Doc. No. 78-2661-02

# PA-4R Token Ring Port Adapter Installation and Configuration

### Product Numbers: PA-4R and PA-4R=

This configuration note describes the installation and configuration of the PA-4R(=) Token Ring port adapter, which can be used in the Cisco 7200 series routers, and on the second-generation Versatile Interface Processor (VIP2) in all Cisco 7500 series routers, and in Cisco 7000 series routers using the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI). (Refer to the section "Software and Hardware Requirements" on page 3.)

**Note** For VIP2 users, use this configuration note in conjunction with the configuration note *Versatile Interface Processor (VIP2) Installation, Configuration, and Maintenance* (Document Number 78-2658-xx), which shipped with your VIP2.

For Cisco 7200 series router users, use this configuration note in conjunction with the *Cisco 72xx Installation and Configuration Guide* that shipped with your Cisco 7200 series router.

For complete descriptions of interface subcommands and the configuration options available for interfaces, and which support 4R port adapter functionality, refer to the appropriate software configuration publication listed in the section "If You Need More Information."

## Document Contents

This configuration note is organized into the following three parts.

1. The following sections include general information and information about port adapter installation:
   - If You Need More Information, page 2
   - Port Adapter Installation Prerequisites, page 3
2. The following section includes information specific to the 4R port adapter:
   - What Is the 4R Port Adapter?, page 8

Copyright © 1995
Cisco Systems, Inc.
All rights reserved.

3 The following sections include information specific to the 4R port adapter's use with the VIP2 in Cisco 7000 family routers and in the Cisco 7200 series routers:

   — VIP2 and the 4R Port Adapter, page 12

   — Cisco 7200 Series and the 4R Port Adapter, page 27

The section "Cisco Connection Online," on page 37, includes general reference information.

## If You Need More Information

The Cisco IOS software running the router contains extensive features and functionality. The Cisco Internetwork Operating System (Cisco IOS) software running your router contains extensive features and functionality. The effective use of many of many of these features is easier if you have more information at hand. For additional information on configuring the Cisco 7000 family routers and VIP2, or the Cisco 7200 series, the following documentation resources are available to you:

- Cisco Connection Documentation, Enterprise Series CD-ROM

  This publication and all other Cisco Systems publications are available on Cisco Connection Documentation, Enterprise Series, which is Cisco's online library of product information. Cisco Connection Documentation, Enterprise Series is updated and shipped monthly, so it might be more up to date than printed documentation. To order Cisco Connection Documentation, Enterprise Series, contact a Cisco Sales or Customer Service representative.

- For Cisco 7000 family systems with Cisco IOS Release 11.1(472), a Cisco-approved Release 11.1(472) beta software version, or a later Cisco IOS release, or, Cisco 7200 series systems Cisco IOS Release 11.1(472), a Cisco-approved Release 11.1(472) beta software version, or a later Cisco IOS release, refer to the following modular configuration and modular command reference publications, as appropriate for your configuration:

  — *Configuration Fundamentals Configuration Guide*

  — *Configuration Fundamentals Command Reference*

  — *Wide-Area Networking Configuration Guide*

  — *Wide-Area Networking Command Reference*

  — *Network Protocols Configuration Guide*

  — *Network Protocols Command Reference*

  — *Bridging and IBM Networking Configuration Guide*

  — *Bridging and IBM Networking Command Reference*

  — *Configuration Builder Getting Started Guide*

  — *Troubleshooting Internetworking Systems*

- For hardware installation and maintenance information on the Cisco 7000 family routers, and the VIP2, refer to the following publications:

  — *Cisco 7000 Hardware Installation and Maintenance*

  — *Cisco 7010 Hardware Installation and Maintenance*

  — *Cisco 7505 Hardware Installation and Maintenance*

  — *Cisco 7507 Hardware Installation and Maintenance*

  — *Cisco 7513 Hardware Installation and Maintenance*

  — *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*

- For hardware installation and maintenance information on the Cisco 7200 series router, refer to the *Cisco 72xx Installation and Configuration Guide* that shipped with your Cisco 7200 series router.
- To obtain information about documentation, refer to the Cisco Connection Documentation, Enterprise Series CD-ROM, to the section "Cisco Connection Online," 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 company holidays). You can also send e-mail to `cs-rep@cisco.com`. You can also refer to the *Cisco Information Packet* that shipped with your router.

## Port Adapter Installation Prerequisites

This section provides software requirements, a list of parts and tools you will need to perform the port adapter installation, and safety and ESD-prevention guidelines to help you avoid injury and damage to the equipment during installation. Also included is information on the systems in which port adapters can be installed and overview information on interface specifications. The following sections discuss general information and information about port adapter installation requirements:

- Software and Hardware Requirements
- List of Parts and Tools, page 4
- Safety Guidelines, page 4
- Token Ring Overview, page 6

### Software and Hardware Requirements

The 4R port adapter requires that the host Cisco 7000 family router is running Cisco IOS Release 11.1(472), or later, and that the host Cisco 7200 series router is running Cisco IOS Release 11.1(472) or later.

**Caution** The VIP2 requires that the 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 the Cisco 7000 series router.

---

**Note** The maximum transmission unit (MTU) sizes available for the 4R port adapter might require additional VIP2 SRAM to ensure adequate buffers when two 4R port adapters, one 4R and one 4T, or one 4R and one FDDI port adapter are installed on a VIP2.

We recommend the VIP2-20 for use with any combination of two of these port adapters on a VIP2.

The minimum required VIP2 model, if you have only one 4R port adapter on a VIP2, is VIP2-20.

