



PA-1C-P Parallel Channel Port Adapter Installation and Configuration

Product Number: PA-1C-P(=)

This document contains instructions for installing and configuring the Parallel Channel Port Adapter (PCPA), which is used in the Cisco 7200 series routers.

For complete descriptions of interface configuration commands and the configuration options available for Cisco 7200 series interfaces that support the PCPA functionality, refer to the appropriate software configuration publication listed in the “If You Need More Information” section on page 2.



Note

Cisco IOS Release 11.3(7)T or later or Release 12.0(1) or later supports the PCPA. When ordered as a spare, the PCPA microcode is available via Cisco.com. When ordered as part of a new system, the PCPA microcode is available on Flash memory cards or SanDisk memory devices (which also include the Cisco IOS software release compatible with the microcode version) and via Cisco.com. When the PCPA is shipped with a new system, there is a default setting in the Cisco IOS software that points to the PCPA microcode with which it has been virtually bundled (separately bundled and preloaded onto the Flash memory card or SanDisk memory device along with the compatible Cisco IOS software). The Cisco IOS software loads the PCPA microcode image onto the PCPA when the router boots and when a PCPA is inserted into a router that has already been booted.

We recommend that you use the version of the PCPA microcode that is virtually bundled with your Cisco IOS software. If you choose not to, you must then copy a microcode image onto the router Flash memory card or SanDisk memory device and use the **microcode** router configuration command to instruct the Cisco IOS software to use this microcode image instead of the microcode image virtually bundled with your version of the Cisco IOS software.

For instructions on placing PCPA microcode on the router Flash memory card, see the “Copying to the Flash Memory Card on a Cisco 7200 Series Router” section on page 33. For instructions on placing PCPA microcode on the SanDisk memory device, see the “Using SanDisk Devices” section on page 36.

For instructions on configuring Cisco IOS software to use a PCPA image from the router



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Flash memory card or SanDisk memory device, refer to the “Configuring Microcode” section on page 31.

For general information on PCPA microcode, refer to the “PCPA Microcode Overview” section on page 5. For specific instructions to configure the Cisco IOS software to download microcode from the router Flash memory card or SanDisk memory device, refer to the “PCPA Microcode Upgrade Overview” section on page 31.

Document Contents

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- General port adapter information
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If You Need More Information

The Cisco IOS software running on your router contains a large number of features and functionality. For additional information on configuring the Cisco IOS software running on a Cisco 7200 series router, the following documentation resources are available:

- Cisco Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package that ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more up to date than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or through an annual subscription. See the “Obtaining Documentation” section on page 37 for information on how to access Cisco documentation on the World Wide Web.
- Cisco IOS software configuration and command reference publications
 - *Configuration Fundamentals Configuration Guide*

- *Configuration Fundamentals Command Reference*
 - *Security Configuration Guide*
 - *Security Command Reference*
 - *Dial Solutions Configuration Guide*
 - *Dial Solutions Command Reference*
 - *Cisco IOS Switching Services Configuration Guide*
 - *Cisco IOS Switching Services Command Reference*
 - *Wide-Area Networking Configuration Guide*
 - *Wide-Area Networking Command Reference*
 - *Network Protocols Configuration Guide, Part 1*
 - *Network Protocols Command Reference, Part 1*
 - *Network Protocols Configuration Guide, Part 2*
 - *Network Protocols Command Reference, Part 2*
 - *Network Protocols Configuration Guide, Part 3*
 - *Network Protocols Command Reference, Part 3*
 - *Bridging and IBM Networking Configuration Guide*
 - *Bridging and IBM Networking Command Reference*
 - *System Error Messages*
 - *Cisco IOS Software Command Summary*
 - *Cisco IOS Feature Guide for Release 11.3 T*
- For hardware installation and maintenance information on the Cisco 7200 series routers, refer to the *Cisco 72xx Installation and Configuration Guide* that shipped with your Cisco 7200 series router.
 - For international agency compliance, safety, and statutory information for WAN interfaces for the Cisco 7200 series routers, refer to the document *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers* (Part Number 78-3419-xx; Customer Order Number Doc-7200-RCSI=).
 - For port adapter hardware and memory configuration guidelines for the Cisco 7200 series routers, refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines* (Part Number 78-3471-xx; Customer Order Number Doc-7200PA-HCG=).
 - For release note information for the PCPA microcode, refer to the *Channel Port Adapter Microcode Release Note and Microcode Upgrade Requirements* (Part Number 78-5266-xx).
 - To obtain general information about documentation, refer to the “Obtaining Documentation” section on page 37, or call customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com, or you can refer to the *Cisco Information Packet* that shipped with your router.

Port Adapter Installation Prerequisites

This section provides software and hardware requirements, a list of parts and tools you will need to install the port adapter, and safety and electrostatic discharge (ESD)-prevention guidelines to help you avoid injury and damage to the equipment during installation.

The following sections discuss general information about port adapter installation requirements:

- Software and Hardware Requirements, page 4
- PCPA Microcode Overview, page 5
- List of Parts and Tools, page 6
- Safety Guidelines, page 6

Software and Hardware Requirements

The following hardware and software prerequisites ensure proper operation of the PCPA in Cisco 7200 series routers:

- The PCPA can be installed in any available port adapter slot.
- A minimum of 16 MB of dynamic RAM (DRAM).



Note

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

- The router is running Cisco IOS Release 11.3(7)T or later or Release 12.0(1) or later.

Table 1 lists the specific Cisco IOS software images that are compatible with the PCPA.

Table 1 Cisco IOS Release Image Names

Cisco IOS Release	Image Names
Release 11.3(7)T	c7200-aejs-mz, c7200-aejs40-mz, c7200-aejs56i-mz, c7200-ajs-mz, c7200-ajs40-mz, c7200-ajs56i-mz, c7200-js-mz, c7200-js40-mz, c7200-js56i-mz, c7200-ds-mz, c7200-ds40-mz, c7200-ds56i-mz
Release 12.0(1)	c7200-aejs-mz, c7200-aejs40-mz, c7200-aejs56i-mz, c7200-ajs-mz, c7200-ajs40-mz, c7200-ajs56i-mz, c7200-js-mz, c7200-js40-mz, c7200-js56i-mz, c7200-ds-mz, c7200-ds40-mz, c7200-ds56i-mz

Table 2 specifies the recommended minimum level of PCPA microcode for a corresponding Cisco IOS software release.

Table 2 *Cisco IOS Releases and PCPA Microcode Image*

Cisco IOS Release	PCPA Microcode Image
Release 11.3(7)T	xcpa26-4
Release 12.0(1)	xcpa26-4

You can use the following configuration commands to determine the current configuration of a router:

- **show version**—Displays the current hardware configuration of the router, including the system software version that is loaded and running.
- **show microcode**—Lists the recommended and the configured microcode version.
- **show controller**—Shows the microcode version running on the PCPA in the router.

For additional descriptions of configuration commands, refer to the publications listed in the “If You Need More Information” section on page 2.

You can also view the current version of software or microcode stored on the router Flash memory card by using the **show flash slot0:** or the **dir slot0: EXEC** commands. Refer to the “PCPA Microcode Guidelines” section on page 30 for basic configuration information and refer to the appropriate software documentation for complete configuration instructions and examples, which are listed in the “If You Need More Information” section on page 2.

If the command output displays indicate that the required system software and microcode are not available in your system, refer to the “Obtaining Documentation” section on page 37 or contact a service representative for upgrade information.

PCPA Microcode Overview

Microcode, also known as firmware, is a set of processor-specific software instructions that enables and manages the features and functions of a specific port adapter type. At system startup or reload, the system loads the microcode for each port adapter type present in the system.

New microcode is released to enable new features, improve performance, or fix known problems in earlier versions. The Cisco 7200 series routers support downloadable software and microcode images for most upgrades. This support lets you download new or upgraded images remotely, store the images in router memory, and load the new images at system startup without physically accessing the router. You can store multiple versions of an image in Flash or SanDisk memory for a specific port adapter type, and use configuration commands to specify which version of the image loads at startup. All port adapters of the same type (for example, all PCPAs) use the same microcode image.



Caution

To ensure proper operation of the channel and to prevent system problems you should use *only* the default PCPA microcode image that is recommended for the Cisco IOS software release you are running, unless you are directed to do otherwise by Cisco support personnel (Table 2).

The entire PCPA microcode image is delivered on a router Flash memory card or SanDisk memory device, or you can download it from Cisco.com.

By default, the PCPA microcode is loaded from the router Flash memory card or SanDisk memory device for the Cisco 7200 series routers. You can determine the default PCPA microcode version by entering the **show microcode** command.

