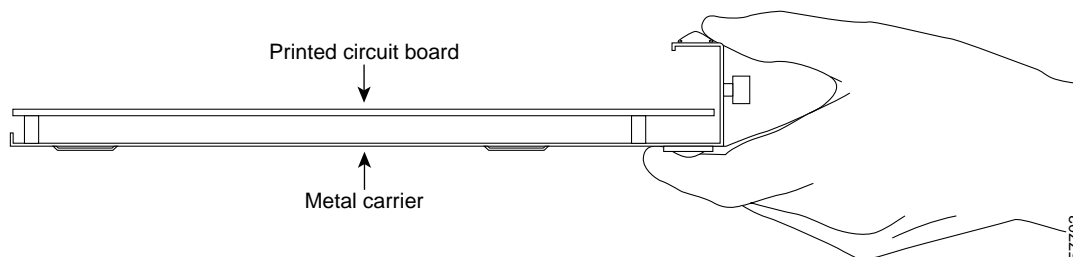**Caution** When powering off the router, wait a minimum of 30 seconds before powering it on again.

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*

Printed circuit board

Metal carrier

57702

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-4B-U in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, or Cisco 7301 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, page 3-4
*   Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter, page 3-5
*   Cisco 7301 Router—Removing and Installing a Port Adapter, page 3-6

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.
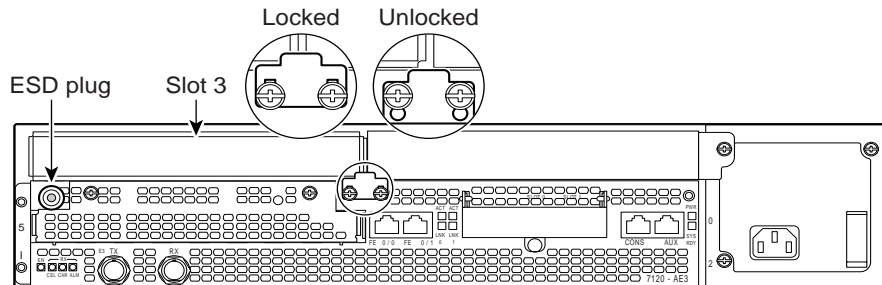
Step 2

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.
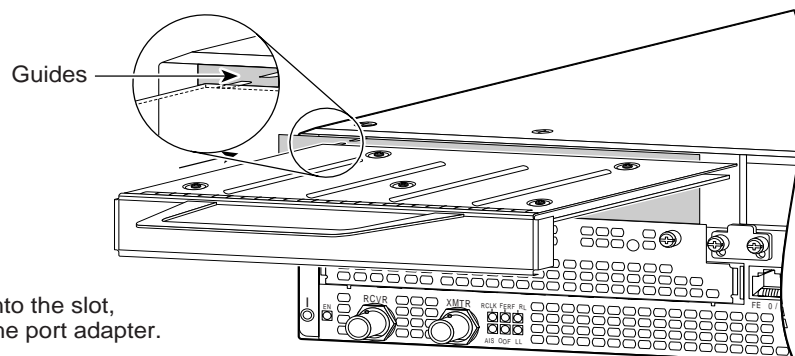
Step 6

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.