---

## List of Parts and Tools

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(=) port adapter
- VIP2-20 or VIP2-40 with at least one open port adapter slot
- Cables appropriate for the port adapter's interfaces (Token Ring cables are not available from Cisco Systems; 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 ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, FRUs, and spares

## Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

### 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 and never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

### Telephone Wiring Guidelines

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

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

## Preventing Electrostatic Discharge Damage

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

Following are guidelines for preventing ESD damage:

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

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

## Token Ring Overview

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

### Token Ring Specifications

The term Token Ring refers to both IBM's Token Ring Network, which IBM developed in the 1970s, and to IEEE 802.5 networks. The IEEE 802.5 specification was modeled after, and still closely shadows, IBM's network. The two types are compatible, although the specifications differ slightly.

Token Ring and IEEE 802.5 are token passing networks, which 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 it detects a free token passing by.

The IBM Token Ring specifies a star topology, with all end stations connected through a device called a multistation access unit (MSAU). 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). Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair cabling; however, some networks that operate at 4 Mbps use unshielded twisted-pair cable. Table 1 shows a comparison of the two types.

**Table 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 shielded twisted-pair<br>72 unshielded twisted-pair | 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 4R port adapter interfaces support both 4- and 16-Mbps operation and early token release. The default for all ports is for 4-Mbps operation and early token release disabled. Both states are enabled with configuration commands in Configuration mode.

To enable 16 Mbps, specify the slot/port address and use the configuration command **ring-speed 16**; to return to 4 Mbps operation, use the command **ring-speed 4**. To enable and disable early token release, specify the slot/port address and use the configuration command [**no**] **early token release**. For complete descriptions and examples of software commands, refer to the related software configuration documentation.

In the typical Token Ring network shown in Figure 1, lobe cables connect each Token Ring station (4R port adapter interface) to the MSAU (or MAU), and patch cables connect adjacent MSAUs (or MAUs) to form one large ring.

**Figure 1 Token Ring Network Physical Connections**

## Token Ring Connection Equipment

You will need an 802.5 MAU or an MSAU to provide the interface between the 4R port adapter Token Ring interfaces and the external ring, and a Token Ring lobe cable between each 4R port adapter interface and the MAU or MSAU. Lobe cables connect each Token Ring station (4R port adapter interface) to the MAU or MSAU, and patch cables can connect adjacent MSAUs to form one large ring.

4R port adapter interfaces operate at either 4 or 16 Mbps. The default speed for all 4R port adapter interfaces is 4 Mbps, which you can change to 16 Mbps on any port using the **ring-speed** *n* configuration command, where *n* is the speed (4 or 16) in Mbps. 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 is set for the correct speed, or it can bring down the ring.

**Caution** Each 4R port adapter interface must be configured 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 will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

### Token Ring Distance Limitations

The maximum transmission distance is not defined for IEEE 802.5 (Token Ring) networks. Shielded twisted-pair (STP) cabling is most commonly used for rates of 4 and 16 Mbps. Twisted-pair cabling is more susceptible to interference than other types of cabling; therefore, the network length and repeater spacing should be planned accordingly.

### Token Ring Speed Considerations

Before you install the 4R port adapter, determine the ring speed (4 or 16 Mbps) of each ring to be connected 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 with the **ring-speed** command) before you bring the interface up and insert it into the ring with the **no shutdown** command.

**Caution** Each Token Ring port must be configured 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 will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

## What Is the 4R Port Adapter?

The 4R port adapter provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces. Each Token Ring interface can be set for 4 Mbps or 16 Mbps. All Token Ring ports run at wire speed.

**Note** While the VIP2 supports online insertion and removal (OIR), individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then replace port adapters as required.

**Figure 2 4R Port Adapter, Faceplate View**

The 4R port adapter can be installed on the VIP2 in port adapter slot 0 and port adapter slot 1, or in the Cisco 7200 series routers in any of the chassis' port adapter slots: 1 through 6 in the Cisco 7206. Port adapters have a handle attached, but this handle is occasionally not shown to allow a full view of detail on the port adapter's faceplate.

The following sections discuss the 4R port adapter, which is shown in Figure 2.


- Port Adapter Locations on the VIP2 and the Cisco 7200 Series Router, page 9
- 4R Port Adapter LEDs, page 10
- 4R Port Adapter Receptacles, Cables, and Pinouts, page 10

## Port Adapter Locations on the VIP2 and the Cisco 7200 Series Router

Figure 3 shows a VIP2 with installed port adapters. With the VIP2 oriented as shown in Figure 3, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1. Port adapters have handles that allow for easy installation and removal; however, they are occasionally not shown in this publication to highlight port adapter faceplate detail. In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP2 is installed vertically. In the Cisco 7010 and Cisco 7505 chassis the VIP2 is installed horizontally.

**Figure 3 Two Port Adapters on the VIP2 (Horizontal Orientation Shown)**

Figure 4 shows a Cisco 7206 with port adapters installed. In the Cisco 7206, port adapter slot 1 is in the lower left position and port adapter slot 6 is in the upper right position.

**Figure 4 Port Adapters in the Cisco 7206**

## 4R Port Adapter LEDs

The 4R port adapter has several LEDs that indicate status of the port adapter and its interfaces. The 4R port adapter's enabled LED (shown in Figure 5) goes on to indicate the following status of the 4R port adapter:

- The port adapter is enabled for operation and correctly connected
- The port adapter is receiving power
- The system contains a valid microcode version for the port adapter

If any of these conditions is not met, or if the initialization fails for other reasons, the port adapter's enabled LED does not go on.

