



PA-4R-DTR Dedicated Token Ring Port Adapter Installation and Configuration

Product Number: PA-4R-DTR(=)

Platforms Supported: Cisco 7100 Series, Cisco 7200 Series,
VIP2 in the Cisco 7000 Series and Cisco 7500 Series

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PA-4R-DTR Dedicated Token Ring Port Adapter Installation and Configuration

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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 v](#)
- [Related Documentation, page vi](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page vii](#)

Document Revision History

The Document Revision History table below records technical changes to this document.

Document Version	Date	Change Summary
OL-10589-02	July, 2007	This version corrects an interface address error.

Objectives

This document describes how to install and configure the PA-4R-DTR Dedicated Token Ring port adapter (PA-4R-DTR[=]), hereafter referred to as the PA-4R-DTR, which is used in the following platforms:

- Cisco 7100 series routers, consisting of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers, consisting of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and Cisco 7206VXR
- VIP2 in Cisco 7500 series and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

Organization

This document contains the following chapters:

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

Related Documentation

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

- Cisco IOS software:

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 hardware installation and maintenance information, refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide* that shipped with your Cisco 7100 series router.
 - For information on setting up a Virtual Private Network, refer to the *Cisco 7100 Series VPN Configuration Guide*.
- Cisco 7200 series routers:
 - For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
 - For hardware installation and maintenance information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the installation and configuration guide that shipped with your Cisco 7200 series router.
 - For information on Network Processing Engines or Network Services Engines, refer to the *Network Processing Engine and Network Services Engine Installation and Configuration publication*.

- Cisco 7200 VXR routers:

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

- VIP2 in Cisco 7000 series and Cisco 7500 series routers:

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

- The installation and configuration guide that shipped with your Cisco 7000 series or Cisco 7500 series router
- *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*

- For international agency compliance, safety, and statutory information for WAN interfaces:

- *Site Preparation and Safety Guide*
- *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
- *Regulatory Compliance and Safety Information for Cisco 7100 Series VPN Routers*
- *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
- *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*

- To view Cisco documentation or obtain general information about the documentation, refer to the following sources:

- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page vii](#)
- 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.
- *Cisco Information Packet* that shipped with your router or switch.

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised technical documentation at: <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.



CHAPTER 1

Overview

This chapter describes the PA-4R-DTR and contains the following sections:

- [Port Adapter Overview, page 1-1](#)
- [Token Ring Overview, page 1-2](#)
- [LEDs, page 1-6](#)
- [Cables, Connectors, and Pinouts, page 1-7](#)
- [Port Adapter Slot Locations on the Supported Platforms, page 1-9](#)
- [Identifying Interface Addresses, page 1-11](#)

Port Adapter Overview

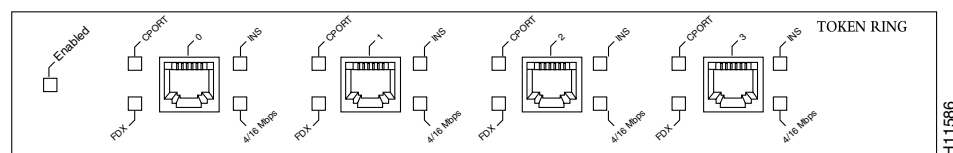
The PA-4R-DTR, shown in [Figure 1-4](#) provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces. You can set each Token Ring interface for 4-Mbps or 16-Mbps, half-duplex or full-duplex operation, and each interface can operate as a concentrator port or a classic Token Ring station. All Token Ring ports run at wire speed.



Note

Port adapters have a handle, but this handle is not always shown in figures in this publication to allow a full view of the detail on the port adapter faceplate.

Figure 1-1 *PA-4R-DTR—Faceplate View*



Note

While the VIP2 supports online insertion and removal (OIR), individual port adapters do not. To replace port adapters in Cisco 7000 series and Cisco 7500 series routers, you must first remove the VIP2 from the chassis and then replace port adapters as required. Cisco 7200 series routers support OIR of port adapters.

Token Ring Overview

The following sections describe Token Ring specifications, physical connections, connection equipment, and cables and connectors:

- [Token Ring Specifications, page 1-2](#)
- [Token Ring Port Operation, page 1-3](#)
- [Dedicated Token Ring, page 1-5](#)
- [Token Ring Connection Equipment, page 1-5](#)
- [Token Ring Distance Limitations, page 1-6](#)
- [Token Ring Speed Considerations, page 1-6](#)

Token Ring Specifications

Token Ring refers to both the IBM Token Ring network and the IEEE 802.5 networks. The IEEE 802.5 specification was modeled after, and still closely shadows, the IBM network. The two networks are compatible, but their specifications differ slightly.

Token Ring and IEEE 802.5 are token-passing networks that move a small frame (called a token) around the network. Possession of the token grants the right to transmit; a station with information to transmit must wait until a free token passes.

The IBM Token Ring network specifies a star topology, with all end stations connected through a device called a multistation access unit (MSAU) for half-duplex functionality or through a Token Ring switch for full-duplex functionality. IEEE 802.5 does not specify any topology, although most implementations are based on a star configuration with end stations attached to a device called a media access unit (MAU) for half-duplex functionality or to a Token Ring switch for full-duplex functionality. IBM Token Ring specifies twisted-pair cabling, but IEEE 802.5 does not specify a media type. Most Token Ring networks use foil twisted-pair (FTP) cabling; however, networks that operate at 4 Mbps sometimes use unshielded twisted-pair cable (UTP). shows a comparison of the two networks.

Table 1-1 IBM Token Ring and IEEE 802.5 Comparison

Network Type	Data Rates	Stations/ Segment	Topology	Media	Signaling	Access Method	Encoding
IBM Token Ring network	4, 16 Mbps	260 STP 72 UTP	Star	Twisted-pair	Baseband	Token passing	Differential Manchester
IEEE 802.5 network	4, 16 Mbps	250	Not specified	Not specified	Baseband	Token passing	Differential Manchester

All PA-4R-DTR interfaces support both 4- and 16-Mbps, half-duplex and full-duplex operation, concentrator port and station port operation, and early token release. You can change the configuration using the following commands issued in configuration mode:

- To enable 16-Mbps operation, specify the slot/port address and use the **ring-speed 16** command. To enable 4-Mbps operation, specify the slot/port address and use the **ring-speed 4** command.
- To enable early token release, specify the slot/port address and use the **early token release** command. To disable early token release, specify the slot/port address and use the **no early token release** command.

- To enable full-duplex operation, specify the slot/port address and use the **full-duplex** command. To return to half-duplex operation, specify the slot/port address and use the **no full-duplex** command or **half-duplex** command.
- To enable DTR concentrator port mode on the interface, specify the slot/port address and use the **port** command. When enabled, the interface operates in concentrator port mode. To disable DTR concentrator port mode on the interface, specify the slot/port address and use the **no port** command. When disabled, the interface operates in station mode.