The following example is a partial display of the **show microcode** command output:

```
Router# show microcode
Microcode images for downloadable hardware
HW Type           Microcode image names
-----
pcpa      default  slot0:xcpa26-4

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



Note

In Cisco IOS Release 11.3(7)T or later and Release 12.0(1) or later, the filename convention of all released PCPA microcode images is *xcpa26-*nn** (for example, *xcpa26-4*). Interim pre-release versions of PCPA microcode images use the filename convention *xcpa214-*nnn** (for example, *xcpa214-10*).

List of Parts and Tools

You need the following parts and tools to install a port adapter. If you do not have this equipment, contact a service representative for ordering information.

- PCPA
- Bus and tag interface cables
- ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares

Safety Guidelines

Observe the following safety guidelines when working with any equipment that connects to electrical power or telephone wiring.

Safety Warnings

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



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 være 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 förekommer 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

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 ESD Damage

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.

The following guidelines help prevent 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 megohm.

What is the PCPA?

This section discusses channel attachment and the PCPA, its LED functions, and its memory and cable requirements.

The following information is included in this section:

- Channel Attachment Overview, page 9
- PCPA Overview, page 9
- PCPA Description, page 10

Channel Attachment Overview

A mainframe channel (referred to as a *channel*) is an intelligent processor that manages the protocol on the communications media and controls the data transfer to and from the main central processing unit (CPU) storage. Devices called input/output processors (IOPs) communicate between the host CPU and the channel. One IOP controls multiple channels. There is no relationship between the number of CPUs and the number of IOPs.

The channel relieves the mainframe CPU of direct communication with input/output (I/O) devices, which saves processing cycles and allows data processing and communications tasks to run concurrently. Channels use one or more channel paths as the links between mainframes and I/O devices. I/O devices are connected directly to control units, which provide the logical capabilities required to operate and control the I/O devices.

PCPA Overview

A PCPA provides a single channel interface for Cisco 7200 series routers. In some situations, this interface can eliminate the need for a separate front-end processor (FEP). The PCPA contains a bus and tag (also called an original equipment manufacturer's interface [OEMI] and a parallel I/O interface) connector.

**Note**

The PCPA supports online insertion and removal (OIR), which allows you to install or remove a PCPA while the system is operating without shutting down system power.

PCPA Description

The following information is included in this section:

- PCPA General Layout, page 10
- PCPA DRAM Configurations, page 11
- Port Adapter Locations in Cisco 7200 Series Routers, page 11
- PCPA LED Indicators and Sequences, page 11
- Bus and Tag Specifications, page 12
- PCPA Bus and Tag Cables, page 13

PCPA General Layout

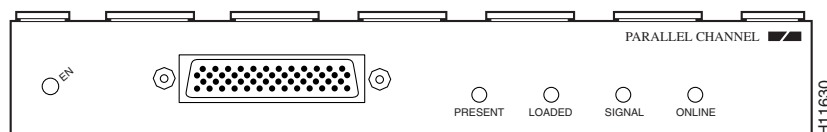
The PCPA (Figure 1) provides a single channel attachment interface for connecting Cisco 7200 series routers to a mainframe bus and tag channel.



Note

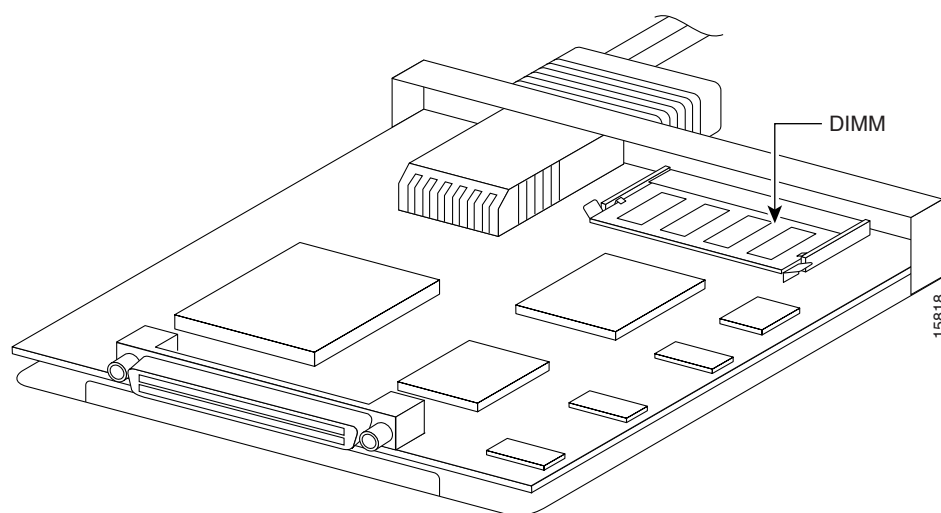
The Cisco 7200 series routers support the OIR of all port adapter types.

Figure 1 PCPA, Faceplate View



The PCPA has a single DRAM dual in-line memory module (DIMM) and comes configured with 16 MB of DRAM as the minimum standard (default) memory configuration (Figure 2).

Figure 2 PCPA DRAM DIMM Location



PCPA DRAM Configurations

Each PCPA model is available in the following configurations of DRAM DIMM:

- 16 MB DRAM—MEM-CPA-16M
- 32 MB DRAM—MEM-CPA-32M
- 32 MB DRAM—MEM-CPA-32M=



Note

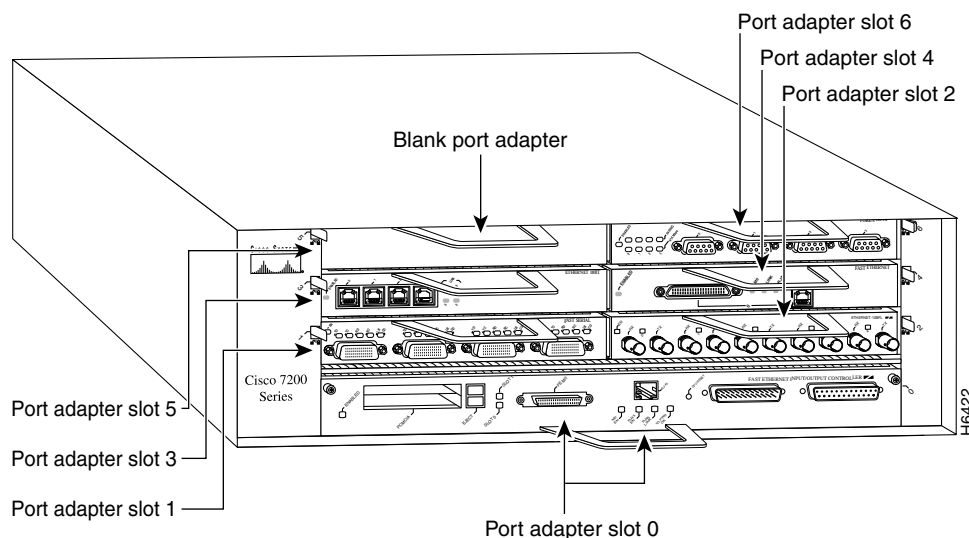
MEM-CPA-16M is the default memory configuration that ships on the PCPA. MEM-CPA-32M is a memory option that can be specified when ordering the port adapter. MEM-CPA-32M= is a spare memory option that is intended for PCPAs with the 16 MB default already been installed.

PCPA DRAM can be upgraded in the field by Cisco-certified service personnel *only*.

Port Adapter Locations in Cisco 7200 Series Routers

In Cisco 7200 series routers, which consist of the Cisco 7202, Cisco 7204, and the Cisco 7206, 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 slot 6 for the Cisco 7206. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller. Figure 3 shows a Cisco 7206 with port adapters installed.

Figure 3 Cisco 7200 Series Port Adapters (Cisco 7206)



PCPA LED Indicators and Sequences

The functions of the PCPA LEDs are as follows:

- Enabled—Indicates that the PCPA is enabled for operation by the system.
- Present—Indicates that the PCPA is recognized by the Cisco 7200 series router.
- Loaded—Indicates that the PCPA firmware is completely loaded.

- **Signal**—Indicates that the Operational Out signal has been detected. Note that even though a system reset and selective reset both cause the operational out signal to drop, the signal LED will still be on during those sequences.
- **Online**—Indicates that the PCPA is ready to establish connection to the host channel.

The PCPA LED indicator sequences during a cold boot are shown in Table 3.

Table 3 Cold Boot LED Sequence

Sequence	En	Present	Loaded	Signal	Online
1*	On	Off	On	Off	Off
2	On	Off	Off	Off	On
3	On	Off	On	Off	On
4	On	On	Off	Off	Off
5	On	On	On	Off	Off
6	On	On	Off	Off	On
7*	On	On	On	Off	On
8*	On	Off	Off	On	Off
9 ¹	On	Off	Off	Off	Off

1. Indicates that the PCPA is starting to execute the microcode and waiting for commands



Note

Because of the short duration of the LEDs, you will typically see only the LED sequences marked by asterisks in Table 3.

Bus and Tag Specifications

The specifications for the PCPA interface are shown in Table 4.

Table 4 Bus and Tag Specifications (continued)

Characteristic	Bus and Tag Specification
Supported processor I/O architectures	System/370, 370/Xa, ESA/390
Bit transmission	Parallel
Maximum distance	400 ft (122 m) ¹
Channel data rate	Up to 4.5 MBps
Signaling rate ²	4.5 MBps
Cable types	Copper bus and tag
Addition of devices to running systems	Static
Number of addressable devices per channel	256

Characteristic	Bus and Tag Specification
Connectable control units per channel	Up to 8
Connectable channels per adapter	1

- 1.The IBM 3044 C/D (host side/remote side) copper to fiber repeater can extend this distance up to 1.2 miles (2 km).
- 2.For bus and tag, the signaling rate matches the channel data rate. For example, if you use a 3 MBps channel, the signaling rate is 3 MBps. The ESCON interface signals at a constant rate; the bus and tag interface signals at the data rate.

PCPA Bus and Tag Cables

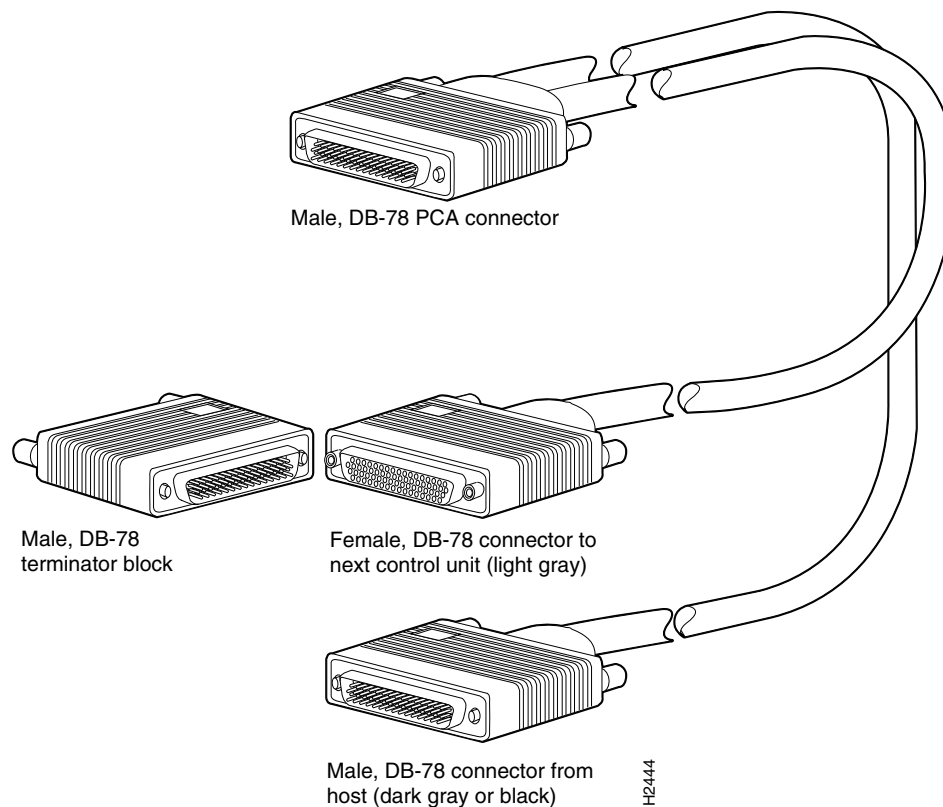
This section includes descriptions and illustrations of the PCPA bus and tag cables.

- Y cable—CAB-PCA-Y
- VA cable—CAB-PCA-VA
- VB cable—CAB-PCA-VB

Y Cable

The bus and tag cable with three 78-pin connectors (Figure 4) has a DB-78 male (PCA) connector on the port adapter end, a DB-78 female connector on the next-control-unit end, and a DB-78 male connector on the from-host end. This cable is referred to as the *Y cable*.

Figure 4 PCA Bus and Tag Cable (CAB-PCA-Y)