**Figure 5 4R Port Adapter LEDs**

When a Token Ring interface is configured by using software commands, the In Ring and 4/16 Mbps LEDs (shown in Figure 5) indicate the following for each port:

- In ring—Goes on when the interface is currently active and inserted into the ring; off when the interface is not active and is not inserted into a ring.
- 4/16 Mbps—Goes on if the interface is operating at 16 Mbps; off when the interface is operation at 4 Mbps (default).

## 4R Port Adapter Receptacles, Cables, and Pinouts

A network interface cable provides the connection between the 9-pin Token Ring receptacles on the 4R port adapter and a media access unit (MAU). The 9-pin connector at the 4R port adapter end and the MAU connector at the network end are described in the section "Token Ring Connection Equipment" on page 7.

### 4R Port Adapter Cables

The Token Ring ports on the 4R port adapter are DB-9 (PC type) receptacles that require Type 1 or Type 3 lobe cables. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors.

Type 1 lobe cables use shielded twisted-pair (STP) cable and terminate at the network end with a large MAU plug. (See Figure 6.) The 4R port adapter end of the cable is a DB-9 plug.

**Figure 6 Token Ring Type 1 Lobe Cable Connectors, DB-9 and MAU Types**

Type 3 lobe cables use either shielded or unshielded twisted-pair (UTP) cable and terminate at the network end with an RJ-11 plug. (See Figure 7.) The 4R port adapter end of the cable is a DB-9 plug.

**Figure 7 Token Ring Type 3 Lobe Cable Connectors, DB-9 and RJ-11 Types**

## 4R Port Adapter Receptacle Pinout

Table 2 lists the pinout for the DB-9 receptacle used on the 4R port adapter.

**Table 2 Token Ring Signals**

| Pin | Signal |
|---|---|
| 1 | Ring-In B |
| 5 | Ring-Out A |
| 6 | Ring-In A |
| 9 | Ring-Out B |
| 10 and 11 | Ground |

## VIP2 and the 4R Port Adapter

The 4R port adapter is used on the VIP2, and can be installed in either port adapter slot 0 or port adapter slot 1. Figure 8 shows a 4R port adapter installed on a VIP2 in port adapter slot 0.

**Figure 8 VIP2 with a 4R Port Adapter in Port Adapter Slot 0**

The following sections include information specific to the 4R port adapter and its use on the second-generation Versatile Interface Processor (VIP2) in Cisco 7000 family routers:

## Installing or Replacing a Port Adapter on a VIP2

Depending on the circumstances you might need to install a new port adapter on a VIP2 motherboard or replace a failed port adapter in the field.

---

**Note** The maximum transmission unit (MTU) sizes available for the 4R port adapter might require additional VIP2 SRAM to ensure adequate buffers when two 4R port adapters, one 4R and one 4T, or one 4R and one FDDI port adapter are installed on a VIP2.

We recommend the VIP2-20 for use with any combination of two of these port adapters on a VIP2.

The minimum required VIP2 model, if you have only one 4R port adapter on a VIP2, is VIP2-20.

---

You need a number 1 Phillips screwdriver, an antistatic mat onto which you can place the removed interface processor, and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

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

---

**Note** Each port adapter's printed circuit board is mounted to a metal carrier and is sensitive to ESD damage. The following procedures should be performed by a Cisco-certified service provider only. While the VIP2 supports online insertion and removal (OIR), individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then install or replace port adapters as required. If a blank port adapter is installed on the VIP2 in which you want to install a new port adapter, you must first remove the VIP2 from the chassis, then remove the blank port adapter.

---

When only one port adapter is installed on a VIP2, a blank port adapter must fill the empty slot to allow the VIP2 and router chassis to conform to electromagnetic interference (EMI) emissions requirements, and so that air flows through the chassis properly. If you plan to install a new port adapter, you must first remove the blank port adapter.

Following is the standard procedure for removing and replacing any type of port adapter on the VIP2:

**Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

---

**Note** If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

---

**Step 2** For a new port adapter installation or a port adapter replacement, disconnect any interface cables from the ports on the front of the port adapter, although, this is not required. You can remove VIP2s with cables attached; however, we do not recommend it.

**Step 3** To remove the VIP2 from the chassis, follow the steps in the section "Removing a VIP2" in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* (Document Number 78-2658-xx), which shipped with your VIP2.

**Step 4** Place the removed VIP2 on an antistatic mat.

**Step 5** Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See Figure 9.) This screw secures the port adapter (or blank port adapter) to its slot.

**Figure 9 Location of Port Adapter Screw, Partial Port Adapter View**

**Step 6** Remove the screw that secures the port adapter (or blank port adapter).

**Step 7** 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 Figure 10.)

**Figure 10 Pulling a Port Adapter Out of a Slot, Partial Port Adapter View**

**Step 8** If you removed a port adapter, place it in an antistatic container for safe storage or shipment back to the factory. If you removed a blank port adapter, no special handling is required; however, store the blank port adapter for potential future use.

**Step 9** Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See Figure 11.)

**Caution** To prevent jamming the carrier between the upper and lower edges of the port adapter slot, and to assure that the edge connector at the rear of the port adapter mates with the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and lower slot edges, as shown in the cutaway in Figure 11.

**Figure 11 Removing a Port Adapter**

**Step 10** Before you begin to insert the new port adapter in its slot, verify that the port adapter carrier should be between the upper and lower slot edges, as shown in Figure 12. Do not jam the carrier between the slot edges.

**Caution** To ensure a positive ground attachment between the port adapter carrier and the VIP2 motherboard and port adapter slot, and to ensure that the connectors at the rear of the port adapter and slot mate properly, the carrier must be between the upper and lower slot edges, as shown in Figure 12.