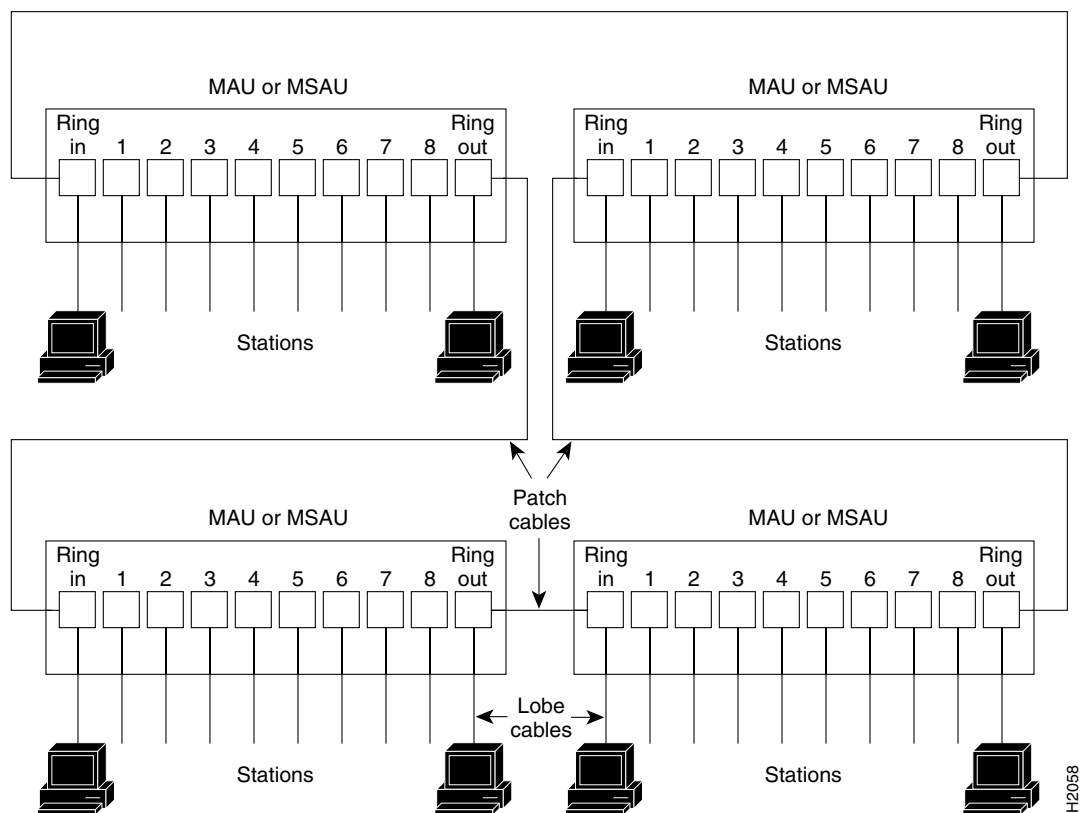
For complete descriptions and examples of software commands, refer to the related software configuration documentation.

Token Ring Port Operation

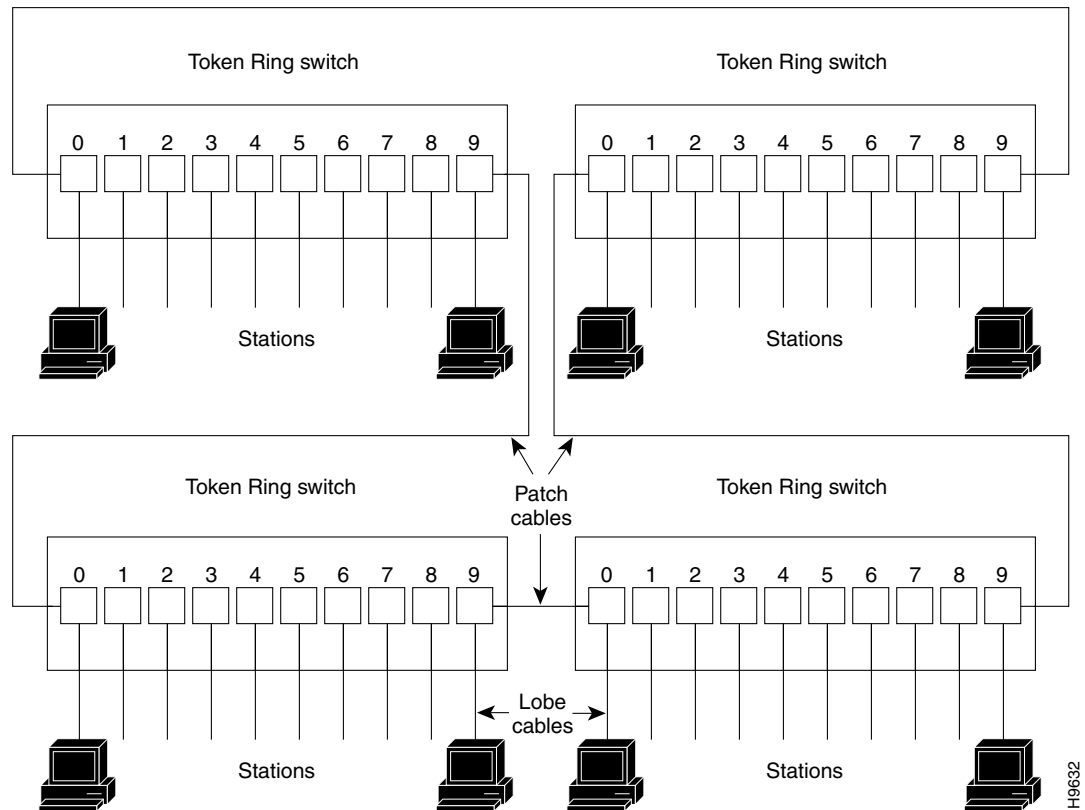
The Token Ring ports operate in the following modes:

- Half-duplex concentrator port—The port is connected to a single station in half-duplex mode. The port behaves like an active MAU port for classical Token Ring.
- Half-duplex station emulation—The port is connected to a port on an MAU. The port behaves like a station connected to a classical Token Ring segment that contains multiple stations.
- Full-duplex concentrator port—The port is connected to a single station in full-duplex mode.
- Full-duplex station emulation—The port is connected to a switch or a concentrator port in full-duplex mode.

In a typical half-duplex Token Ring network, lobe cables connect each Token Ring station (PA-4R-DTR interface) to the MAU and patch cables connect adjacent MAUs to form one large ring. (See [Figure 1-2](#).)

Figure 1-2 *Half-Duplex Token Ring Network Physical Connections*

In a typical full-duplex Token Ring network, lobe cables connect each Token Ring station (PA-4R-DTR interface) to the Token Ring switch and patch cables connect adjacent Token Ring switches to form one large ring. (See [Figure 1-3](#).)

Figure 1-3 Full-Duplex Token Ring Network Physical Connections

Dedicated Token Ring

Classic 4- and 16-Mbps Token Ring adapters are connected to a port on a concentrator. These adapters are also limited to operating in half-duplex mode. In half-duplex mode, the adapter only sends or receives a frame; it cannot do both simultaneously.

DTR, developed by the IEEE, defines a method in which the port emulates a concentrator port and eliminates the need for an intermediate concentrator. DTR defines a full-duplex data-passing mode called transmit immediate. Transmit immediate eliminates the need for a token and allows the adapter to simultaneously transmit and receive.

DTR is particularly useful for providing improved access to servers because a server is attached directly to a router. This direct attachment allows the server to take advantage of the full 16-Mbps bandwidth available for sending and receiving data and results in an aggregate bandwidth of 32 Mbps.

Token Ring Connection Equipment

You need an IEEE 802.5 MAU, MSAU, or a Token Ring switch to provide the interface between the PA-4R-DTR Token Ring interfaces and the external ring. You also need a Token Ring lobe cable between each PA-4R-DTR interface and the MAU, MSAU, or the Token Ring switch.

**Note**

Lobe cables connect each Token Ring station (PA-4R-DTR interface) to the MAU, MSAU, or Token Ring switch. Patch cables can connect adjacent MSAUs or Token Ring switches to form one large ring.

PA-4R-DTR interfaces operate at 4 or 16 Mbps. You can set the port speed using the **ring-speed *n*** configuration command, where *n* is the speed (4 or 16) in megabits per second. The speed of each Token Ring port must match the speed of the ring to which it is connected. Before you enable the Token Ring interfaces, ensure that each interface is set for the correct speed, or you risk bringing down the ring.

**Caution**

You must configure each PA-4R-DTR interface for the same ring speed as the ring to which it is connected (either 4 or 16 Mbps). If the port is set for a different speed, it causes the ring to beacon, which brings down the ring.

Token Ring Distance Limitations

The maximum transmission distance is not defined for IEEE 802.5 networks. FTP cabling is most commonly used for 4- and 16-Mbps ring-speed rates. Because twisted-pair cabling is more susceptible to interference than other types of cabling, the network length and repeater spacing must be planned accordingly.

Token Ring Speed Considerations

Before you install the PA-4R-DTR, determine the ring speed of each ring that you plan to connect to the server. There is no factory default for the interface speed. You must set the speed of each interface (within the **setup** command facility or using the **ring-speed** command) before you bring up the interface and insert it into the ring using the **no shutdown** command.