The male connector might be labeled *IN* and is typically black, but can also be a dark gray. The female connector might be labeled *OUT* and is typically light gray. The female *OUT* cable is nearest to the select/bypass switch.



Caution

The Y cable must be connected directly to the PCPA. Do not connect any other cables directly to the PCPA.

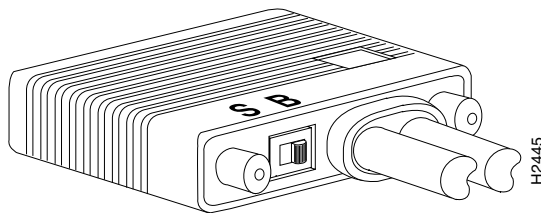
On the rear of the PCA connector on the Y cable there is a switch marked *S* (for select mode) and *B* (for bypass mode) (Figure 5). The select/bypass switch is required to allow the cable to be separated from the PCPA without “opening” the select-out loop.



Caution

To prevent halting the system or negatively affecting the mainframe operating system, verify that the select/bypass switch is in bypass mode before you remove the PCA connector on the Y cable from the PCPA.

Figure 5 **Select/Bypass Switch on the Rear of the PCA Connector on the Y Cable (CAB-PCA-Y Bypass Shown)**



In select mode the PCPA is operational and the select-out signal is passed in a loop to all control lines on the channel. All control units have a relay that shorts the incoming select-out signal to the outgoing select-out signal when power is not applied to the control unit. When power is applied, the relay is opened, and the signal is passed to the PCPA.

Without the select/bypass switch in bypass mode, the channel would need to be taken offline before servicing or replacing PCPA. If the selected address does not match, the select-out signal is passed to the next control unit. If the select-out signal gets all the way back to the channel, the control unit being addressed is not present.



Note

In bypass mode, the incoming select-out signal is shorted to the outgoing select-out signal, bypassing the PCPA and allowing other devices on the channel to function properly.



Caution

Provide adequate strain relief for the heavy bus and tag cables that attach to the PCPA to prevent damaging the connector on the PCPA by unintentionally disconnecting the Y cable from the connector.

VA and VB Cables

The two bus and tag cables with connector blocks have a DB-78 (male or female) connector on the port adapter end and 48-pin type-A connector blocks on the bus and tag ends (Figure 6). VA and VB cables are 56 inches (1.42 meters) long.

The bus and tag cable that attaches the host and the PCPA is referred to as the *VA cable*. The female 78-pin connector might be labeled *IN* and is typically light gray. The cable labeled *P2* is bus, and the cable labeled *P3* is tag. Looking into the end of the female 78-pin connector (on the VA cable), with the wide part of the connector D-shell on top, the *P2* (bus) cable is on the right, and the *P3* (tag) cable is on the left. The plastic on the ends of the bus and tag connectors might be black or dark gray. The Cisco VA cable ships with a terminator.

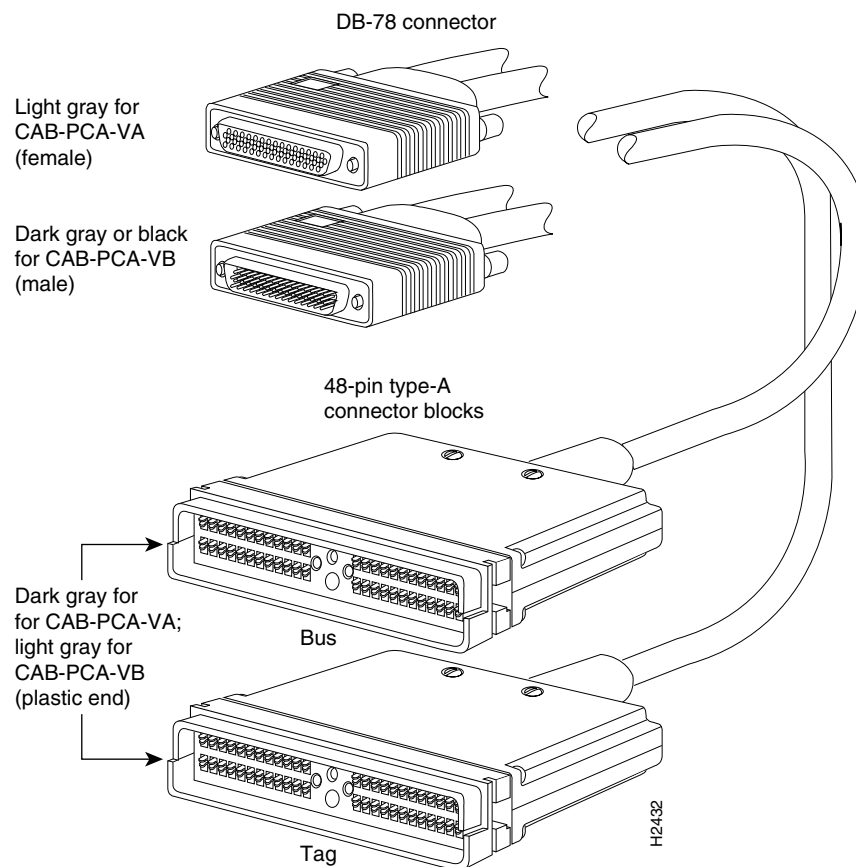
The bus and tag cable that attaches the next control unit and the PCPA is referred to as the *VB cable*. The male 78-pin connector might be labeled *OUT* and is typically black or dark gray. The cable labeled *P2* is bus, and the cable labeled *P3* is tag. Looking into the end of the male 78-pin connector (on the VB cable), with the wide part of the connector D-shell on top, the *P2* (bus) cable is on the left, and the *P3* (tag) cable is on the right. The plastic on the ends of the bus and tag connectors might be light gray (as opposed to the black or dark gray plastic on the VA cable).



Caution

To prevent potential system problems, do not connect the VB cable directly to the PCPA. You must connect the Y cable to the PCPA, then connect the VB cable to the Y cables.

Figure 6 PCA Bus and Tag, VA and VB Cables



The Y cable is always attached to the PCPA. The VA cable attaches the male end of the Y cable and the host. The VB cable attaches the female end of the Y cable and the next (or new) control unit. Do not connect the VB cable directly to the PCPA. If the PCPA is the last control unit, channel termination is required at the end of the Y cable that points away from the host (Figure 4). For attachment instructions refer to the “Attaching the PCPA to the Channel” section on page 20.

**Caution**

To prevent damaging the connector on the PCPA by unintentionally disconnecting the Y cable from the connector, provide adequate strain relief for the heavy bus and tag cables that attach to the PCPA.

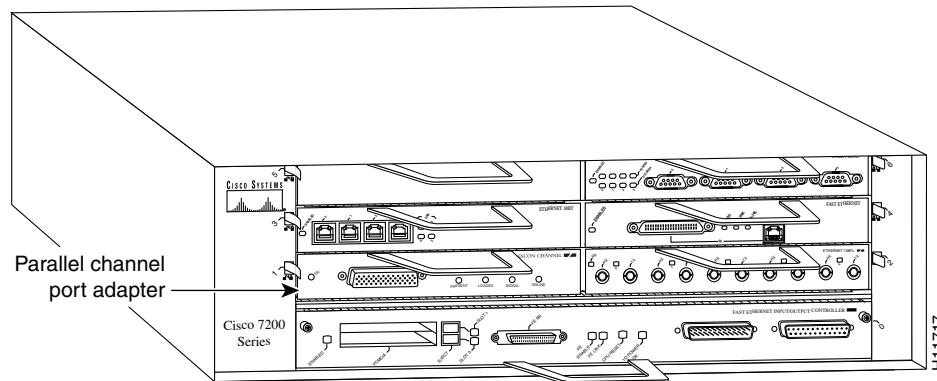
Using the PCPA in Cisco 7200 Series Routers

The following sections include information about using the PCPA in the Cisco 7200 series routers:

- Installing or Replacing a Port Adapter in Cisco 7200 Series Routers, page 16
- Attaching the PCPA to the Channel, page 20
- Using the EXEC Command Interpreter, page 24
- Configuring PCPA Interface, page 24

You can install the PCPA in any of the available port adapter slots in a Cisco 7200 series router. Figure 7 shows a PCPA installed in port adapter slot 1 of a Cisco 7206.

Figure 7 Cisco 7206 with a PCPA in Port Adapter Slot 1



Installing or Replacing a Port Adapter in Cisco 7200 Series Routers

**Note**

The Cisco 7200 series routers support OIR. You do not need to power down the Cisco 7200 series routers when removing and replacing PCPAs.

When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to EMI emissions requirements and to allow proper air flow 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.

The following sections describe how to remove and replace a port adapter:

- Removing a Port Adapter, page 17
- Replacing a Port Adapter, page 18

Removing a Port Adapter

You do not need to power down the Cisco 7200 series routers when removing and replacing PCPAs; however, to prevent a possible interface control check on the mainframe, consult with your system administrator to take appropriate precautions.

The following procedure describes how to remove a port adapter from a Cisco 7200 series router:

- Step 1** Attach an ESD wrist strap to your wrist and an unfinished chassis surface.
- Step 2** Vary offline the addresses assigned to the PCPA. For instructions on how to vary offline, refer to the documentation for your mainframe operating system.
- Step 3** On the PCA connector on the Y cable, place the select/bypass switch in bypass mode (Figure 5).
To allow the propagation of channel signals to downstream control units while the cable is disconnected, leave this switch in bypass mode.

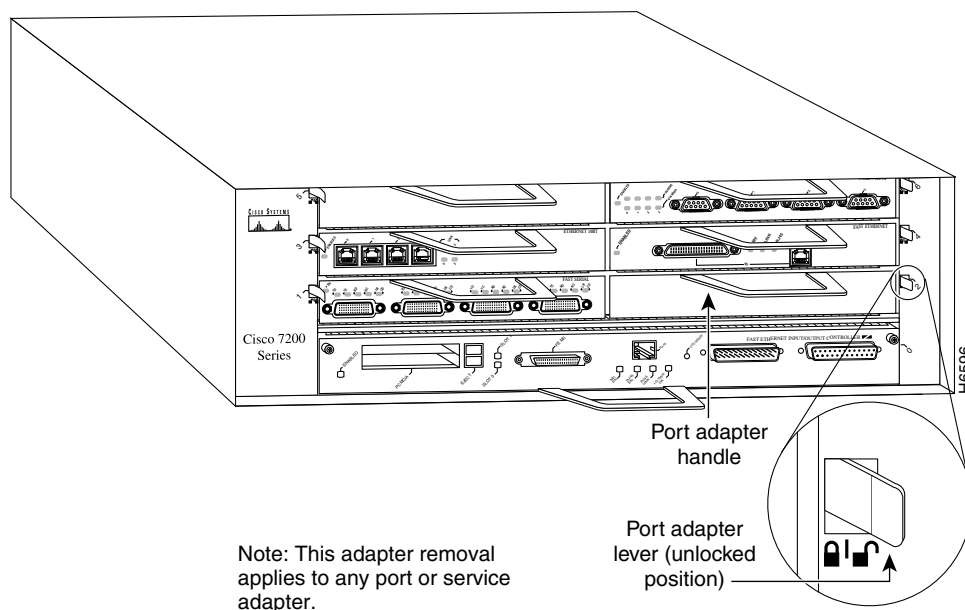


Caution

If the select/bypass switch is in select mode when the PCA connector on the Y cable is removed, other devices on the channel and the mainframe operating system might not operate properly.

- Step 4** Place the port adapter lever for the desired port adapter slot in the unlocked position. The port adapter lever remains in the unlocked position (Figure 8).

Figure 8 *Placing the Port Adapter Lever in the Unlocked Position (Cisco 7206)*



- Step 5** Grasp the handle on the port adapter and pull the port adapter from the midplane until it is about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter from the chassis slot.



Note

As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

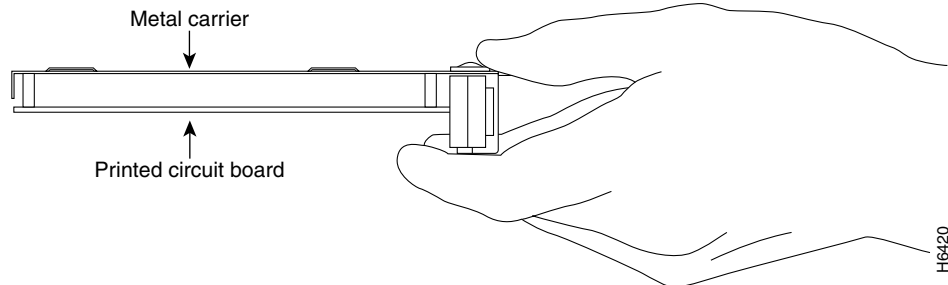
- Step 6** With the port adapter halfway out of the slot, disconnect the PCA connector on the Y cable from the port adapter (Figure 12).
- Step 7** After disconnecting the cable, pull the port adapter from its chassis slot.



Caution

Always handle the port adapter by the carrier edges and handle; never touch the port adapter's components or connector pins (Figure 9).

Figure 9 Handling a Port Adapter



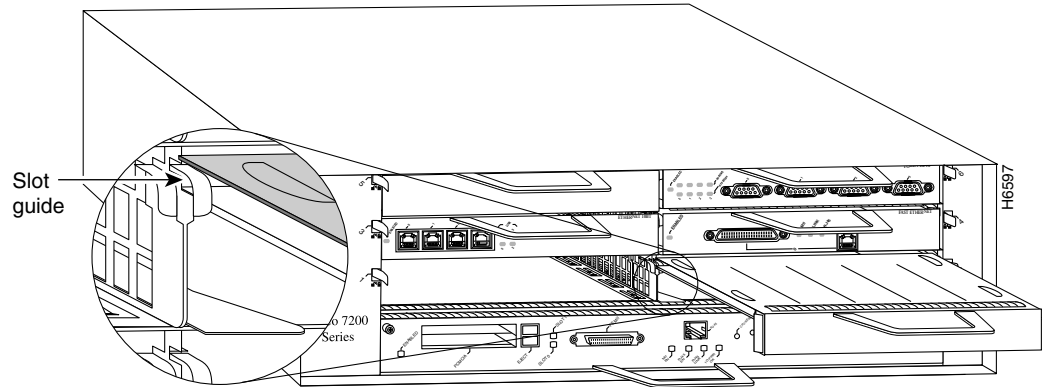
- Step 8** Place the port adapter on an antistatic surface with its components facing upward or place in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.