**Step 11** Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely mated with the connector on the motherboard.

**Figure 12 Aligning the Carrier Edge with Upper and Lower Slot Edges, Partial View**

**Step 12** Install the screw in the rear of the port adapter slot. (See Figure 9 for its location.) Do not overtighten this screw.

**Step 13** To replace the VIP2 in the chassis, follow the steps in the section "Installing a VIP2," in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* (Document Number 78-2658-xx), which shipped with your VIP2.

**Step 14** If disconnected, reconnect the interface cables to the interface processor.

This completes the procedure for installing a new port adapter or replacing a port adapter on a VIP2.

## Attaching 4R Port Adapter Interface Cables

The Token Ring ports on the 4R port adapter run at either 4- or 16 Mbps. You need one Token Ring interface cable for each 4R port adapter interface you want to use. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors.

Following is the procedure for attaching Token Ring cables to the 4R port adapter:

**Step 1** Determine which 4R port adapter ports you want to use.

---

**Note** The IBM Token Ring specifies a star topology, with all end stations connected through a device called an MSAU. 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. Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair (STP) cabling; however, some networks that operate at 4 Mbps 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 13).

---

**Note** Port adapters have a handle attached (see Figure 3), but this handle is not shown in Figure 13 to allow a full view of detail on the 4R port adapter's faceplate.

---

**Figure 13 Token Ring Interface Cable Connections**

**Caution** Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

**Step 3** Attach the network end of the Token Ring interface cable to the appropriate Token Ring equipment at your site: a MAU or MSAU.

## Configuring the 4R Interfaces

The following procedures describe basic configuration information for the 4R port adapter. If you installed a new 4R port adapter or if you want to change the configuration of an existing interface, you must enter Configuration mode using the **configure** command. If you replaced a 4R port adapter that was previously configured, the system will recognize the new 4R interfaces and bring them up in their existing configuration.

After you verify that the new 4R port adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you will need, such as the following:

- Protocols you plan to route on each new interface
- Internet protocol (IP) addresses if you plan to configure the interfaces for IP routing
- Whether the new interfaces will use bridging

---

**Note** The 4R interfaces on a VIP2 can be configured for 16-Mbps operation and are configured for 4-Mbps operation as a default.

---

For a summary of the configuration options available and instructions for configuring the 4R interfaces on the VIP2, refer to the appropriate configuration publications listed in the section “If You Need More Information” on page 2.

### Selecting Chassis Slot, Port Adapter, and Token Ring Interface Port Numbers

The following section describes how to identify chassis slot, port adapter, and Token Ring interface port numbers.

---

**Note** Although the processor slots in the seven-slot Cisco 7507 and 13-slot Cisco 7513 are vertically oriented and those in the five-slot Cisco 7505 are horizontally oriented, all models use the same method for slot and port numbering.

---

In the router, physical port addresses specify the actual physical location of each interface port on the router interface processor end. (See Figure 14.) This address is composed of a three-part number in the format *chassis slot number/port adapter number/interface port number*, as follows:

- The first number identifies the chassis slot in which the VIP2 is installed (as shown in the example system in Figure 14).
- The second number identifies the physical port adapter number on the VIP2, and is either 0 or 1.
- The third number identifies interface ports on each 4R port adapter and are always numbered in sequence as interface 0 through 3.

Interface ports on the 4R port adapter 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 first number in the address changes to reflect the new slot number.

Figure 14 shows some of the slot port adapter and interface ports of a sample Cisco 7505 system. The first port adapter slot number is always 0. The second port adapter slot number is always 1. The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

For example, the addresses for the 4R interface ports on the first port adapter on a VIP2 (see Figure 14) are 3/0/0 through 3/0/3 (chassis slot 3, port adapter slot 0, and interface ports 0 through 3). If the 4R port adapter was installed in port adapter slot 1, the interface addresses would be 3/1/0 through 3/1/3.

---

**Note** If you remove the 4R-equipped VIP2 (shown in Figure 14) from chassis slot 3 and install it in slot 2, the addresses of those same ports become 2/0/0 through 2/0/3.

---

**Figure 14 4R Token Ring Interface Port Number Example (Cisco 7505 Shown)**

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

## Using the EXEC Command Interpreter

You can modify the startup configuration for Cisco 7500 series routers through the software command interpreter called *EXEC*. To configure the interfaces for interface processors, you can use either one of the **setup** or **configure** EXEC commands.

The **setup** command facility can be used after first time startup to make basic changes at any time. The changes you make will affect only the changed elements' current memory values that are stored in nonvolatile memory.

The **configure** privileged EXEC command enables you to perform advanced configurations such as specifying interfaces. The EXEC interprets the commands you enter and carries out the corresponding operations. You can list available EXEC commands by entering a question mark (?). You also can enter a question mark to obtain more information about commands. For example, enter **terminal ?** to obtain a list of **terminal** commands or **show ?** to obtain a list of **show** commands.

Before you use the **setup** or the **configure** command, you must have privileged access to the EXEC command interpreter. The system prompt for the privileged level ends with a pound sign (#) instead of an angle bracket (>). The EXEC **enable** command allows access to the privileged level, prompting for a password if one has been set with the **enable-password** configuration command.

Follow these steps to enter the privileged level of the EXEC.