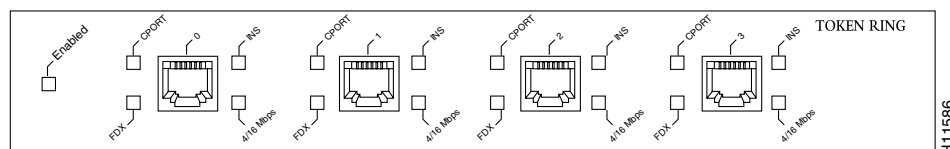
**Caution**

You must configure each PA-4R-DTR interface for the same ring speed as the ring to which it is connected (either 4 or 16 Mbps). If the port is set for a different speed, it causes the ring to beacon, which brings down the ring.

LEDs

The PA-4R-DTR has four status LEDs for each port and one enabled LED. (See [Figure 1-4](#).) The green- and amber-colored LED for each port indicates port status.

Figure 1-4 LEDs on the PA-4R-DTR—Horizontal Orientation



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

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

- The port adapter is correctly connected to the backplane or midplane and receiving power.
- A valid system software image for the port adapter is downloaded.
- The system recognizes the port adapter or PA-4R-DTR-equipped VIP2.

If these conditions are met and the initialization occurs, the enabled LED goes on.

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

Table 1-2 lists LED colors and indications.

Table 1-2 PA-4R-DTR LEDs

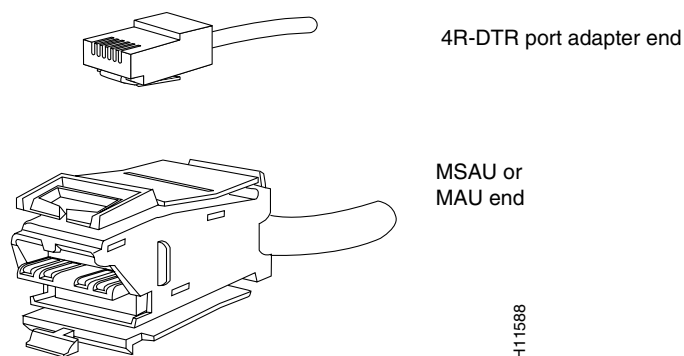
LED Label	Color	Status	Description
Enabled	Green	On	Port adapter is enabled for operation.
CPORT	Green	On	Port is operating as a concentrator port.
		Off	Port is operating in station mode.
FDX	Green	On	Port is operating in full-duplex mode.
		Off	Port is operating in half-duplex mode.
INS	Green	On	Interface is active and inserted in the ring.
		Off	The interface is not active and is not inserted in the ring.
4/16 Mbps	Green	On	The interface is operating at 16 Mbps.
		Off	The interface is operating at 4 Mbps.

Cables, Connectors, and Pinouts

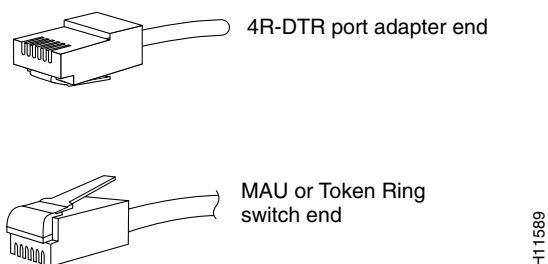
A network interface cable provides the connection between the RJ-45 Token Ring receptacles on the PA-4R-DTR and an MAU or Token Ring switch. The RJ-45 connector at the PA-4R-DTR end and the MAU or Token Ring switch connector at the network end are described in the [“Token Ring Connection Equipment” section on page 1-5](#).

The Token Ring ports on the PA-4R-DTR are RJ-45 receptacles that require Type 1 or Type 3 lobe cables. Token Ring interface cables are not available from Cisco, but are commercially available through outside cable vendors.

Type 1 lobe cables use FTP cable and terminate at the network end with a large MAU plug. (see [Figure 1-5](#).) The PA-4R-DTR end of the cable is an RJ-45 connector. [Table 1-2](#) lists the pinouts and signals for the PA-4R-DTR.

Figure 1-5 Token Ring Type 1 Lobe Cable Connectors—RJ-45 and MAU Types

Type 3 lobe cables use either FTP or UTP cable and terminate at the network end with an RJ-11 plug. (See [Figure 1-6](#).) The PA-4R-DTR end of the cable is an RJ-45 connector.

Figure 1-6 Token Ring Type 3 Lobe Cable Connectors—RJ-45 and RJ-11 Types**Warning**

The ports labeled “Ethernet”, “10BaseT”, “Token Ring”, “Console”, and “AUX” are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the Basic Rate Interface (BRI) circuits are treated like telephone-network voltage avoid connecting the SELV circuit to the telephone network voltage circuits.

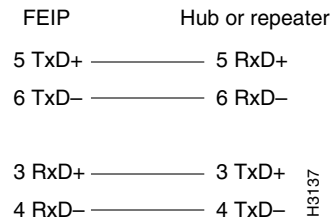
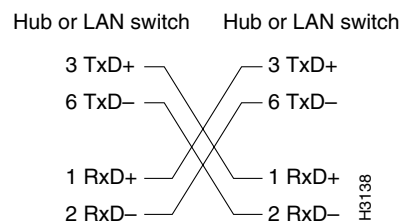
Table 1-3 PA-4R-DTR RJ-45 Connector Pinout

Pin	Description
1	Receive Data + (RxD+)
2	RxD–
3	Transmit Data + (TxD+)
6	TxD–

**Note**

Proper common-mode line terminations should be used for the unused Category 5 UTP cable pairs 4/5 and 7/8. Common-mode termination reduces the contributions to electromagnetic interference (EMI) and susceptibility to common-mode sources.

Depending on your RJ-45 interface cabling requirements, use the pinouts in [Figure 1-7](#) and [Figure 1-8](#).

Figure 1-7 *Straight-Through Cable Pinout—PA-4R-DTR RJ-45 Connection to a Hub or Repeater***Figure 1-8** *Crossover Cable Pinout—PA-4R-DTR RJ-45 Connections Between Hubs and Repeaters*

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

The PA-4R-DTR can be installed in port adapter slot 3 in Cisco 7120 series routers, and in port adapter slot 4 in Cisco 7140 series routers. [Figure 1-9](#) shows a Cisco 7120 with a port adapter installed in slot 3. [Figure 1-10](#) shows a Cisco 7140 with a port adapter installed in slot 4.

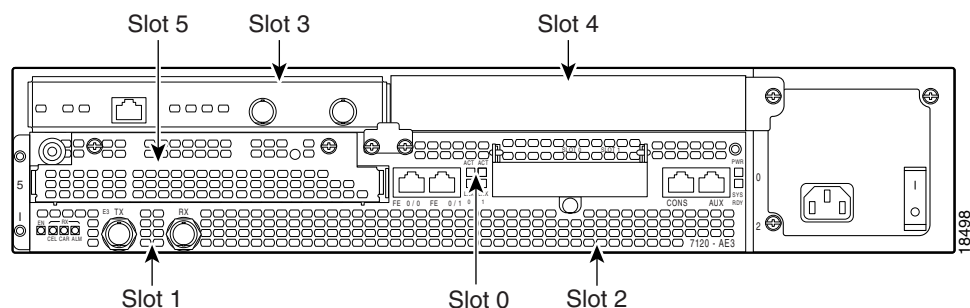
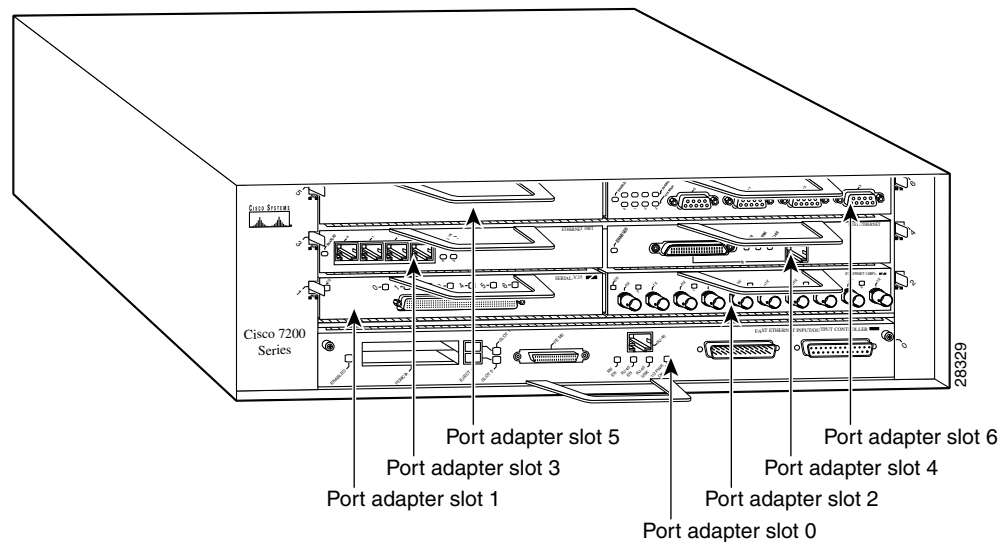
Figure 1-9 *Port Adapter Slots in the Cisco 7100 Series Router—Cisco 7120 Series*