Replacing a Port Adapter

The following procedure describes how to replace a port adapter in a Cisco 7200 series router:

- Step 1** Attach an ESD wrist strap to your wrist and an unfinished chassis surface.
- Step 2** Use both hands to grasp the port adapter by its metal carrier edges and position the port adapter so that its components are downward (Figure 9).
- Step 3** Align the left and right edges of the port adapter metal carrier between the guides in the port adapter slot (Figure 10).

Figure 10 *Align the Port Adapter Metal Carrier Between the Slot Guides (Cisco 7206)*



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

Step 4 With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



Caution

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

Step 5 With the port adapter halfway in the slot, connect the PCA connector on the Y cable to the port adapter.

Step 6 After connecting the required cables, carefully slide the port adapter all the way into the slot until you feel the port adapter's connectors mate with the midplane.

Step 7 After feeling the connectors mate, move the port adapter lever to the locked position. Figure 11 shows the port adapter lever in the locked position.



Note

If the port adapter lever 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 to the locked position.

Step 8 Place the select/bypass switch on the PCA connector on the Y cable in select mode (Figure 5).

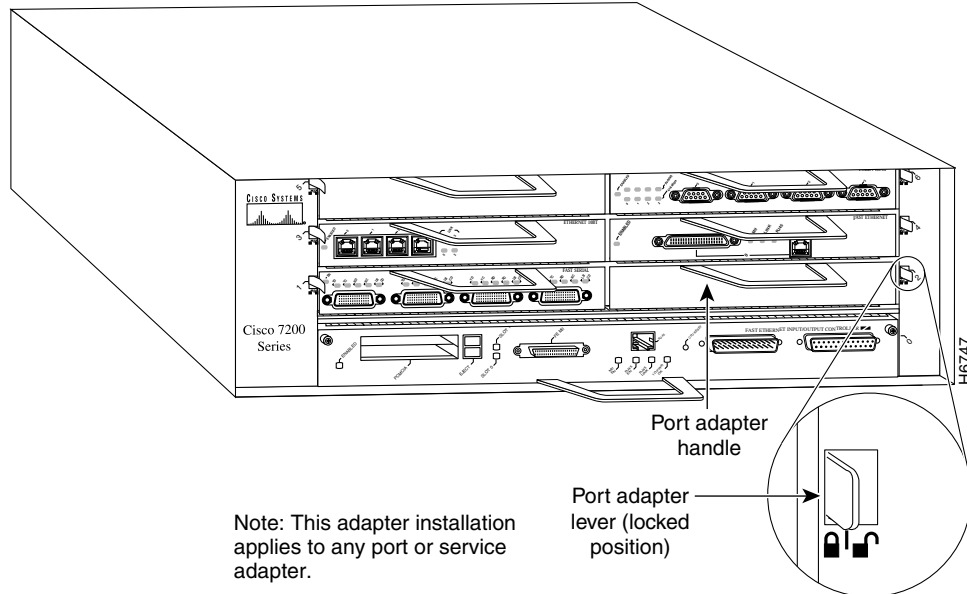
Step 9 Vary online all addresses assigned to the PCPA. For instructions on how to vary addresses online, refer to the documentation for your mainframe operating system.



Caution

To prevent damaging the connector on the PCPA by unintentionally disconnecting the Y cable from the connector, provide adequate strain relief for the heavy bus and tag cables that attach to the PCPA.

Figure 11 Port Adapter Lever in the Locked Position (Cisco 7206)



Attaching the PCPA to the Channel

The PCPA is connected using the bus and tag cable with 78-pin connectors (the Y cable) and the bus and tag cables with 48-pin, type A connector blocks (the VA and VB cables). In general, a Y cable attaches to the PCPA, and the VA and VB cables attach to the remaining ends of the Y cable.

The following procedure describes how to attach the bus and tag cables between the PCPA and the host channel.

Caution

We recommend that an authorized service representative or other qualified service person perform the following procedure. To prevent hardware problems with your host processor, all the channel connections must be tight. A loose connection can cause the host processor or its channel to *halt*. Every cable must be tightly seated in its connector.

Step 1

If the PCPA is already seated on the midplane, use the **shutdown** interface command on the router to shut down the PCPA interface. This action prevents excessive error messages from being sent to the router log output. In addition, we recommend that you vary offline the host channel to which the PCPA will be attached. For instructions on how to vary offline the host channel, refer to the documentation for your mainframe operating system.

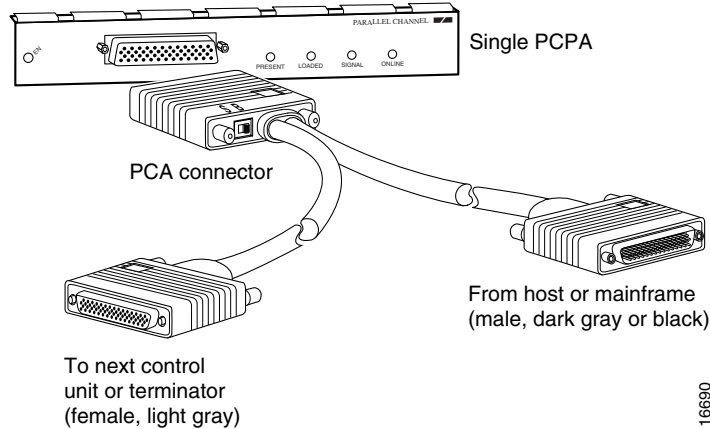
Caution

Ensure the select/bypass switch on the PCA connector on the Y cable is in the bypass position; otherwise, the mainframe operating system can be negatively affected.

Step 2

Attach the PCA connector on the Y cable to the PCPA (Figure 12).

Figure 12 Connecting or Removing the Y Cable



- Step 3** Attach the female (light-gray) end of the Y cable (Figure 13a) to the male (dark gray or black) end of the VB cable (that goes to the next control unit).



Note If the PCPA is the *last* control unit, channel termination is required to loop signals back to the host.

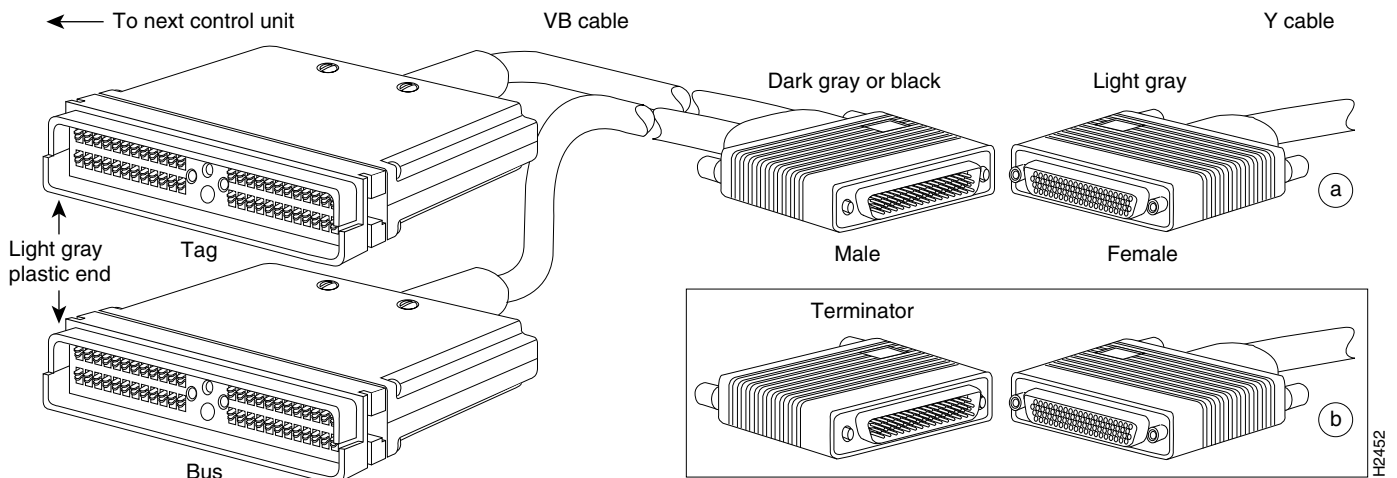
If the PCPA is the *last* control unit on the channel, attach a terminator to the female end of the Y cable (Figure 13b). *Do not attach a VB cable.*



Caution

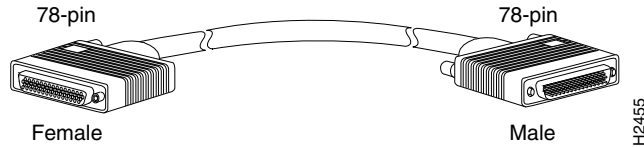
To prevent potential system problems, do not connect the VB cable directly to the PCPA. You must connect the Y cable to the PCPA, then connect the VB cable to the Y cables as appropriate.

Figure 13 Connecting the VB Cable Between the Y Cable and the Next Control Unit



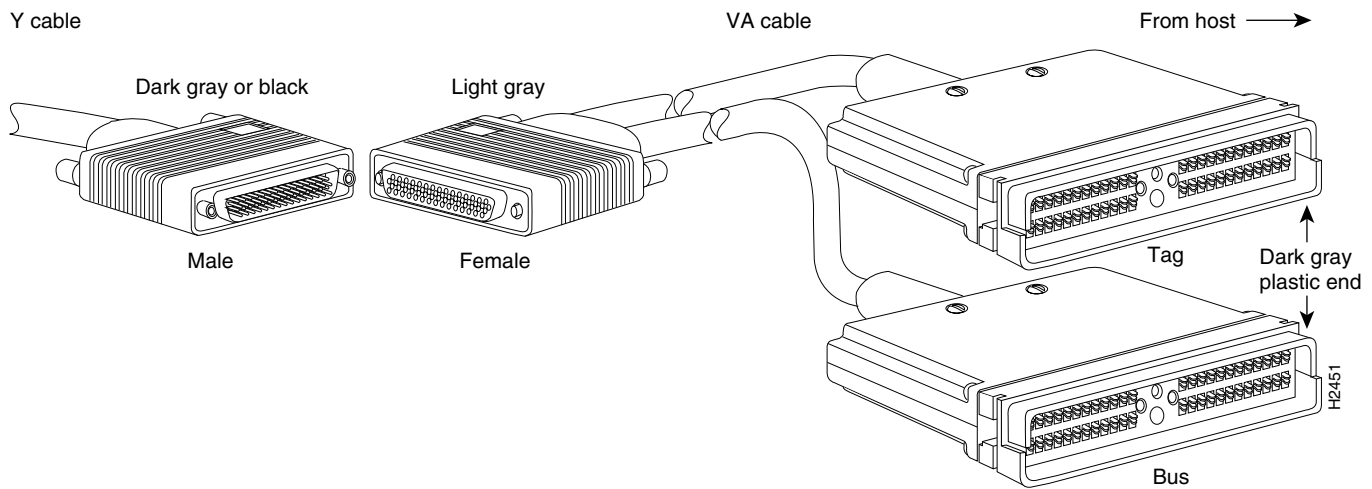
- Step 4** If required, extend the length of the Y cable connections (between the VA and VB cables) with a straight-through cable (Figure 14) that is available from IBM. This cable is not available from Cisco.

Figure 14 *Straight-Through Cable*

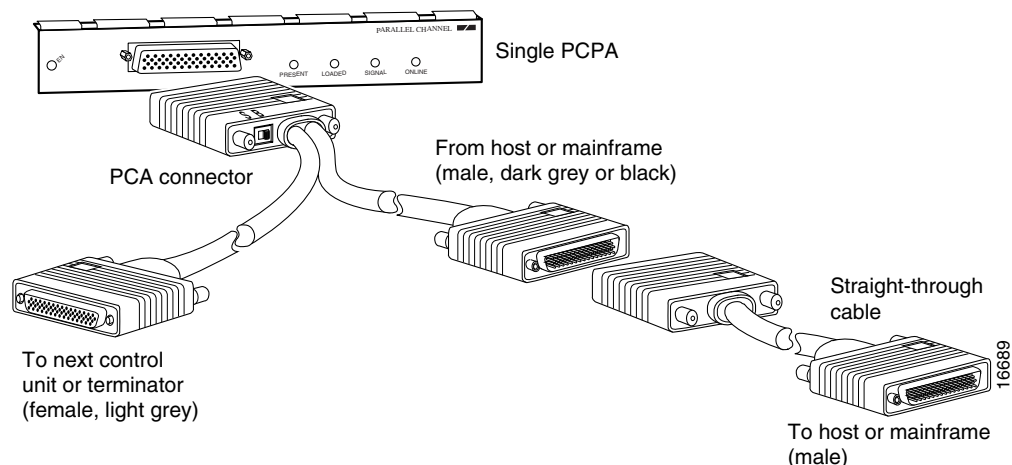


- Step 5** Attach the male (dark gray or black) end of the Y cable to the female (light gray) end of the VA cable that comes from the host (Figure 15).

Figure 15 *Connecting the VA Cable Between the Y Cable and the Host*



- Step 6** Place the select/bypass switch in select mode.
- Step 7** If the PCPA replaces another port adapter or occupies a previously empty interface processor slot, configure the interface(s) on the PCPA as described in the “Configuring PCPA Interface” section on page 24; otherwise, interface configuration is not required.
- Step 8** Vary online the host channel.
- Step 9** For instructions on how to vary the host channel online, refer to the documentation for your mainframe operating system.



Caution

To prevent damaging the connector on the PCPA, by unintentionally disconnecting the Y cable from the connector, make sure you provide adequate strain relief for the heavy bus and tag cables that attach to the PCPA.

Detaching the Y Cable from the PCPA

To properly detach a Y cable from the PCPA, use the following procedure.



Caution

To reduce the potential for problems, you should have an authorized service representative or other qualified service person perform the following procedure. To prevent hardware problems with your host processor, all the channel connections must be tight. A loose connection can cause the host processor or its channel to halt. Every cable must be tightly seated in its mating connector.

Step 1 Vary offline all addresses assigned to the PCPA. For instructions on how to vary addresses offline, refer to the documentation for your mainframe operating system.

Step 2 Place the select/bypass switch on the PCA connector on the Y cable in bypass mode (Figure 5). To allow the propagation of channel signals to downstream control units while the cable is disconnected, leave this switch in bypass mode.



Caution

If the select/bypass switch is in select mode when the PCA connector on the Y cable is removed, other devices on the channel and the mainframe operating system might not operate properly.

Step 3 Remove the PCA connector on the Y cable from the PCPA (Figure 12).

Step 4 When you are finished with the task that required you to detach the PCPA from the host channel, reattach the PCA connector on the Y cable to the PCPA.

Step 5 Place the select/bypass switch on the PCA connector on the Y cable in select mode (Figure 5).

- Step 6** Vary online all addresses assigned to the PCPA. For instructions on how to vary addresses online, refer to the documentation for your mainframe operating system.



Caution

To prevent damaging the connector on the PCPA by unintentionally disconnecting the Y cable from the connector, provide adequate strain relief for the heavy bus and tag cables that attach to the PCPA.

Using the EXEC Command Interpreter

You modify the configuration of your router through the software command interpreter called the EXEC. 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 EXEC command interpreter 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 EXEC level:

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