■   **PA-4B-U Basic Rate Interface Port Adapter Installation and Configuration**

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

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

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

Step 6

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

Step 7

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

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

■   **Port Adapter Removal and Installation**
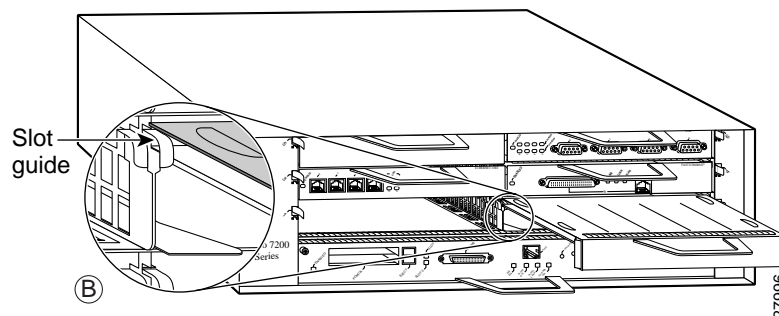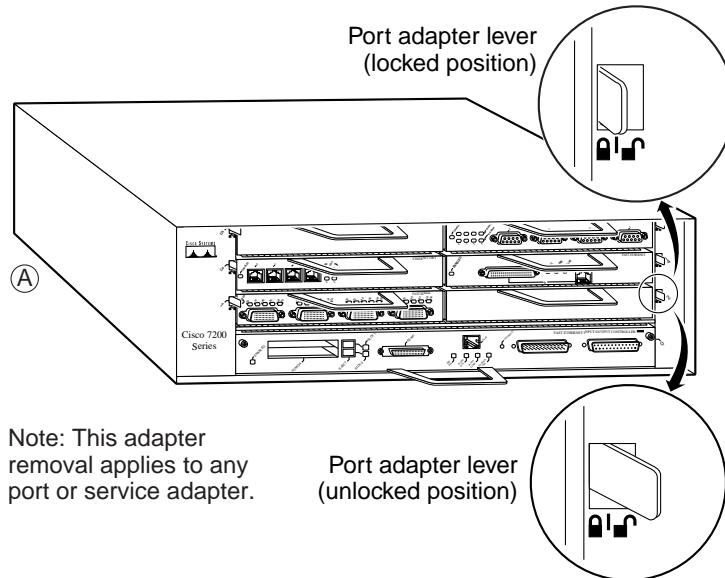
Cisco 7301 Router—Removing and Installing a Port Adapter

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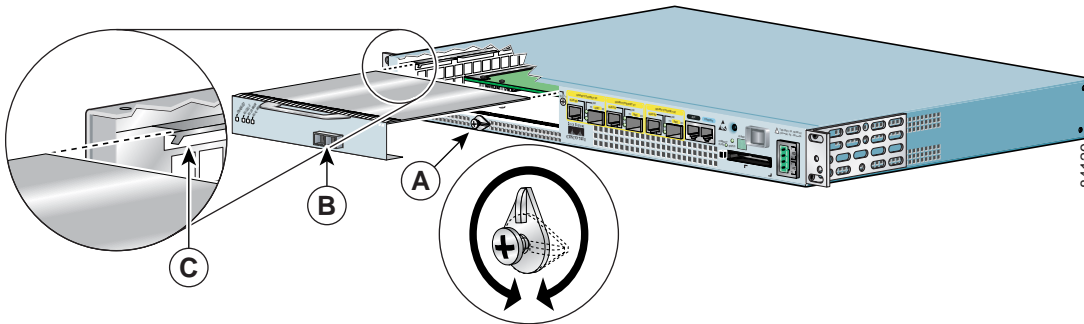
Step 5
To insert the port adapter, carefully align the port adapter carrier in the slot guides. (See C.) Slide the new port adapter halfway into the chassis.

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.

Connecting the PA-4B-U Interface Cables

On a single PA-4B-U, you can use up to four Basic Rate Interface (BRI) connections.

To connect a PA-4B-U interface cable, follow these steps:

Step 1   Attach the cable directly to the receptacle on the PA-4B-U. (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's faceplate.

Step 2   Attach the network end of the cable to your RJ-45 wall jack.

Figure 3-2   Connecting a PA-4B-U Interface Cable—PA-4B-U Front View
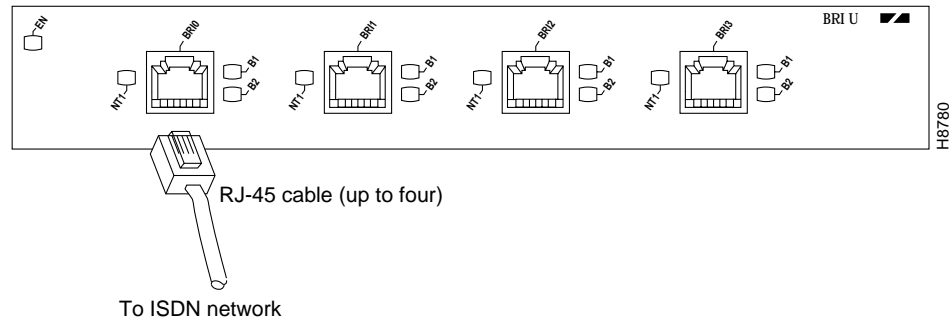
This completes the procedure for attaching a PA-4B-U interface cable.