**Step 1** At the EXEC prompt for a router, enter the **enable** command:

```
Router> enable
```

The EXEC prompts you for a privileged level password:

```
Password:
```

**Step 2** Enter the password.

For security purposes, the password is not displayed. (Also note that the password is case sensitive). When you enter the correct password, the system displays the privileged mode system prompt:

```
Router#
```

To configure Token Ring interfaces using the **setup** EXEC command facility, follow the instructions in the section "Using the Setup Command Facility." To configure the Token Ring interfaces by using the **configure** EXEC command, follow the instructions in the section "Selecting Chassis Slot, Port Adapter, and Token Ring Interface Port Numbers" on page 18.

## Using the Setup Command Facility

The **setup** command facility identifies all interfaces (including the Token Ring interfaces for the ports on the 4R port adapter) that are installed and prompts you for configuration information for each installed interface. When you finish configuring one interface, the **setup** command facility prompts you for the next, continuing until each interface has been configured.

When you enter the **setup** command facility after first time startup, you must run through the entire dialog until you come to the interface you want to change. Note that when you use the **setup** command after first time startup, the default values indicated within the brackets in the System Configuration Dialog are the values last set using the **setup** command facility or left as defaults.

After you choose to continue with the **setup** command (by answering **yes** to the system configuration dialog prompt), the remainder of the script is the actual configuration process. The dialog prompts you first for global system parameters, then for configuration information for each interface. The existing configuration is displayed as the default, in brackets ([ ]), at the end of each prompt. Press Return to accept the default settings.

---

**Note** After you start the **setup** command facility, the system runs through the entire configuration process; you cannot quit out of it. To make a change or correct a mistake, press the Return key at each prompt, answer **no** when asked if you want to save the configuration, and restart the setup facility.

---

Following is the procedure for using the setup facility to configure the 4R Token Ring interfaces:

**Step 1** After you access the privileged level of the EXEC, as described in the section "Using the EXEC Command Interpreter" on page 19, enter the **setup** command to begin the setup facility:

```
Router# setup
```

**Step 1** The following script is displayed on the screen, with the name of your router as the default in the brackets.

```
-System Configuration Dialog-
At any point you may enter a question mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Default settings are in square brackets '[]'.
Continue with configuration dialog? [yes]:
(Use Ctrl-c to abort configuration at any prompt)
Configuring global parameters:
Enter host name [Router]: sandbox
```

**Step 2** To accept the default and keep the router name, press **Return**. (If you do want to change the name of the router, enter the new name before pressing **Return**.)

**Step 3** Proceed through the remainder of the global parameter prompts, using the Return key to accept the defaults.

After the global parameters are configured, the system prompts you for interface configuration information, one interface at a time. Following is a partial display of the script for a previously configured interface:

```
Configuring interface parameters:

Configuring interface Token Ring0:
Is this interface in use [yes]:
Tokenring ring speed (4 or 16) [16]
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.30
(remainder of display text omitted)
```

**Caution** Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

**Step 4** To accept the default at each prompt and retain the existing configuration information, press the **Return** key. When you reach the scripts for configuring new interfaces, enter the new configuration information at each prompt.

When all interfaces are configured, the system displays the entire configuration script followed by a prompt for which there is no default (you must enter **yes** or **no**):

```
Use this configuration [yes/no]:
```

**Step 5** To use the configuration you created, enter **yes**. To discard the configuration file and begin the configuration process again, enter **no.**

If you entered **yes** at the prompt, the following message is displayed:

```
Press RETURN to get started!
```

The configuration process is complete. Proceed to the section "Checking the Configuration" on page 23. It provides **show** commands you can use to display and verify the configuration information.

## Configuring Interfaces Using the configure Command

Following are instructions for a basic configuration using the **configure** command: enabling an interface, setting interface ring speed, and specifying IP routing. You might also need to enter other configuration subcommands depending upon the requirements for your system configuration. 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>
```

Following is an example of a basic configuration procedure:

**Step 1** After you access the privileged level of the EXEC as described in the section "Using the EXEC Command Interpreter" on page 19, enter the **configure** command:

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

**Step 2** Specify the first Token Ring interface to configure by entering the subcommand **interface** *type slot/port adapter/interface*. For example, if you are configuring Token Ring interface 0 for a 4R port adapter installed in port adapter slot 0, on a VIP2 installed in chassis slot 3, enter the following command:

```
Router(config)# interface tokenring 3/0/0
```

**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** configuration subcommand as follows:

```
Router(config-int)# ip address ip address subnet mask
```

**Caution** Each Token Ring port must be configured 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 will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

---

**Note** Token Ring ports operate at either 4 or 16 Mbps. The default speed for the 4R port adapter's Token Ring ports is 4 Mbps, which you can change to 16 Mbps on any port 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 it can bring down the ring.

---

**Step 4** Change the default shutdown state and enable the interface:

```
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 In Ring 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** Either accept the default ring speed of 4 Mbps, or enable the Token Ring interface speed for 16-Mbps operations as follows:

```
Router(config-int)# ring-speed 16
```

**Step 6** Enter any additional configuration subcommands required.

**Step 7** Repeat Steps 2 through 6 for each new interface.

**Step 8** When all new interfaces are configured, press **Ctrl-Z** (hold the Control key down and press the **Z** key).

**Step 9** Write the new configuration to nonvolatile memory by entering the following:

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

**Step 10** Enter **quit** to exit Configuration mode:

```
Router# quit
```

You have now completed configuring the Token Ring interfaces. Check the configuration as described in the section "Checking the Configuration."

## Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces and the **ping** command to check connectivity. Refer to the publications listed in the section "If You Need More Information" on page 2, for detailed command descriptions and examples.

### Using show Commands to Verify the VIP2 Status

After configuring the new interface(s) using either the **setup** command or the **configure** command, use the EXEC **show commands** to display status information.