```
Router> enable
Password:
```

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

- Step 3** When you enter the correct password, the system displays the privileged-mode system prompt (#):

```
Router#
```

Proceed to the following section to configure the new interface.

Configuring PCPA Interface

If you installed a new PCPA or if you want to change the configuration of an existing interface, you must use the privileged EXEC **configure** command. If you remove and replace a PCPA in the same slot that was previously configured, the system will recognize the new PCPA interface and bring it up in its existing configuration. A PCPA removed from one slot and replaced in another slot must be reconfigured.

After you verify that the new PCPA is installed correctly, use the **configure** command to configure the new interface. The enabled LED (EN) goes on when the port adapter is installed correctly. Be prepared with the information you will need to configure the interface, including the following:

- Protocols and encapsulations you plan to use on the new interface.
- Protocol-specific information, such as internet protocol (IP) addresses if you will configure the interface for IP routing.

- Special services you plan to use on the interface, such as Common Link Access for Workstations (CLAW), offload support, TN3270 server support, CIP SNA, or Cisco MultiPath Channel.

**Note**

Configuration commands are executed from the privileged EXEC command interpreter, which usually requires password access. Refer to the “Using the EXEC Command Interpreter” section on page 24 and contact your system administrator, if necessary, to obtain access.

The following sections provide specific information about configuring the PCPA interface:

- Selecting Port Adapter Slots and Parallel Channel Port Number, page 25
- Configuring Interfaces, page 26
- Checking the Configuration, page 27

For complete descriptions of interface subcommands and the configuration options available for Cisco 7200 series interfaces, refer to the publications listed in the “If You Need More Information” section on page 2.

Selecting Port Adapter Slots and Parallel Channel Port Number

This section describes how to identify port adapter slots and the PCPA port number.

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

- The first number identifies the port adapter slot in which the PCPA is installed.
- The second number identifies the interface port on the PCPA, which is always numbered as interface 0 for the PCPA.

**Note**

Some IBM channel attach software features are configured on a *virtual port*. On the CIP cards installed in a Cisco 7500-series router, there are up to two physical ports, numbered 0 and 1, and a virtual port, numbered 2. However, on the PCPA installed in a Cisco 7200 series router, the single physical port and the virtual port are configured using the same port number identifier, number 0.

Interface ports maintain the same address regardless of whether other port adapters are installed or removed from the slot. However, when you move a port adapter to a different slot, the first number in the address changes to reflect the new port adapter slot number.

The port adapter slot numbers start with 1 and continue through 6. Slot 0 is always reserved for the Fast Ethernet port on the I/O controller. The individual interface port numbers are always 0. For example, the port on a PCPA in port adapter slot 3 would have the address 3/0. If the PCPA was in port adapter slot 1, this same interface port would be 1/0.

You can identify interface ports by physically checking the slot/interface port location on the front of the router or by using **show** commands to display information about a specific interface or all interfaces in the router.

Configuring Interfaces

This section describes the procedure for performing a basic configuration of the interface on a PCPA installed in a Cisco 7200 series router.

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>
```