Figure 1-10 Port Adapter Slots in the Cisco 7100 Series Router—Cisco 7140 Series

Cisco 7200 Series Routers Slot Numbering

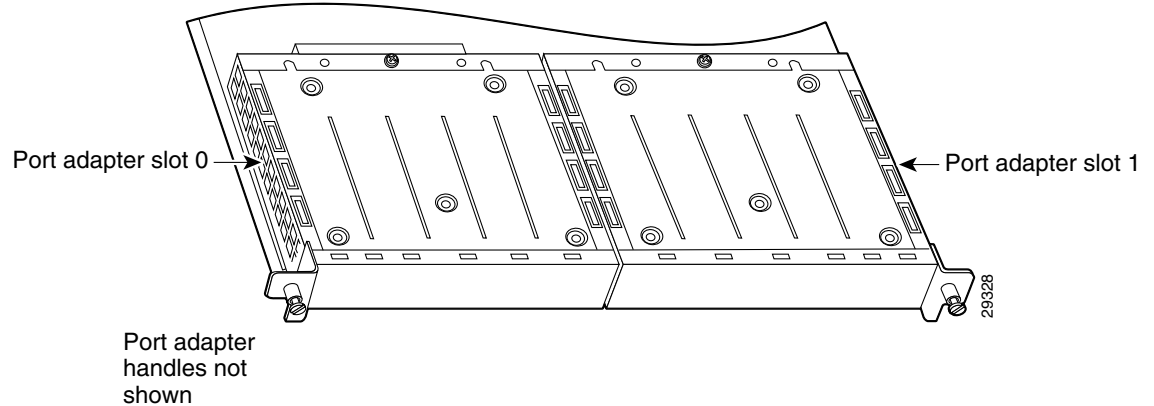
Figure 1-11 shows a Cisco 7206 with port adapters installed. In the Cisco 7206 (including the Cisco 7206 and Cisco 7206VXR as router shelves in a Cisco AS5800 Universal Access Server), port adapter slot 1 is in the lower left position, and port adapter slot 6 is in the upper right position. (The Cisco 7202 and Cisco 7204 are not shown; however, the PA-4R-DTR can be installed in any available port adapter slot.)

Figure 1-11 Port Adapter Slots in the Cisco 7206



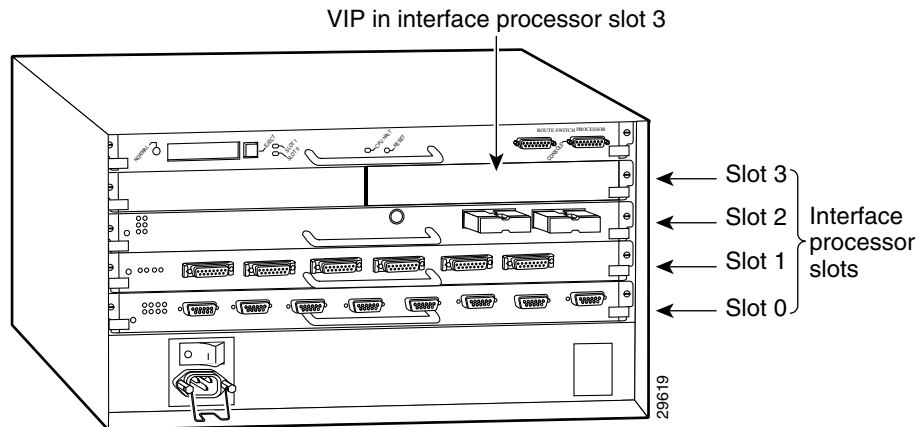
VIP2 Slot Numbering

Figure 1-12 shows a partial view of a VIP motherboard with installed port adapters. With the motherboard oriented as shown in Figure 1-12, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1. The slot numbering is the same for the Catalyst RSM/VIP2. The slots are always numbered 0 and 1.

Figure 1-12 VIP Motherboard with Two Port Adapters Installed—Horizontal Orientation**Note**

In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP motherboard is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP motherboard is installed horizontally.

Interface processor slots are numbered as shown in [Figure 1-13](#).

Figure 1-13 Interface Slot Numbers—Cisco 7505 Shown

Identifying Interface Addresses

This section describes how to identify interface addresses for the PA-4R-DTR in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on the PA-4R-DTR installed in a router maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the interface address changes to reflect the new port adapter slot number.

Interfaces on a PA-4R-DTR installed in a VIP2 maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP2 to a different slot, the interface processor slot number changes to reflect the new interface processor slot.

**Note**

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

Table 1-4 explains how to identify interface addresses.

Table 1-4 **Identifying Interface Addresses**

Platform	Interface Address Format	Numbers	Syntax
Cisco 7120 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 3 Interface port—0 through 3	3/1
Cisco 7140 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—always 4 Interface port—0 through 3	4/0
Cisco 7200 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—0 through 6 (depends on the number of slots in the router) ¹ Interface port—0 through 3	1/0
VIP2 in Cisco 7000 series or Cisco 7500 series routers	Interface-processor-slot-number/port-adapter-slot-number/interface-port-number	Interface processor slot—0 through 12 (depends on the number of slots in the router) Port adapter slot—always 0 or 1 Interface port—0 through 3	3/1/0

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

Cisco 7100 Series Routers Interface Addresses

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

Cisco 7200 Series Routers Interface Addresses

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

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

The interface addresses of the interfaces on the PA-4R-DTR in port adapter slot 1 are 1/0 through 1/3 (port adapter slot 1 and interfaces 0 through 3). If the PA-4R-DTR was in port adapter slot 4, these same interfaces would be numbered 4/0 through 4/3 (port adapter slot 4 and interfaces 0 through 3).

VIP2 Interface Addresses

This section describes how to identify the interface addresses used for the PA-4R-DTR on a VIP2 in Cisco 7000 series and Cisco 7500 series routers.

**Note**

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

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

If the VIP2 is inserted in interface processor slot 3, then the interface addresses of the PA-4R-DTR are 3/1/0 through 3/1/7 (interface processor slot 3, port adapter slot 1, and interfaces 0 through 7). If the port adapter was in port adapter slot 0 on the VIP2, these same interface addresses would be numbered 3/0/0 through 3/0/7.

**Note**

If you remove the VIP2 with the PA-4R-DTR (shown in [Figure 1-13](#)) from interface processor slot 3 and install it in interface processor slot 2, the interface addresses become 2/1/0 through 2/1/7.



CHAPTER 2

Preparing for Installation

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

- [Required Tools and Equipment, page 2-1](#)
- [Software and Hardware Requirements, page 2-1](#)
- [Checking Hardware and Software Compatibility, page 2-3](#)
- [Safety Guidelines, page 2-3](#)
- [FCC Class B Compliance, page 2-6](#)

Required Tools and Equipment

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

- PA-4R-DTR(=) port adapter.
- VIP2 (for installation in Cisco 7000 series or Cisco 7500 series chassis only). For information about the specific VIP2 models that support the PA-4R-DTR, see the [“Software and Hardware Requirements” section on page 2-1](#).
- Cables appropriate for the port adapter’s interfaces (RJ-45 cables are not available from Cisco; they are available from outside commercial cable vendors).
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver (for VIP2 installation only).
- Your own electrostatic discharge (ESD)-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares.
- Antistatic mat.
- Antistatic container.