C H A P T E R**4**

Configuring the PA-4B-U Interfaces

To continue your PA-4B-U port adapter installation, you must configure the PA-4B-U interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms are noted.

This chapter contains the following sections:

- Using the EXEC Command Interpreter, page 4-1
- Configuring the Interfaces, page 4-2
- Checking the Configuration, page 4-6

Using the EXEC Command Interpreter

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

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

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

```
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-mode system prompt (#):

```
Router#
```

Configuring the Interfaces

After you verify that the new PA-4B-U is installed correctly (the enabled LED goes on), use the **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 will configure the interfaces for IP routing
- The ISDN switch type (Table 4-1 lists ISDN service provider switch types)

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 (UK, Denmark, and other nations); covers the Euro-ISDN E-DSSI signaling
basic-net5	system)
primary-net5	NET5 switches (UK and Europe)
vn2	European ISDN PRI switches (UK and Europe)
vn3	French VN2 ISDN switches
	French VN3 ISDN switches
Japan	
ntt	Japanese NTT ISDN switches
primary-ntt	Japanese ISDN PRI switches
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

Note   Cisco 7200 series routers do not support a combination of installed ISDN PRI and ISDN BRI interfaces. The ISDN switch type (PRI or BRI) that you identify during an ISDN configuration is for all ISDN interface ports installed in the router.

If you installed a new PA-4B-U or if you want to change the configuration of an existing interface, you must use the privileged-level **configure** command. If you replaced a PA-4B-U that was previously configured, the system will recognize the new PA-4B-U interfaces and bring each of them up in their existing configurations.

For complete descriptions of interface subcommands and the configuration options available for configuring interfaces on a port adapter, refer to the appropriate configuration publications listed in the section "Related Documentation" section on page vi.

✎
Note Configuration commands are executed from the privileged level of the EXEC command interpreter, which usually requires password access. See the "Using the EXEC Command Interpreter" section on page 4-1 and contact your system administrator, if necessary, to obtain access.

This section contains the following configuration subsections for the standard configurations tasks:

- Shutting Down an Interface, page 4-3
- Performing a Basic Interface Configuration, page 4-4

Shutting Down an Interface

Before you replace an interface cable, replace port adapters, or remove an interface that you will not replace, use the **shutdown** command to shut down (disable) the interfaces. Doing so prevents anomalies from occurring when you reinstall the new or reconfigured port adapters. 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. (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 will be the source of the configuration subcommands as follows:

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

Step 3 Specify the slot/port address of the controller that you want shut down by entering the subcommand **interface**, followed by the *type* (**bri**) and *port adapter slot number/interface port number*. The example that follows is for a PA-4B-U in port adapter slot 1:

```
Router(config)# interface bri 1/0
```

Step 4 Enter the **shutdown** command as follows:

```
Router(config-cont)# shutdown
```

Step 5 To shut down additional existing interfaces, enter the *port adapter slot number/interface port number* of each interface followed by the **shutdown** command. When you have entered all the interfaces to be shut down, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter prompt as follows:

```
Router(config)# interface bri 1/0
Router(config-int)# shutdown
Ctrl-Z
```

■   Configuring the Interfaces

```
        Router#
```

Step 6   Write the new configuration to memory as follows:

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

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

Step 7   To verify that new interfaces are now in the correct state (shutdown), use the **show interfaces bri** *port adapter slot number/interface port number* command to display the specific interface, or use the **show interfaces command**, without variables, to display the status of all interfaces in the system.