The following example describes a basic configuration procedure:

-
- Step 1** At the privileged EXEC prompt, enter configuration mode and specify that the console terminal will be the source of the router configuration commands, as follows:

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

- Step 2** At the prompt, enter the interface configuration mode by using the **interface** configuration command. The example that follows prepares you to configure the interface on the channel port adapter in slot 2, port 0:

```
Router(config)# interface channel 2/0
```

- Step 3** If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface with the **ip address** interface configuration, as in the following example:

```
Router(config-if)# ip address 1.1.1.10 255.255.255.0
```

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

- Step 5** Change the shutdown state to up and enable the interface as follows:

```
Router(config-if)# no shutdown
```

- Step 6** When you have included all configuration commands to complete the configuration, press **Ctrl-Z** to exit configuration mode. You may also type **end** to exit configuration mode and return to the EXEC prompt.

Step 7 Write the new configuration to nonvolatile memory as follows:

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

To check the interface configuration using **show** commands, see the “Checking the Configuration” section on page 27.

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.

Using show Commands to Verify the New Interface Status

Use **show** commands to verify that the new interfaces are configured and operating correctly, as follows:

-
- Step 1** Display the system hardware configuration with the **show version** command. Ensure that the list includes the new interface.
 - Step 2** Display all the current port adapters and their interfaces with the **show controllers** command. Verify that the new PCPA appears in the correct slot.
 - Step 3** Specify the new interface with the **show interfaces port adapter type slot/interface** 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 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 nonvolatile RAM (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 service representative for assistance.