Software and Hardware Requirements

[Table 2-1](#) lists the recommended minimum Cisco IOS software release required to use the PA-4R-DTR in supported router or switch platforms.

Table 2-1 PA-4R-DTR Software Requirements

Platform	Recommended Minimum Cisco IOS Release
Cisco 7100 series <ul style="list-style-type: none"> Cisco 7120 series and Cisco 7140 series 	Cisco IOS Release 12.0(4)XE or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0 T
Cisco 7200 series <ul style="list-style-type: none"> Cisco 7204 and Cisco 7206 Cisco 7204VXR and Cisco 7206VXR 	Cisco IOS Release 11.1(20)CA1 or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0 T Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0 XE Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B
Cisco 7000 series and Cisco 7500 series <ul style="list-style-type: none"> With VIP2-15 With VIP2-20(=) With VIP2-40(=) 	Cisco IOS Release 11.1(20)CA1 or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.1(20)CA1 or a later release of Cisco IOS Release 11.1 CA Cisco IOS Release 11.1(20)CA1 or a later release of Cisco IOS Release 11.1 CA

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

For release note information on your PA-4R-DTR, refer to the Cisco IOS software release note for the version of Cisco IOS software you are running.

Ensure that the following hardware requirements are met for your PA-4R-DTR:

- In a Cisco 7200 series router, an NPE-150 or NPE-200 is installed. The NPE-100 *does not* support the PA-4R-DTR in Cisco 7200 series routers.
- In Cisco 7000 series or Cisco 7500 series routers, the PA-4R-DTR requires the following VIP2 models:
 - VIP2-15 (1 MB of SRAM, 8 MB of dynamic random-access memory [DRAM])
 - VIP2-20 (1 MB of SRAM, 16 MB of DRAM)
 - VIP2-40 (2 MB of SRAM, 32 MB of DRAM)

**Note**

The VIP2-50 does not support this release of the PA-4R-DTR. (This restriction is subject to change without notice.)

The maximum transmission unit (MTU) sizes available for the PA-4R-DTR might require additional VIP2 SRAM to ensure adequate buffers when two PA-4R-DTR port adapters, one PA-4R-DTR and one 4T, or one PA-4R-DTR and one Fiber Distributed Data Interface (FDDI) port adapter are installed on a VIP2. We recommend that you use the VIP2-20 (with 1 MB of SRAM and 16 MB of DRAM) with any combination of two of these port adapters on a VIP2. You can install the PA-4R-DTR port adapter in port adapter slot 0 or slot 1 on the VIP2 motherboard and in any available port adapter slot in Cisco 7200 series chassis.

**Caution**

The VIP2 requires that a Cisco 7000 series router has the RSP7000 and RSP7000CI installed. The VIP2 will not operate properly with the Route Processor (RP), Switch Processor (SP), or Silicon Switch Processor (SSP) installed in a Cisco 7000 series router.

Checking Hardware and Software Compatibility

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



Note

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

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

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

Safety Guidelines

Following are 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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (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 <i>Regulatory Compliance and Safety Information</i> (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

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

Telephone Wiring Guidelines

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

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

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

Following are guidelines for preventing ESD damage:

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

- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

**Caution**

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

FCC Class B Compliance

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

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

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

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



CHAPTER 3

Removing and Installing Port Adapters

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

- [Handling Port Adapters, page 3-1](#)
- [Online Insertion and Removal, page 3-2](#)
- [Warnings and Cautions, page 3-3](#)
- [Port Adapter Removal and Installation, page 3-3](#)
- [Connecting a PA-4R-DTR Interface Cable, page 3-8](#)

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



Note

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



Caution

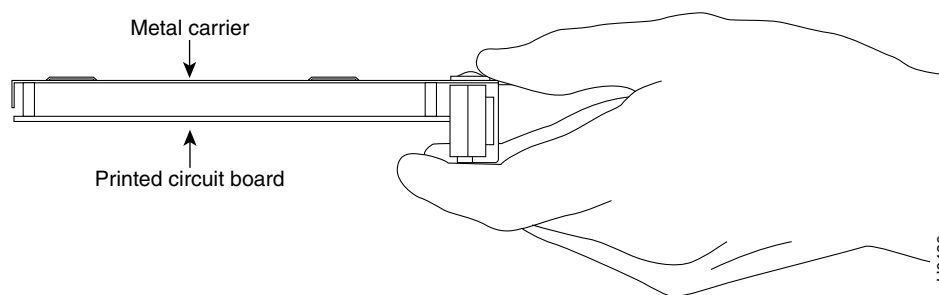
When powering off the router, wait a minimum of 30 seconds before powering it on again.

Handling Port Adapters



Caution

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

Figure 3-1 Handling a Port Adapter

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-4R-DTR in Cisco 7100 series routers and Cisco 7200 series routers.

Although the VIP2 supports online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis and then install or replace port adapters as required. If a blank port adapter is installed on the VIP2 on which you want to install a new port adapter, you must first remove the VIP2 from the chassis and then remove the blank port adapter.



Caution

To prevent system problems, do not remove port adapters from the VIP2 motherboard or attempt to install other port adapters on the motherboard when the system is operating. To install or replace port adapters, first remove the VIP2 from its interface processor slot.

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



Note

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

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

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

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

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

When you remove or insert a module, the pins send signals to notify the system of changes. The router then 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 module back to their previously installed state. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar module type is reinserted into a slot, its ports are configured and brought online up to the port count of the originally installed module of that type.

**Note**

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

Warnings and Cautions

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

**Caution**

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

**Note**

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

**Caution**

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

**Warning**

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

Port Adapter Removal and Installation

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

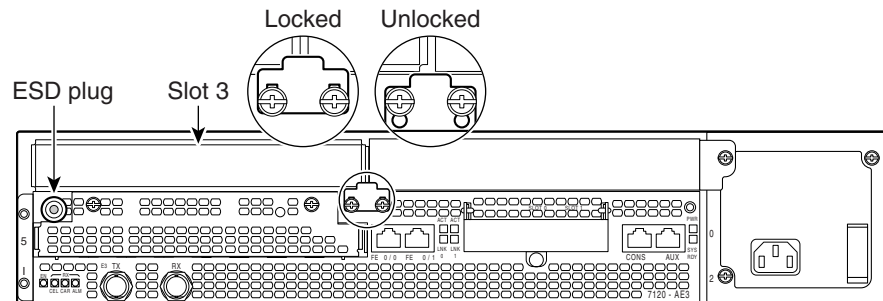
- [Cisco 7100 Series—Removing and Installing a Port Adapter, page 3-5](#)

- [Cisco 7200 Series—Removing and Installing a Port Adapter, page 3-6](#)
- [VIP2—Removing and Installing a Port Adapter, page 3-7](#)

Cisco 7100 Series—Removing and Installing a Port Adapter

Step 1

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



Step 2

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

Step 3

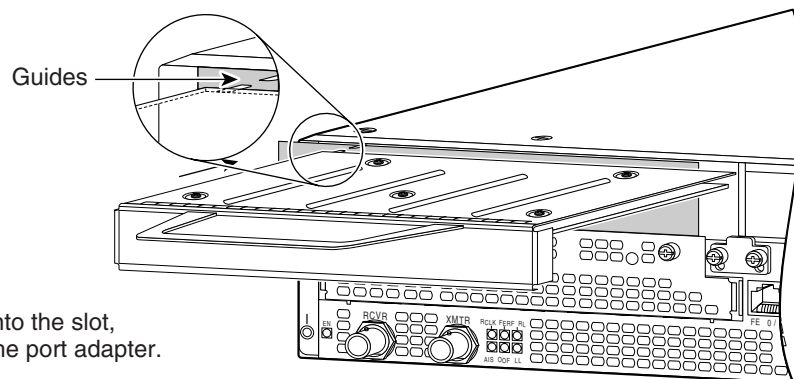
With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

Step 4

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

Step 5

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



Step 6

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

Step 7

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

Step 8

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

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Cisco 7200 Series—Removing and Installing a Port Adapter