**Step 1** To display the current system configuration file, enter the **show configuration** command:

```
Router# show configuration
```

The configuration file for the router is displayed. Check the Token Ring configuration information in the display.

**Step 2** To display and check all interfaces, enter the following command:

```
Router# show interfaces
```

Each interface is listed along with its assigned IP address. Verify that each new Token Ring interface appears.

**Step 3** To obtain detailed status information about a specific Token Ring interface, specify the interface with the following command:

```
Router# show interface tokenring slot/port adapter/port
```

Detailed information about the interface is displayed. The first line of display specifies the interface along with its slot and port number. It indicates whether the hardware is functional and if the line protocol is up or down. If the line protocol is down (and you did not administratively shut it down), or if the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. For explanations of the displayed information, refer to publications listed in the section "If You Need More Information," on page 2, which are available on the Cisco Connection Documentation, Enterprise Series CD-ROM.

**Step 4** To display the current internal status of the processors, use the **show controller** command:

```
Router# show controllers token
```

The display lists the interfaces connected to each processor and indicates whether the system has identified your new interface. It does not indicate the state of the line or the protocol.

To display information about a specific interface, use the **show interfaces** command with the interface type and port address in the format **show interfaces** [*type slot/port adapter/port*].

Following is an example of how the **show interfaces** [*type slot/port adapter/port*] command displays status information (including the physical slot and port address) for the interfaces you specify. In these examples, most of the status information for each interface is omitted, and the four Token Ring interfaces (0–3) are in chassis slot 3, in port adapter slot 0. (Interfaces are administratively shut down until you enable them.)

```
Router# sh int tokenring 3/0/0
TokenRing3/0/0 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.2389)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/1
TokenRing3/0/1 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238a)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/2
TokenRing3/0/2 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238b)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/3
TokenRing3/0/3 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238b)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
```

With the **show interfaces** *type slot/port adapter/port* command, use arguments such as the interface type (Token Ring, and so forth) and the slot, port adapter, and port numbers (slot/port adapter/port) to display information about a specific serial interface only.

The following example of the **show interfaces tokenring** *slot/port adapter/port* command shows all of the information specific to the first 4R interface port (interface port 0) in chassis slot 3, port adapter slot 0:

```
Router# sh int tokenring 3/0/0
TokenRing3/0/0 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.2388)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters 2:56:26
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
```

To determine which type of port adapter is installed on a VIP2 in your system, use the **show diag** *slot* command. Specific port adapter information is displayed, as shown in the following example of two 4R port adapters in chassis slot 8:

```
Router# show diag 8
Slot 8:
        Physical slot 8, ~physical slot 0x7, logical slot 8, CBus 0
        Microcode Status 0x4
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: None
        EEPROM format version 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 ping Command

The *packet internet groper* (**ping**) command allows you 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 and VIP2 have booted successfully and are operational, you can use this command to verify the status of interface ports.

The **ping** command sends an echo request out to a remote device at an 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.

Following is an example of a successful **ping** command to a remote server with the address 1.1.1.10:

```
Router# ping 1.1.1.10 <Return>
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 (powered on), and repeat the **ping** command.

For complete descriptions of interface subcommands and the configuration options available for VIP2-related interfaces, and which support VIP2 functionality, refer to the publications listed in the section “If You Need More Information” on page 2.

## Cisco 7200 Series and the 4R Port Adapter

The 4R port adapter is used in the Cisco 7200 series and can be installed in any of the available port adapter slots. Figure 15 shows a Cisco 7206 with a 4R port adapter installed in port adapter slot 6.

**Figure 15 Cisco 7206 with a 4R Port Adapter in Port Adapter Slot 6**

The following sections include information specific to the 4R port adapter and its use in the Cisco 7200 series routers:



### Installing or Replacing a Port Adapter in Cisco 7200 Series Routers

Depending on your circumstances, you might need to install a new port adapter in a Cisco 7200 series router or replace a failed port adapter in the field. In either case, no tools are necessary; all port adapters available for the Cisco 7200 series connect directly to the router midplane and are locked into position by a port adapter lever. When removing and replacing a port adapter, you will need an antistatic mat onto which you can place a removed port adapter and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

**Note** The Cisco 7200 series routers support OIR; therefore, you do not have to power down the Cisco 7200 series routers when removing and replacing a 4R port adapter.

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 a blank port adapter.

## Removing a Port Adapter

Following is the procedure for removing a port adapter from a Cisco 7200 series router:

**Step 1** Attach an ESD-preventative wrist strap between you and an unfinished chassis surface.

**Step 2** Place the port adapter lever for the desired port adapter slot in the unlocked position. The port adapter lever remains in the unlocked position. (Refer to Figure 16.)

**Figure 16 Placing the Port Adapter Lever in the Unlocked Position (Cisco 7206 shown)**

**Step 3** Grasp the handle on the port adapter and pull the port adapter from the midplane, about half way 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 4** With the port adapter half way out of the slot, disconnect all cables from the port adapter.

**Step 5** After disconnecting the cables, 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. (Refer to Figure 17.)

**Figure 17 Handling a Port Adapter**

**Step 6** Place the port adapter on an antistatic surface with its components facing upward, or in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.

This completes the procedure for removing a port adapter from a Cisco 7200 series router.

## Replacing a Port Adapter

Following is the procedure for installing a new port adapter in a Cisco 7200 series router:

**Step 1** Attach an ESD-preventative wrist strap between you 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. (Refer to Figure 17).