Using show Commands to Display Interface and System Information

Use the **show interfaces type slot/port** command to display information about a specific interface. The following example of the **show interfaces channel slot/port** command shows all of the information specific to the PCPA in port adapter slot 5:

```
Router# show interfaces channel 5/0
Channel5/0 is up, line protocol is up
  Hardware is Parallel Channel (Bus & Tag)
  Internet address is 168.18.1.105/29
  MTU 4472 bytes, BW 98304 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation CHANNEL, loopback not set
  PCA adapter card
  Data transfer rate 3 Mbytes, number of subchannels 4
  Last input 01:13:26, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    58312 packets input, 191351408 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    58309 packets output, 191351216 bytes, 0 underruns
    0 output errors, 0 collisions, 9 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

With the **show interfaces type slot/port** command, use arguments such as the interface type and the port adapter slot and port number to display information about a specific PCPA.

Display all the current port adapters and their interfaces with the **show controllers** command. Following is an example of the **show controllers type slot/port** command that shows information about a specific PCPA:

```
Router# show controllers channel 5/0
PCPA 5, hardware version 1.0, microcode version 214.10
  Microcode loaded from flash slot0:xcpa214-120_kernel_xcpa
  Loaded:seg_pca      Rev. 0    Compiled by jpod on Fri 16-Jan-98 17:45
  Loaded:seg_offload  Rev. 0    Compiled by jpod on Fri 16-Jan-98 17:44
  Loaded:seg_tcpip    Rev. 0    Compiled by jpod on Fri 16-Jan-98 17:46
  EPROM version 214.10, VPLD version 0.86
  PCA0: hw version 255, microcode version C1010000
  Load metrics:
    Memory      sram 3323864/4096K, dram 13389864/16M
    CPU         1m  1%, 5m  1%, 60m  0%
    DMA         1m  1%, 5m  0%, 60m  0%
    PCA0        1m  0%, 5m  0%, 60m  0%
Interface Channel5/0
Hardware is Parallel Channel (Bus & Tag)
HW Registers control status=0x0001EC07 LED control=0x00045DDF
HW Poll Register 4B05A5C0:[00000001]

Free buffer queues
  queue=0 max_entries=64 size=600 head=55 ring=4B0F0F40
  queue=1 max_entries=64 size=4520 head=47 ring=4B0A3BA0
Tx Queues
  queue=0 head=5 tail=5 tx_cnt=0 tx_pakcnt=0
  max_entries=128 type=1 poll_index=0 ring=4B0B2F00
  queue=1 head=18 tail=18 tx_cnt=0 tx_pakcnt=0
  max_entries=32 type=2 poll_index=1 ring=4B0A30A0
Rx Queues
  max_entries=126 poll_index=3 head=82 ring=4B0B3340
```

Use the **show diag slot** command to determine which type of port adapter is installed in your system. Specific port adapter information is displayed, as shown in the following example of a PCPA in port adapter slot 5:

```
Router# show diag 5
Slot 5:
Bus and Tag port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 1d19h ago
Hardware revision 1.0          Board revision A0
Serial number      56          Part number    73-2961-02
Test history       0x0         RMA number     00-00-00
EEPROM format version 1
EEPROM contents (hex):
      0x20: 01 2E 01 00 00 00 00 38 49 0B 91 01 00 00 00 00
      0x30: 50 00 00 00 98 03 00 00 00 00 FF FF FF FF FF 00
```

Use the **show version** (or **show hardware**) command to display the configuration of the router hardware, the software version, the names and sources of configuration files, and the boot images. An example of the output from the **show version** command is as follows:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-AJS-M), Experimental Version 11.3(19980105:225321)
[jpod-xcpa_col_p.nightly 171]
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Tue 20-Jan-98 02:17 by
Image text-base: 0x600088B8, data-base: 0x60E46000

ROM: System Bootstrap, Version 11.1(11855) [beta 2], INTERIM SOFTWARE
BOOTFLASH: 7200 Software (C7200-BOOT-M), Version 11.1(472), RELEASE SOFTWARE (fc
1)

Router uptime is 20 hours, 8 minutes
System image file is "xcpa-ios/980120/c7200-ajs-mz.XCPA_980120", booted via tftp
from 171.69.160.37

cisco 7206 (NPE150) processor with 57344K/8192K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (512KB Level 2 Cache)
Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
8 Ethernet/IEEE 802.3 interface(s)
1 FastEthernet/IEEE 802.3 interface(s)
2 IBM channel interface(s)
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).
4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

For complete command descriptions and examples for the Cisco 7200 series routers, refer to the publications listed in the “If You Need More Information” section on page 2.

Using the Ping Command to Verify Network Connection

Use the **ping** command to verify that an interface port is functioning properly and to check the path between a specific port and connected devices at various locations on the network. This section provides brief descriptions of the **ping** command. After you verify that the system has booted successfully and is operational, you can use the **ping** command to verify the status of interface ports.

The **ping** command sends an echo request out to a remote device at the IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified time-out 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.

The following example shows a successful **ping** command to a remote server with the IP address 1.1.1.10:

```
Router# ping 1.1.1.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 1.1.1.10, 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 server and that the server is active, then repeat the **ping** command.

For complete descriptions of interface configuration commands and the configuration options available for Cisco 7200 series interfaces and functions, refer to the publications listed in the “If You Need More Information” section on page 2.

PCPA Microcode Guidelines

The following sections discuss PCPA microcode configuration requirements:

- How Does PCPA Microcode Ship?, page 30
- PCPA Microcode Upgrade Overview, page 31
- Configuring Microcode, page 31

For additional information about specific microcode requirements, refer to the “PCPA Microcode Overview” section.

How Does PCPA Microcode Ship?

For the Cisco 7200 series routers, when the PCPA is ordered as part of a new system, the Channel Port Adapter microcode is available on a Flash memory card or SanDisk memory device (which also includes the Cisco IOS software release compatible with the microcode version) and via Cisco.com. When the PCPA is ordered as a spare, the Channel Port Adapter microcode is available via Cisco.com.



Note

The PCPA compatible microcode images are virtually bundled with all Cisco IOS software releases that support PCPA. The virtual bundling of the microcode means that the microcode software is loaded separately by the Cisco IOS software.

PCPA Microcode Upgrade Overview

To upgrade the PCPA microcode obtained from Cisco.com, complete the steps in the following procedures.



Note

Perform the following procedure only if you are upgrading your microcode.



Caution

To prevent system problems in the following procedure, you must be running Cisco IOS Release 11.3(7)T or later or Release 12.0(1) or later. For information on upgrading your Cisco IOS software, refer to the appropriate software configuration publication listed in the “If You Need More Information” section on page 2.

Upgrading from Cisco.com

To upgrade PCPA microcode images obtained from Cisco.com, do the following:

-
- | | |
|---------------|---|
| Step 1 | Download the PCPA microcode image from Cisco.com to a TFTP server. |
| Step 2 | Remove any configuration commands that specify a PCPA microcode image from the running configuration. |
| Step 3 | Copy the PCPA microcode image to the Flash memory card in slot0 or slot1, or to the SanDisk memory device in disk0 or disk1. |
| Step 4 | Reconfigure the router, as necessary, to use the PCPA microcode image stored in the Flash memory card in slot0 or slot1, or in the SanDisk memory device in disk0 or disk1. |
| Step 5 | Save your running configuration to a TFTP server, Flash memory card, or SanDisk memory device. |
| Step 6 | Perform a microcode reload. |
-

Configuring Microcode

This section describes how to modify the startup configuration to load different microcode images at startup, or to change existing configuration instructions and re-enable the system default.

At system startup or reload, the system loads a microcode image for each port adapter type. All port adapters of the same type use the same microcode image; only one image for each type can load at startup. The PCPA microcode image must be located on a Flash memory card or SanDisk memory device.

When you upgrade software or microcode by downloading new images onto a Flash memory card or SanDisk memory device, you must configure the system to load the new microcode image at startup. Otherwise, the system will continue to load the default image from the system or attempt to load any previous image if it is still specified in the configuration file.

**Note**

If you are running anything other than the default PCPA microcode with your Cisco IOS software and you want to upgrade to a later version of Cisco IOS software, and want to use the default PCPA microcode that comes with that later version, you must remove the **microcode pcpa slot:filename** statement from the system configuration file, otherwise the Cisco IOS software will try to load that old version of the PCPA microcode.

To instruct the system to load a PCPA microcode image other than the default at startup, use the **microcode pcpa slot:filename** and the **microcode reload** configuration commands to add the instructions to the configuration file.