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

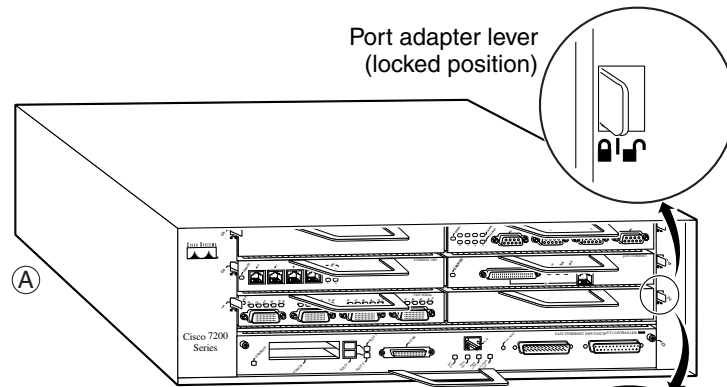
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

Step 6

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

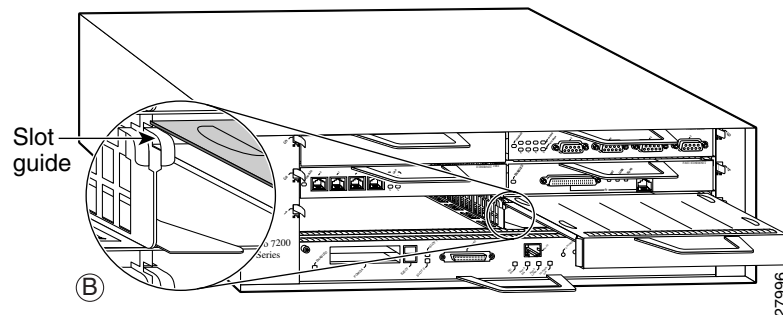
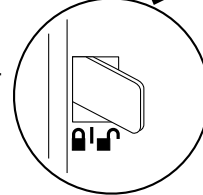
Step 7

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



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

Port adapter lever (unlocked position)



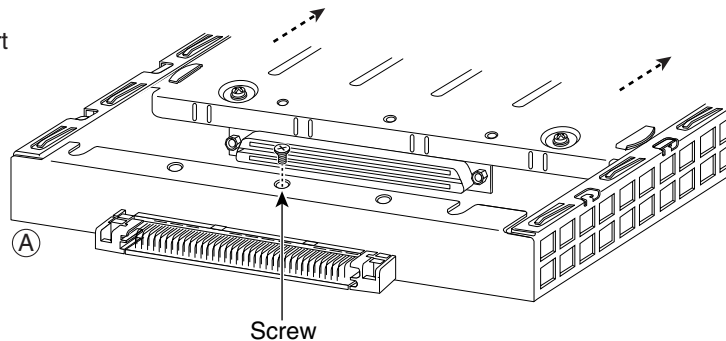
27996

VIP2—Removing and Installing a Port Adapter

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

Step 1

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

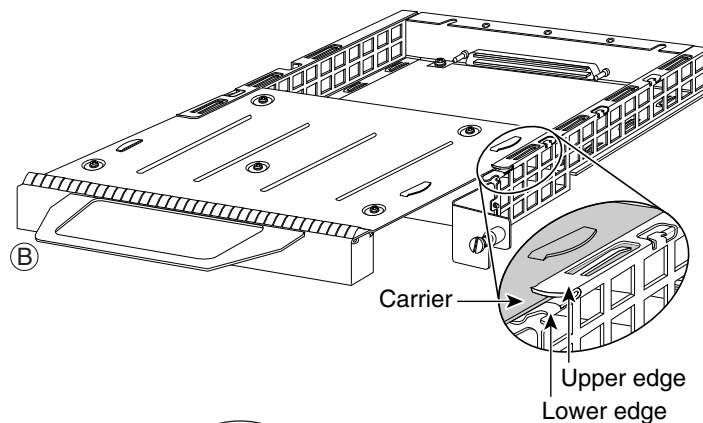


Step 2

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

Step 3

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

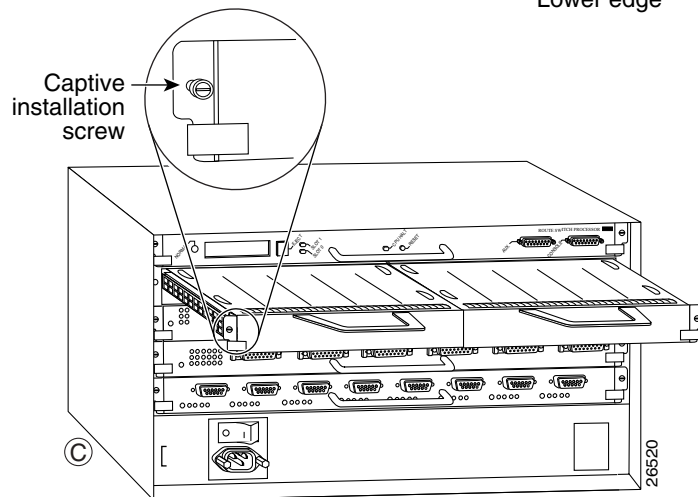


Step 4

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

Step 5

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



Step 6

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

Connecting a PA-4R-DTR Interface Cable

After installing the PA-4R-DTR, you need one Token Ring interface cable for each PA-4R-DTR interface you want to use. Token Ring interface cables are not available from Cisco but are commercially available through outside cable vendors.

Use the following procedure to connect RJ-45 cables to the PA-4R-DTR:

Step 1 Determine which PA-4R-DTR ports you want to use.



Note

The IBM Token Ring specifies a star topology with all end stations connected through a device called a MSAU or Token Ring switch. IEEE 802.5 does not specify any topology, although most implementations are based on a star configuration with end stations attached to a device called an MAU or to a Token Ring switch. Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use FTP cabling; however, some 4-Mbps networks use UTP cable.

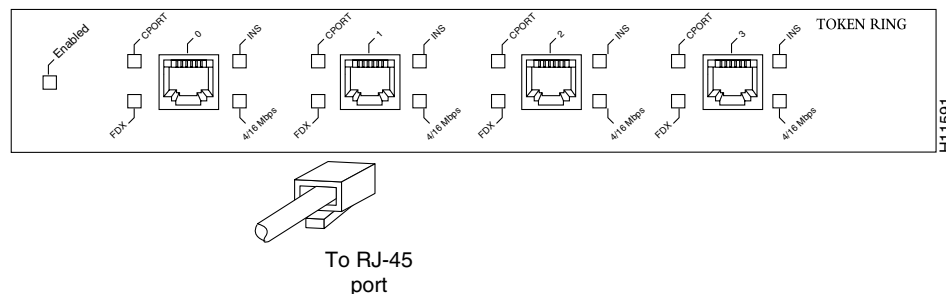
Step 2 Attach the port adapter end of a Token Ring interface cable, or other connection equipment, to the interface port. (See [Figure 3-2](#).)



Note

Port adapters have a handle attached, but this handle is not shown to allow a full view of detail on the PA-4R-DTR port adapter faceplate.

Figure 3-2 Token Ring Interface Cable Connections



Caution

Each PA-4R-DTR interface must be configured for the same ring speed as the ring to which it is connected (4 or 16 Mbps). If the PA-4R-DTR interface is set for a different speed, it causes the ring to beacon, which brings down the ring.

Step 3 Attach the network end of the Token Ring interface cable to the appropriate Token Ring equipment at your site (MAU, MSAU, or Token Ring switch).

This completes the procedure for attaching a PA-4R-DTR interface cable.



CHAPTER 4

Configuring the PA-4R-DTR

To continue your PA-4R-DTR installation, you must configure the *serial* interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- [Using the EXEC Command Interpreter, page 4-1](#)
- [Configuring the Interfaces, page 4-2](#)
- [Checking the Configuration, page 4-7](#)

Using the EXEC Command Interpreter

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

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

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

```
Router> enable
```

```
Password:
```

- Step 2** Enter the password (the password is case sensitive). For security purposes, the password is not displayed. When you enter the correct password, the system displays the privileged-level system prompt (#):

```
Router#
```

To configure the new interfaces, proceed to the [“Configuring the Interfaces” section on page 4-2](#).