**Step 3** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (Refer to Figure 18.)

**Figure 18 Aligning the Port Adapter Metal Carrier Between the Slot Guides (Cisco 7206 shown)**

**Step 4** With the metal carrier aligned in the slot guides, gently slide the port adapter half way 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 half way in the slot, connect all required cables to the port adapter.

**Step 6** After connecting all required port adapter 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 connector's mate, move the port adapter lever to the locked position. Figure 19 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 half way out of the slot, reinsert it, and move the port adapter lever to the locked position.

---

**Figure 19 Placing the Port Adapter Lever in the Locked Position (Cisco 7206 shown)**

This completes the procedure for installing a new port adapter in a Cisco 7200 series router.

## Attaching 4R Port Adapter Interface Cables

The Token Ring ports on the 4R port adapter run at either 4 or 16 Mbps. You need one Token Ring interface cable for each 4R port adapter interface you want to use. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors.

Following is the procedure for attaching Token Ring cables to the 4R port adapter:

**Step 1** Determine which 4R port adapter ports you want to use.

---

**Note** The IBM Token Ring specifies a star topology, with all end stations connected through a device called an MSAU. 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. Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair (STP) cabling; however, some networks that operate at 4 Mbps 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 20).

**Note** Port adapters have a handle but this handle is not shown in Figure 20 to allow a full view of detail on the 4R port adapter's faceplate.

**Figure 20 Token Ring Interface Cable Connections**

**Caution** Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

**Step 3** Attach the network end of the Token Ring interface cable to the appropriate Token Ring equipment at your site: a MAU or MSAU.

This completes the procedure for attaching port adapter interface cables.

## Configuring the 4R Interfaces

The following procedures describe basic configuration information for the 4R port adapter. If you installed a new 4R port adapter or if you want to change the configuration of an existing interface, you must enter Configuration mode using the **configure** command. If you replaced a 4R port adapter that was previously configured, the system will recognize the new 4R interfaces and bring them up in their existing configuration.

After you verify that the new 4R port adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you will need, such as the following:

- Protocols you plan to route on each new interface
- Internet protocol (IP) addresses if you plan to configure the interfaces for IP routing
- Whether the new interfaces will use bridging

**Note** The 4R interfaces in a Cisco 7206 can be configured for 16-Mbps operation and are configured for 4-Mbps operation as a default.

For a summary of the configuration options available and instructions for configuring the 4R interfaces on the Cisco 7206, refer to the appropriate configuration publications listed in the section "If You Need More Information" on page 2.

## Selecting Port Adapter Slot and Token Ring Interface Port Numbers

The following section describes how to identify port adapter slot and Token Ring interface port numbers. In the router, physical port addresses specify the actual physical location of each interface port on the router. (See Figure 21.) 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 chassis slot in which the 4R port adapter is installed.
- The second number identifies interface ports on each 4R port adapter and are always numbered in sequence as interface 0 through 3.

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

Figure 21 shows some of the slot port adapter and interface ports of a Cisco 7206. 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—if present). The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

For example, the addresses of the interface ports on the 4R port adapter in slot 6 are 6/0 through 6/3 (chassis slot 6 and interface ports 0 through 3). If the 4R port adapter was installed in port adapter slot 4, the interface addresses would be 4/0 through 4/3.

**Figure 21 4R Token Ring Interface Port Number Example**

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

## Configuring Interfaces

Following are instructions for a basic interface configuration using the **configure** command: enabling an interface, setting interface ring speed, and specifying IP routing. You might also need to enter other configuration subcommands depending upon the requirements for your system configuration. 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>
```

Following is an example of a basic configuration procedure:

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

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

**Step 2** Specify the first Token Ring interface to configure by entering the subcommand **interface** *type* **(token ring)** and *slot/interface* (port adapter slot number and interface number). The example that follows is for the first interface of the port adapter in slot 6:

```
Router(config)# interface tokenring 6/0
```

**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** configuration subcommand as follows:

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

**Caution** Each Token Ring port must be configured 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 will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

---

**Note** Token Ring ports operate at either 4 or 16 Mbps. The default speed for the 4R port adapter's Token Ring ports is 4 Mbps, which you can change to 16 Mbps on any port 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 it can bring down the ring.

---

**Step 4** Change the shutdown state to up and enable the interface as follows:

```
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 In Ring 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** Either accept the default ring speed of 4 Mbps, or enable the Token Ring interface speed for 16-Mbps operation as follows:

```
Router(config-int)# ring-speed 16
```

**Step 6** Enter any additional configuration subcommands required.

**Step 7** Repeat Step 2 through Step 6 for each new interface.

**Step 8** When all new interfaces are configured, press **Ctrl-Z** (hold the **Control** key down and press the **Z** key).

**Step 9** Write the new configuration to nonvolatile memory by entering the following:

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

To check the interface configuration using **show** commands, proceed to the section "Checking the Configuration."

## Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces and use the **ping** command to check connectivity.

### Using show Commands to Verify the New Interface Status

The following steps use **show** commands to verify that the new interfaces are configured and operating correctly.

**Step 1** Use the **show version** command to display the system hardware configuration. Ensure that the list includes the new interfaces.

**Step 2** Display all the current port adapters and their interfaces with the **show controllers** command. Verify that the new 4R port adapter appears in the correct slot.

**Step 3** Specify one of the new interfaces 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 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 the interface up, contact a service representative for assistance.

### Using show Commands to Display Interface Information

To display information about a specific interface, use the **show interfaces** command with the interface type and port address in the format **show interfaces** [*type slot/port*].