```
Router# show interfaces bri 1/0

bri1/0 is down, line protocol is down
  Hardware is BRI
[display text omitted]
```

Step 8   To re-enable the interfaces, repeat the previous steps, but use the **no shutdown** command; then write the new configuration to memory as follows:

```
Router(config)# interface bri 1/0
Router(config-int)# no shutdown
Ctrl-Z
Router#

Router# copy running-config startup-config
[OK]
Router# show interfaces bri 1/0

bri1/0 is up, line protocol is up
  Hardware is BRI
[display text omitted]
```

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 a controller 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, refer to the publications listed in the "Related Documentation" section on page vi.

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>
```

Note   Cisco 7200 series routers identify PA-4B-U interfaces by port adapter slot number and interface port number (0 through 3). For example, the address of the PA-4B-U installed in port adapter slot 4 and interface port 1 would be bri *4/1*.

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

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

Step 2   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 BRI interface ports installed in a Cisco 7200 series router.

Step 3   At the prompt, specify the first interface to configure by entering the subcommand **interface**, followed by the *type* (**bri**)*, and port adapter slot number/interface port number.* The example that follows is for the PA-4B-U in port adapter slot 1, interface port 1:

```
Router(config)# interface bri 1/1
```

Step 4   At the prompt, assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand as in the following example:

```
Router(config-int)# ip address 10.10.10.1 255.255.255.0
Router(config-int)#
```

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

Step 6   Use the **no shutdown** command to re-enable the interfaces. See the "Shutting Down an Interface" section on page 4-3 for **no shutdown** command examples.

Step 7   After including all of the configuration subcommands, to complete the configuration, enter **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode.

Step 8   Write the new configuration to memory as follows:

```
Router# copy running-config startup-config
```

The system displays an OK message when the configuration is stored.

Step 9   Exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable

Router>
```

This completes the procedure for creating a basic configuration. Proceed to the next section to check the interface configuration using **show** commands. For additional information about configuring ISDN BRI interfaces, refer to the *Wide-Area Networking Configuration Guide* and *Wide-Area Networking Command Reference* on Cisco.com.

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

The following procedure demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the port adapter 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 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.

Take the following steps to verify that the new interfaces are configured and operating correctly:

Step 1 Display the system hardware configuration with the **show version** command. Ensure that the list includes the new BRI interfaces.

Step 2 Specify one of the new BRI interfaces with the **show interfaces** *type port adapter slot/interface port number* command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.

Step 3 Display all ISDN interfaces installed in the router and the ISDN switch type for the interfaces with the **show isdn status** command. Ensure that the correct ISDN switch type is displayed for the installed ISDN interfaces.

Step 4 Display the protocols configured for the entire system and specific interfaces with the **show protocols** command. If necessary, return to configuration mode to add or remove protocol routing on the system or specific interfaces.

Step 5 Display the running configuration file with the **show running-config** command. Display the configuration stored in NVRAM using the **show startup-config** command. Verify that the configuration is accurate for the system and each interface.

If the interface is down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. If you still have problems bringing up the interface, contact a customer service representative for assistance.

This section includes the following subsections:

For command descriptions and examples for the individual router platforms, refer to the publications listed in the "Related Documentation" section on page vi.

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:

```
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.
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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.
4 ISDN Basic Rate interfaces.
1 Compression port adapter.
Integrated NT1s for 4 ISDN Basic Rate interfaces
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

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

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*.

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 a **show diag** command from a Cisco 7200 series router with a PA-4B-U installed in port adapter slot 1:

```
Router# show diag 1
Slot 1:
        BRI (U) port adapter, 4 ports
        Port adapter is analyzed
        Port adapter insertion time 02:42:18 ago
        Hardware revision 1.0          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 22 01 00 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 for individual interfaces, refer to the publications listed in the "Related Documentation" section on page vi.

Note The ouputs 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 from a Cisco 7200 series router that shows all of the information specific to the first PA-4B-U interface port (interface port 0) 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 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.

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

Following is an example of a **show isdn status** command from a Cisco 7200 series router with a PA-4B-U installed in port adapter slot 1 and an 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 ping Command to Verify Network Connectivity

Use the **ping** command to verify that an interface port is functioning properly after the system has booted successfully and is operational.

The **ping** command sends echo request packets out to a remote device at an IP address that you specify. After sending an echo request, the command waits a specified time for the remote device to reply. Each echo reply 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 that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 10.10.10.1:

```
Router# ping 10.10.10.1 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.10.10.1, 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.