Configuring the Interfaces

After you verify that the new PA-4R-DTR is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

- Protocols you plan to route on each new interface
- IP addresses, if you plan to configure the interfaces for IP routing
- Bridging protocols you plan to use
- *Clock timing source you plan to use for each new interface and clock speeds for external timing*

If you installed a new PA-4R-DTR or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interfaces. If you replaced a PA-4R-DTR that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configuration.

For a summary of the configuration options available and instructions for configuring interfaces on a PA-4R-DTR, refer to the appropriate configuration publications listed in the [“Related Documentation” section on page vi](#).

You execute configuration commands from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain password access. (See the [“Using the EXEC Command Interpreter” section on page 4-1](#) for an explanation of the privileged level of the EXEC.)

This section contains the following subsections:

- [Shutting Down an Interface, page 4-2](#)
- [Performing a Basic Configuration, page 4-4](#)
- [Configuring Full-Duplex Operation, page 4-6](#)
- [Configuring Concentrator Port Operation, page 4-7](#)

Shutting Down an Interface

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

Follow these steps to shut down an interface:

-
- | | |
|---------------|--|
| Step 1 | Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the “Using the EXEC Command Interpreter” section on page 4-1 for instructions.) |
| Step 2 | At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# |
| Step 3 | Shut down interfaces by entering the interface tokenring subcommand (followed by the interface address of the interface), and then enter the shutdown command. Table 4-1 shows the command syntax. |

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

Table 4-1 **Syntax of the shutdown Command**

Platform	Command	Example
Cisco 7120 series routers	interface , followed by the <i>type</i> (tokenring) and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 3. Router(config-if)# interface tokenring 3/0 Router(config-if)# shutdown Router(config-if)# interface tokenring 3/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7140 series routers	interface , followed by the <i>type</i> (tokenring) and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 4. Router(config-if)# interface tokenring 4/0 Router(config-if)# shutdown Router(config-if)# interface tokenring 4/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7200 series routers	interface , followed by the <i>type</i> (tokenring) and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 6. Router(config-if)# interface tokenring 6/0 Router(config-if)# shutdown Router(config-if)# interface tokenring 6/1 Router(config-if)# shutdown Ctrl-Z Router#
VIP2 in Cisco 7000 series or Cisco 7500 series routers	interface , followed by the <i>type</i> (tokenring) and <i>slot/port adapter/port</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number)	The example is for interface 1 and interface 0 on a port adapter in port adapter slot 1 of a VIP2 installed in interface processor slot 1. Router(config-if)# interface tokenring 1/1/1 Router(config-if)# shutdown Router(config-if)# interface tokenring 1/1/0 Router(config-if)# shutdown Ctrl-Z Router#



Note

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

Step 4 Write the new configuration to NVRAM as follows:

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

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

- Step 5** Verify that new interfaces are now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface. [Table 4-2](#) provides examples.

Table 4-2 Examples of the **show interfaces** Command

Platform	Command	Example
Cisco 7200 series routers	show interfaces tokenring , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 6. Router# show interfaces tokenring 6/0 tokenring 6/0 is administratively down, line protocol is down [Additional display text omitted from this example]
VIP2 in Cisco 7000 series or Cisco 7500 series routers	show interfaces tokenring , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 1. Router# show interfaces tokenring 1/1/0 tokenring 1/1/0 is administratively down, line protocol is down [Additional display text omitted from this example]

- Step 6** Reenable interfaces by doing the following:
- Repeat Step 3 to reenable an interface. Substitute the **no shutdown** command for the **shutdown** command.
 - Repeat Step 4 to write the new configuration to memory. Use the **copy running-config startup-config** command.
 - Repeat Step 5 to verify that the interfaces are in the correct state. Use the **show interfaces** command followed by the interface type and interface address of the interface.

For complete descriptions of software configuration commands, refer to the publications listed in the [“Related Documentation”](#) section on page vi.

Performing a Basic Configuration

Following are instructions for a basic configuration: enabling an interface, specifying IP routing, and **setting the clock rate**. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available for *tokenring* interfaces, refer to the appropriate software documentation.

In the following procedure, press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable
```



```
Router>
```

- Step 1** Enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

- Step 2** Specify the first interface to configure by entering the **interface tokenring** subcommand, followed by the interface address of the interface you plan to configure. Table 4-3 provides examples.

Table 4-3 Examples of the interface tokenring Subcommand

Platform	Command	Example
Cisco 7120 series routers	interface , followed by the <i>type (tokenring)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 3. Router(config-if)# interface tokenring 3/0 Router(config-if)# shutdown Router(config-if)# interface tokenring 3/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7140 series routers	interface , followed by the <i>type (tokenring)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 4. Router(config-if)# interface tokenring 4/0 Router(config-if)# shutdown Router(config-if)# interface tokenring 4/1 Router(config-if)# shutdown Ctrl-Z Router#
Cisco 7200 series routers	interface tokenring , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 6. Router(config)# interface tokenring 6/0 Router(config-if)#
VIP2 in Cisco 7000 series or Cisco 7500 series routers	interface tokenring , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 1. Router(config)# interface tokenring 1/1/0 Router(config-if)#

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

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



Caution

Each Token Ring port must be configured for the same ring speed as the ring to which it is connected (4 or 16 Mbps). If the port is set for a different speed, it causes the ring to beacon, which effectively brings down the ring.

**Note**

Token Ring ports operate at either 4 or 16 Mbps. You can set the port speed using the configuration **ring-speed** *n* command, where *n* is the speed (4 or 16) in Mbps. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or you risk bringing down the ring.

- Step 4** Change the default shutdown state to up and enable the interface by entering the following command:
- ```
Router(config-int)# no shutdown
```
- When you enable the interface by using the **no shutdown** command, the LED for 4 Mbps or 16 Mbps is turned on after about 5 seconds. The insert (INS) LED for that interface is turned on about 5 to 18 seconds later, when the port is initialized and connected to the ring.
- Step 5** Enable the ring speed for 4-Mbps operation or enable the Token Ring interface speed for 16-Mbps operation as follows:
- ```
Router(config-int)# ring-speed 16
```
- Step 6** Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.
- Step 7** Configure all additional port adapter interfaces as required.
- Step 8** After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.
- Step 9** Write the new configuration to NVRAM as follows:
- ```
Router# copy running-config startup-config
[OK]
Router#
```

This completes the procedure for creating a basic configuration.

## Configuring Full-Duplex Operation

Full-duplex operation is *not* the default configuration of a PA-4R-DTR interface and must be turned on using the **full-duplex** command. To turn off full-duplex operation and reset the interface, use the **no full-duplex** or **half-duplex** command.

The following is an example of configuring a PA-4R-DTR interface for full-duplex operation using the **full-duplex** command:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface tokenring 3/0/0
Router(config-if)# full-duplex
Ctrl-z
Router#
```

The output of the **show interfaces tokenring slot/port-adapter/port** command displays the state of the Token Ring port adapter interface and transmission mode. The following example shows the output of this command from a PA-4R-DTR interface with full-duplex operation enabled:

```
Router# show interfaces tokenring 3/0/0
TokenRing3/0/0 is up, line protocol is up
 Hardware is cxBus Token Ring, address is 0000.0000.0000 (bia 0000.0000.0000)
 Internet address is 14.0.0.2/8
```

```
MTU 4464 bytes, BW 1600 Kbit, DLY 630 usec, rely 255/255, load 1/255
Encapsulation SNAP, loopback not set, keepalive not set
ARP type: SNAP, ARP Timeout 04:00:00
Ring speed: 16 Mbps, operating in full-duplex
[display text omitted]
```

## Configuring Concentrator Port Operation

By default, the ports of the PA-4R-DTR operate as station ports. To enable the port to operate as a concentrator port, use the **port** command.