To load a microcode image from a file stored on a Flash memory card, enter the **show flash slot0: EXEC** command to display the Flash directory contents and verify the exact name of the file (**xcpa26-4** is used in this example):

Router> **show flash slot0:**

```
(additional displayed text omitted)
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
23 .. unknown 00000001 4930F8 11 1 Jan 20 1998 14:33:19 xcpa26-4
24 .. unknown 70908993 4E213C 23 323522 Jan 20 1998 14:33:19 xcpa26-4_kernel_xcpa
25 .. unknown 5CD4E560 51A4F4 19 230200 Jan 20 1998 14:33:34 xcpa26-4_seg_802
26 .. unknown 0954E702 56522C 20 306360 Jan 20 1998 14:33:44 xcpa26-4_seg_cmpc
27 .. unknown 44575172 57A814 20 87400 Jan 20 1998 14:33:59 xcpa26-4_seg_csna
28 .. unknown 1C73CFC5 5EB2F4 19 461408 Jan 20 1998 14:34:03 xcpa26-4_seg_eca
29 .. unknown 090B4417 5FC0F4 23 68992 Jan 20 1998 14:34:24 xcpa26-4_seg_offload
30 .. unknown BE20EFEA 60D064 19 69360 Jan 20 1998 14:34:28 xcpa26-4_seg_pca
31 .. unknown 4A1D172A 610DB4 20 15568 Jan 20 1998 14:34:31 xcpa26-4_seg_push
32 .. unknown 227EF97E 63D9C4 21 183184 Jan 20 1998 14:34:32 xcpa26-4_seg_tcpip
33 .. unknown 249B5D63 6C8FBC 22 570744 Jan 20 1998 14:34:41 xcpa26-4_seg_tn3270
```

(additional displayed text omitted)

2927520 bytes available (17650784 bytes used)

Perform the following steps to configure the microcode for a PCPA on a router configured with Cisco IOS Release 11.3(7)T or later or Release 12.0(1) or later:

Step 1 Enter the privileged EXEC mode command interpreter:

```
Router> enable
Password:
Router#
```

**Note**

For complete information on the command interpreter and software functions, refer to the publications listed in the “If You Need More Information” section on page 2.

Step 2 If you need to copy a new PCPA microcode image to your router’s Flash memory, refer to the “Using Flash Memory” section on page 33, then proceed to Step 3.**Step 3** In privileged command mode, enter router configuration mode and specify that the console terminal will be the source of the configuration subcommands:

```
Router# configure terminal
```


To load the microcode from an individual microcode image that is stored as a file on a Flash memory card, enter the **microcode** command, the port adapter type, the specific memory location of the PCPA microcode image, and the exact argument for *filename* (**xcpa26-4** is used in this example):

```
Router(config)# microcode pcpa slot0:xcpa26-4
Router(config)# microcode reload
```



Note The **microcode reload** command is written automatically in the configuration file following the **microcode pcpa** command when you modify the system default to load a microcode image.

The **no microcode** command cancels any existing instructions to load an image from a Flash memory card and restores the default configuration:

```
Router(config)# no microcode pcpa slot0:xcpa26-4
```

Step 4 To save the configuration file, press **Ctrl-Z** (or type **end**), then copy the new configuration to NVRAM:

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

Step 5 To verify that the correct microcode is loaded according to the new instructions, enter the **show controllers EXEC** command. The display indicates the currently loaded and running microcode version for the PCPA.

Step 6 To verify the contents of the configuration file, enter the **show running-config EXEC** command. You can also verify that the correct software image is configured to load at system restart or reload by using the **show startup-config EXEC** command.

Using Flash Memory

The following provides information on the different functions of Flash memory that you might need when configuring microcode:

- Copying to the Flash Memory Card on a Cisco 7200 Series Router, page 33
- Additional Flash Memory Commands, page 34
- Recovering from Locked Blocks, page 36

Copying to the Flash Memory Card on a Cisco 7200 Series Router

Copying a new image to a Flash memory card might be required when a new microcode image becomes available. Use the command **copy tftp:filename [bootflash | slot0 | slot1]:filename** for the copy procedure, where **tftp:filename** is the source of the file and **[bootflash | slot0 | slot1]:filename** is the destination in onboard Flash memory or on either of the Flash memory cards. The following example shows the output from the **copy tftp:filename** command:

```
Router# copy tftp:xcpa26-4 slot0:xcpa26-4
2283972 bytes available on device flash, proceed? [confirm]
Address or name of remote host [biff.cisco.com]?
Accessing file "xcpa26-4" on biff.cisco.com ...FOUND
Loading xcpa26-4 from 1.1.1.22 (via Ethernet0/0): !Verifying via checksum...
```


Additional Flash Memory Commands

```
Router# pwd
slot0
```

You can move between Flash memory media using the **cd** [**bootflash:** | **slot0:** | **slot1:**] command:

```
Router# cd slot0:
slot0
Router# cd slot1:
Router# pwd
slot1
```

You can list the directory of any Flash memory media using the **dir** [**bootflash:** | **slot0:** | **slot1:**] command:

```
Router# dir
-#- -length- ----date/time----- name
1  4601977  May 19 1994 09:42:19 myfile1
6   679     May 19 1994 05:43:56 todays-config
7   1       May 19 1994 09:54:53 fun1
```

You can delete a file from any Flash memory media using the **delete** command:

```
Router# delete slot0:fun1
Router# dir
-#- -length- ----date/time----- name
1  4601977  May 19 1994 09:42:19 myfile1
6   679     May 19 1994 05:43:56 todays-config
```

To verify that the **delete** command was successful, use the **dir /deleted** command to view the deleted files.



Note

Files that are deleted are simply marked as deleted, but still occupy space in Flash memory. To remove the files, use the **squeeze** command.

The **squeeze** command permanently removes files that are marked as deleted, and pushes together all other undeleted files to eliminate spaces between them.

The following example shows the **squeeze** command:

```
Router# squeeze slot0:
All deleted files will be removed, proceed? [confirm]
Squeeze operation may take a while, proceed? [confirm]
ebESZ
```

To prevent loss of data because of sudden power loss, the “squeezed” data is temporarily saved to a special location of Flash memory.

In the **squeeze** command display output, the displayed characters have the following meaning:

- The character “e” means the Flash memory special location has been erased, which occurs before a write operation.
- The character “b” means that the data that is about to be written to this special location has been temporarily copied.
- The character “E” signifies that the sector that was temporarily occupied by the data has been erased.
- The character “S” signifies that the data was written to its permanent location in Flash memory.
- The character “Z” means this log was erased after the successful **squeeze** command operation.

The **squeeze** command automatically tracks which of these functions has been performed so upon sudden power failure, it can safely continue with the process.

Recovering from Locked Blocks

A locked block of Flash memory occurs when power is lost or a Flash memory card is unplugged during a write or erase operation. When a block of Flash memory is locked, it cannot be written to or erased, and the operation will consistently fail at a particular block location. The only way to recover from locked blocks is by reformatting the Flash memory card with the **format** command.



Caution

Formatting a Flash memory card to recover from locked blocks will cause existing data to be lost.

Using SanDisk Devices

PCMCIA Flash memory cards use a slot0/slot1 convention to specify memory locations; slot0 is the default directory for IOS searches. However, SanDisk memory devices use a disk0/disk1 convention. Therefore, when you use a SanDisk device on a Cisco 7200-series router, you need to specify disk0 or disk1 explicitly in IOS search arguments.

For example, to copy a new microcode image to a Sandisk device, use the following command:

```
copy tftp:source_filename {disk0|disk1}:sandisk_filename
```

where:

- *tftp:source_filename* is the source location of the microcode image file
- *sandisk_filename* is the destination on disk0 or disk1 of the SanDisk memory card

The following example shows sample output for the **copy tftp:filename** command:

```
Router# copy tftp:xcpa27-1 disk0:xcpa27-1
2283972 bytes available on device flash, proceed? [confirm]
Address or name of remote host [biff.cisco.com]? [confirm]
Source filename [xcpa27-1]? [confirm]
Destination filename [xcpa27-1]? [confirm]
Accessing file "xcpa27-1" on biff.cisco.com ...
Loading xcpa26-1 from 1.1.1.22 (via FastEthernet0/0):!
  Expanding disk0:xcpa27-1_kernel_xcpa (406910 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_802 (245522 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_cmpc (564632 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_csna (96024 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_eca (460704 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_offload (91420 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_pca (68840 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_push (15488 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_tcpip (161140 bytes):!!!!!!!!!!!!
  Expanding disk0:xcpa27-1_seg_tn3270 (620400 bytes):!!!!!!!!!!!!
[OK - 2739200/5478400 bytes]

2739200 bytes copied in 68.500 secs (40282 bytes/sec)
```

To update your running configuration:

Step 1 Enter the following commands, beginning in global configuration mode:

```
Router# configuration term  
Router(config)# microcode ecpa diskX:xcpaXX-YY  
Router(config)# microcode reload  
Router(config)# end
```

where:

- *diskX* is **disk0** or **disk1** on the SanDisk device
- *xcpaXX-YY* is the xCPA image you want to use, such as **xcpa27-1**

Step 2 Save the running configuration to NVRAM.

Running PCPA Diagnostic Tests

The PCPA diagnostic test routines are as follows:

- Processor test 1
- Processor test 2
- I/O device tests
- Serial link controller (SLC) device tests
- Internal electrical wrap
- External electrical wrap



Note

All diagnostic tests are run every time the adapter is started. They cannot be run independently. The external optical wrap test requires special wrap plugs for the PCPA. Contact a service representative to obtain the appropriate wrap plugs.

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

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

<http://www.cisco.com>

Translated documentation is available at this URL:

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

Documentation CD-ROM

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

Ordering Documentation

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:
http://www.cisco.com/cgi-bin/order/order_root.pl
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
<http://www.cisco.com/go/subscription>
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Obtaining Technical Assistance

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Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

<http://www.cisco.com/tac>

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

<http://www.cisco.com/register/>

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

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

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

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

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

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

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

This document is to be used in conjunction with the documents listed in the "If You Need More Information" section.

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