Following is an example of how the **show interfaces** [*type slot/port*] command displays status information (including the physical slot and port address) for the interfaces you specify. In these examples, most of the status information for each interface is omitted, and the four Token Ring interfaces (0–3) are in port adapter slot 6. (Interfaces are administratively shut down until you enable them.)

```
Router# sh int tokenring 6/0
TokenRing6/0 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted]

Router# sh int tokenring 6/1
TokenRing6/1 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted]

Router# sh int tokenring 6/2
TokenRing6/2 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted]

Router# sh int tokenring 6/3
TokenRing6/3 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted]
```

With the **show interfaces** *type slot/port* command, use arguments such as the interface type (Token Ring, and so forth) slot, and the port number (slot/port) to display information about a specific Token Ring interface only.

The following example of the **show interfaces tokenring** *slot/port* command shows all of the information specific to the first 4R interface port (interface port 0) in port adapter slot 6:

```
Router# sh int tokenring 6/0
TokenRing6/0 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 04:00:00
  Ring speed: 16 Mbps
  Single ring node, Source Route Transparent Bridge capable
  Ethernet Transit OUI: 0x000000
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 transitions
```

To determine which type of port adapter is installed on a Cisco 7206 in your system, use the **show diag** *slot* command. Specific port adapter information is displayed, as shown in the following example of a 4R port adapter in port adapter slot 6:

```
Router# show diag 6

Slot 6:
 Token-ring port adapter, 4 ports
 Port adapter is analyzed
 Port adapter insertion time 1d18h ago
 Hardware revision 1.0           Board revision A0
 Serial number     2023868       Part number    73-1390-04
 Test history      0x0           RMA number     00-00-00
 EEPROM format version 1
 EEPROM contents (hex):
     0x20: 01 05 01 00 00 1E E1 BC 49 05 6E 04 00 00 00 00
     0x30: 50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

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

### Using the ping Command

The *packet internet groper* (**ping**) command allows you 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 this command to verify the status of interface ports. Refer to the publications listed in the section "If You Need More Information" on page 2, for detailed command descriptions and examples.

The **ping** command sends an echo request out to a remote device at an 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.

Following is an example of a successful **ping** command to a remote server with the address 1.1.1.10:

```
Router# ping 1.1.1.10 <Return>
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 (powered on), and repeat the **ping** command.

For complete descriptions of interface subcommands and the configuration options available for Cisco 7206-related interfaces and functionality, refer to the publications listed in the section "If You Need More Information" on page 2.

## Cisco Connection Online

Cisco Connection Online (CCO), formerly Cisco Information Online (CIO), is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional content and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously—a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: http://www.cisco.com.
- WWW: http://www-europe.cisco.com.
- WWW: http://www-china.cisco.com.
- Telnet: cco.cisco.com.
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and baud rates up to 14.4 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

---

**Note** If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

---

This document is to be used in conjunction with the *Cisco 7000 Hardware Installation and Maintenance*, *Cisco 7010 Hardware Installation and Maintenance*, *Cisco 7505 Hardware Installation and Maintenance*, *Cisco 7507 Hardware Installation and Maintenance*, *Cisco 7513 Hardware Installation and Maintenance*, *Cisco 72xx Installation and Configuration Guide*, and *Versatile Interface Processor (VIP2) Installation, Configuration, and Maintenance* publications. (2661v24r.fm)

tmDirector, AutoConnect, AutoRoute, AXIS, BPX, Catalyst, CD-PAC, CiscoAdvantage, CiscoFusion, Cisco IOS, the Cisco IOS logo, *CiscoLink*, CiscoPro, the CiscoPro logo, CiscoRemote, the CiscoRemote logo, CiscoSecure, Cisco Systems, CiscoView, CiscoVision, CiscoWorks, ClickStart, ControlStream, EdgeConnect, EtherChannel, FairShare, FastCell, FastForward, FastManager, FastMate, FastPADlmp, FastPADmicro, FastPADmp, FragmentFree, FrameClass, Fulcrum INS, IGX, Impact, Internet Junction, JumpStart, LAN$^2$LAN Enterprise, LAN$^2$LAN Remote Office, LightSwitch, NetBeyond, NetFlow, Newport Systems Solutions, *Packet*, PIX, Point and Click Internetworking, RouteStream, Secure/IP, SMARTnet, StrataSphere, StrataSphere BILLder, StrataSphere Connection Manager, StrataSphere Modeler, StrataSphere Optimizer, Stratm, StrataView Plus, StreamView, SwitchProbe, SwitchVision, SwitchWare, SynchroniCD, *The Cell*, The FastPacket Company, TokenSwitch, TrafficDirector, Virtual EtherSwitch, VirtualStream, VlanDirector, Web Clusters, WNIC, Workgroup Director, Workgroup Stack, and XCI are trademarks; Access by Cisco, Bringing the Power of Internetworking to Everyone, Enter the Net with MultiNet, and The Network Works. No Excuses. are service marks; and Cisco, the Cisco Systems logo, CollisionFree, Combinet, EtherSwitch, FastHub, FastLink, FastNIC, FastPacket, FastPAD, FastSwitch, ForeSight, Grand, Grand Junction, Grand Junction Networks, the Grand Junction Networks logo, HSSI, IGRP, IPX, Kalpana, the Kalpana logo, LightStream, MultiNet, MultiWare, OptiClass, Personal Ethernet, Phase/IP, RPS, StrataCom, TGV, the TGV logo, and UniverCD are registered trademarks of Cisco Systems, Inc. All other trademarks, service marks, registered trademarks, or registered service marks mentioned in this document are the property of their respective owners.

Copyright © 1996, Cisco Systems, Inc.
All rights reserved. Printed in USA.
969R