The following is an example of configuring a PA-4R-DTR interface for concentrator port operation:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface tokenring 3/0/0
Router(config-if)# port
Ctrl-z
Router#
```

The output of the **show interfaces tokenring slot/port-adapter/port** command displays the state of the Token Ring port adapter interface, the transmission mode, and whether the port is operating in concentrator port mode. The following example shows the output of this command from a PA-4R-DTR interface with concentrator port operation enabled:

```
Router# show interfaces tokenring 3/0/0
TokenRing3/0/0 is up, line protocol is up
Hardware is cxBus Token Ring, address is 0000.0000.0000 (bia 0000.0000.0000)
Internet address is 14.0.0.2/8
MTU 4464 bytes, BW 1600 Kbit, DLY 630 usec, rely 255/255, load 1/255
Encapsulation SNAP, loopback not set, keepalive not set
 ARP type: SNAP, ARP Timeout 04:00:00
 Ring speed: 16 Mbps
 Duplex: full
 Mode: DTR concentrator port
```

## Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces, and use the **ping** and **loopback** commands to check connectivity. This section includes the following subsections:

- [Using show Commands to Verify the New Interface Status, page 4-7](#)
- [Using the ping Command to Verify Network Connectivity, page 4-11](#)
- [Using loopback Commands, page 4-12](#)

## Using show Commands to Verify the New Interface Status

[Table 4-4](#) demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the *PA-4R-DTR* 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.

**Table 4-4**      **Using show Commands**

| Command                                                                                                                          | Function                                                                                                                                                                   | Example                                        |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>show version</b> or<br><b>show hardware</b>                                                                                   | Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images | Router# <b>show version</b>                    |
| <b>show controllers</b>                                                                                                          | Displays all the current interface processors and their interfaces                                                                                                         | Router# <b>show controllers</b>                |
| <b>show diag slot</b>                                                                                                            | Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot                     | Router# <b>show diag 2</b>                     |
| <b>show interfaces type</b><br><i>port-adapter-slot-number/</i><br><i>interface-port-number</i>                                  | Displays status information about a specific type of interface (for example, tokenring) in a Cisco 7200 series router                                                      | Router# <b>show interfaces tokenring 1/0</b>   |
| <b>show interfaces type interface-processor-</b><br><i>slot-number/port-adapter-slot-number/</i><br><i>interface-port-number</i> | Displays status information about a specific type of interface (for example, tokenring) on a VIP2 in a Cisco 7000 series or Cisco 7500 series router                       | Router# <b>show interfaces tokenring 3/1/0</b> |
| <b>show protocols</b>                                                                                                            | Displays protocols configured for the entire system and for specific interfaces                                                                                            | Router# <b>show protocols</b>                  |
| <b>show running-config</b>                                                                                                       | Displays the running configuration file                                                                                                                                    | Router# <b>show running-config</b>             |
| <b>show startup-config</b>                                                                                                       | Displays the configuration stored in NVRAM                                                                                                                                 | Router# <b>show startup-config</b>             |

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

- [Using the show version or show hardware Commands, page 4-9](#)
- [Using the show diag Command, page 4-10](#)
- [Using the show interfaces Command, page 4-11](#)

Choose the subsection appropriate for your system. Proceed to the [“Using the ping Command to Verify Network Connectivity”](#) section on page 4-11 when you have finished using the **show** commands.

## Using the show version or show hardware Commands

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



### Note

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

### VIP2 in Cisco 7000 Series and Cisco 7500 Series Routers

Following is an example of the **show version** command from a Cisco 7500 series router with the *PA-4R-DTR*:

Router# **show version**

```
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-A), Version 11.1(17)CA [amcrae 125]
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Sat 10-Aug-97 17:56 by amcrae
Image text-base: 0x600108A0, data-base: 0x60952000

ROM: System Bootstrap, Version 5.3(16645) [szhang 571], RELEASE SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(17)CA, RELEASE SOFTWARE (fc1)

gshen_7500 uptime is 5 days, 4 minutes
System restarted by reload
System image file is "rsp-jv-mz", booted via slot0

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
Channelized E1, Version 1.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Primary Rate ISDN software, Version 1.0.
Chassis Interface.
1 EIP controller (6 Ethernet).
1 TRIP controller (4 Token Ring).
2 MIP controllers (4 E1).
1 VIP2 controller (2 E1) (4 Token Ring).
6 Ethernet/IEEE 802.3 interfaces.
8 Token Ring/IEEE 802.5 interfaces.
3 Serial network interfaces.
6 Channelized E1/PRI ports.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 7.
Configuration register is 0x0
```

## Using the show diag Command

Display the types of port adapters installed in your system (and specific information about each) using the **show diag slot** command, where *slot* is the *port adapter slot* in a Cisco 7200 series router and the *interface processor slot* in a Cisco 7000 series or Cisco 7500 series router with a VIP2.



### 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.



### Note

The *slot* argument is not required for Catalyst 5000 family switches.

### Cisco 7200 Series Routers

Following is an example of the **show diag slot** command that shows a PA-4R-DTR in port adapter slot 1 of a Cisco 7200 series router:

```
Router# show diag 1

Slot 1:
Serial port adapter, 4 ports
Port adapter is analyzed
Port adapter insertion time 2d09h ago
Hardware revision 1.1 Board revision A0
Serial number 4294967295 Part number 73-1556-04
Test history 0x0 RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 02 01 01 FF FF FF FF 49 06 14 04 00 00 00 00
0x30: 50 00 00 00 FF FF FF FF FF FF FF FF FF FF FF FF
```

### VIP2 in Cisco 7000 Series and Cisco 7500 Series Routers

Following is an example of the **show diag slot** command that shows two PA-4R-DTRs in port adapter slot 0 and slot 1 on a VIP2 in interface processor slot 3:

```
Router# show diag 3

Slot 3:
Physical slot 3, ~physical slot 0x7, logical slot 3, CBus 0
Microcode Status 0x4
Master Enable, LED, WCS Loaded
Board is analyzed
Pending I/O Status: None
EEPROM format version 1
VIP2 controller, HW rev 2.2, board revision UNKNOWN
Serial number: 03341418 Part number: 73-1684-02
Test history: 0x00 RMA number: 00-00-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
0x20: 01 15 02 02 00 32 FC 6A 49 06 94 02 00 00 00 00
0x30: 07 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4 Insertion time: 0x3188 (01:20:53 ago)

Controller Memory Size: 8 MBytes
```

```

PA Bay 0 Information:
 Token Ring PA, 4 ports
 EEPROM format version 1
 HW rev 1.1, Board revision 0
 Serial number: 02827613 Part number: 73-1390-04

PA Bay 1 Information:
 Token Ring PA, 4 ports
 EEPROM format version 1
 HW rev 1.1, Board revision 88
 Serial number: 02023786 Part number: 73-1390-04

```

## Using the show interfaces Command

The **show interfaces** command displays status information (including the physical slot and interface address) for the interfaces you specify. All of the examples that follow specify *tokenring* interfaces.

For complete descriptions of interface subcommands and the configuration options available for **Cisco 7200 series and VIP2** interfaces, 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.

Following is an example of the **show interfaces tokenring** command, which shows all of the information specific to interface port 0 on a PA-4R-DTR installed in port adapter slot 0, on a VIP2 in interface processor slot 3:

```

Router# show interfaces tokenring 3/0/0
TokenRing3/0/0 is up, line protocol is up
 Hardware is cxBus Token Ring, address is 0000.0000.0000 (bia 0000.0000.0000)
 Internet address is 14.0.0.2/8
 MTU 4464 bytes, BW 1600 Kbit, DLY 630 usec, rely 255/255, load 1/255
 Encapsulation SNAP, loopback not set, keepalive not set
 ARP type: SNAP, ARP Timeout 04:00:00
 Ring speed: 16 Mbps
 Duplex: full
 Mode: DTR concentrator port
[display text omitted]

```

## Using the ping Command to Verify Network Connectivity

Using the **ping** command, you can verify that an interface port is functioning properly. This section provides a brief description of this command. Refer to the publications listed in the [“Related Documentation” section on page vi](#) for detailed command descriptions and examples.

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

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

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

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

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

## Using loopback Commands

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



### Note

You must configure a clock rate on the port *before* performing a loopback test. However, if no cable is attached to the port, the port is administratively up, and the port is in loopback mode; you do not have to configure a clock rate on the port *before* performing a loopback test.

When no interface cable is attached to a PA-4R-DTR interface, issuing the **loopback controller** command tests the path between the VIP2 and the interface port only (without leaving the VIP2 and port adapter).