



PA-T3 Serial Port Adapter Installation and Configuration

Product Number: PA-T3(=) and PA-2T3(=)

Platforms Supported: Cisco 7500 Series, Cisco 7000 Series, Cisco 7100 Series, Cisco 7200 Series, Cisco uBR7200 Series, Catalyst 5000 Series Switches

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PA-T3 Serial Port Adapter Installation and Configuration
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Preface

This preface describes how to find additional information on the PA-T3 and PA-2T3 serial port adapters and other Cisco products, services, and documentation. This preface contains the following sections:

- Objectives, page v
- Organization, page v
- Related Documentation, page vi
- Cisco Connection Online, page vii
- Cisco Documentation CD-ROM, page viii

Objectives

This document describes how to install and configure the PA-T3 serial port adapter (PA-T3[=] and PA-2T3[=]) in the following platforms:

- Cisco 7200 series routers—which consist of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and six-slot Cisco 7206 and Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers
- Second-generation Versatile Interface Processor (VIP2) in Cisco 7500 series routers and Cisco 7000 series routers with the Cisco 7000 Series Route Switch Processor (RSP7000) and Cisco 7000 Series Chassis Interface (RSP7000CI)
- Cisco 7100 series routers—which consist of the Cisco 7120 and Cisco 7140
- Catalyst Route Switch Module (RSM)/VIP2 in Catalyst 5000 series switches

Organization

This document is organized into the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the PA-T3 port adapter and describes its LED displays, cables, and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform <i>before the actual installation</i> .

Section	Title	Description
Chapter 3	VIP2 and the PA-T3 Port Adapter	Provides instructions for installing the PA-T3 port adapter on a VIP2 interface processor installed in Cisco 7500 or Cisco 7000 series routers.
Chapter 4	Catalyst RSM/VIP2 and the PA-T3 Port Adapter	Provides instructions for installing the PA-T3 port adapter on a Catalyst RSM/VIP2 installed in Catalyst 5000 series switches.
Chapter 5	Cisco 7200 Series and the PA-T3 Port Adapter	Provides instructions for installing the PA-T3 port adapter in a Cisco 7200 series router.
Chapter 6	Cisco uBR7200 Series and the PA-T3 Port Adapter	Provides instructions for installing the PA-T3 port adapter in the Cisco uBR7200 series universal broadband router.
Chapter 7	Cisco 7100 Series and the PA-T3 Port Adapter	Provides information on the PA-T3 and its use in Cisco 7100 series routers.
Chapter 8	Configuring the PA-T3 Interfaces	Provides instructions for configuring your port adapter on the supported platforms. The instructions given in this chapter apply to all supported platforms described in this document.

Related Documentation

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

- For Cisco IOS software 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>.

- For hardware installation and maintenance information on Cisco 7000 series and Cisco 7500 series routers, and the VIP2, 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 VIP2 users only)
- For hardware installation and maintenance information on the Catalyst 5000 series switches and the Catalyst RSM/VIP2, refer to the following publications:
 - The installation and configuration guide that shipped with your Catalyst 5000 series switches

- *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note* (Document Number 78-4780-01) which shipped with your Catalyst RSM/VIP2
- For hardware installation and maintenance information on Cisco 7100 series routers, refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide* publication that shipped with your Cisco 7100 series router.
- For information on setting up a Virtual Private Network, see the *Cisco 7100 Series VPN Configuration Guide*.
- For hardware installation and maintenance information on the Cisco 7200 VXR routers, refer to the *Cisco 7200 VXR Installation and Configuration Guide* publication that shipped with your Cisco 7200 VXR router.
- For hardware installation and maintenance information on the Cisco 7200 routers, refer to the following publications that shipped with your router:
 - *Cisco 7202 Installation and Configuration Guide*
 - *Cisco 7204 Installation and Configuration Guide*
 - *Cisco 7206 Installation and Configuration Guide*
- For hardware installation and maintenance information on the Cisco uBR7200 series routers, refer to the *Cisco uBR72xx Universal Broadband Router Installation and Configuration Guide* that shipped with your Cisco uBR7200 series router.
- For international agency compliance, safety, and statutory information for WAN interfaces for Cisco 7500 series, Cisco 7000 series, Cisco 7200 series, Cisco 7100 series, and Cisco uBR7200 series routers, refer to the following publications:
 - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7100 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco uBR72xx Universal Broadband Router*

Note The regulatory compliance and safety information documentation listed above applies to the Catalyst 5000 series switches and the Catalyst RSM/VIP2.

- For port adapter hardware and memory configuration guidelines for Cisco 7200 series routers, refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
- To view Cisco documentation or obtain general information about the documentation, refer to the Documentation CD-ROM, see the “Cisco Connection Online” section, or call customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com.

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WWW: <http://www-europe.cisco.com>

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Telnet: [cco.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 connection rates up to 28.8 kbps.

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

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.

Cisco Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

Overview

This chapter describes the one-port PA-T3 and two-port PA-2T3 serial port adapters. This chapter contains the following sections:

- Port Adapter Overview, page 1-1
- PA-T3 Serial Port Adapter Features, page 1-2
- Management Information Base, page 1-3

Port Adapter Overview

The PA-T3 serial port adapter is a single-width, one-port or two-port module that integrates data service unit (DSU) functionality into the Cisco router. It provides one or two high-speed serial PA-T3 interfaces on Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series routers, on the second-generation Versatile Interface Processor (VIP2) in all Cisco 7000 series and Cisco 7500 series routers, and on the Catalyst RSM/VIP2 in the Catalyst 5000 series switches. (See Figure 1-1 and Figure 1-2.)

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

Figure 1-1 One-Port PA-T3 Serial Port Adapter

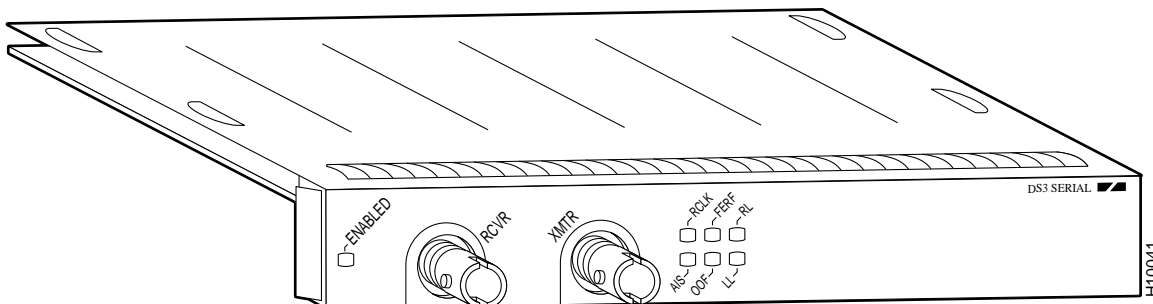
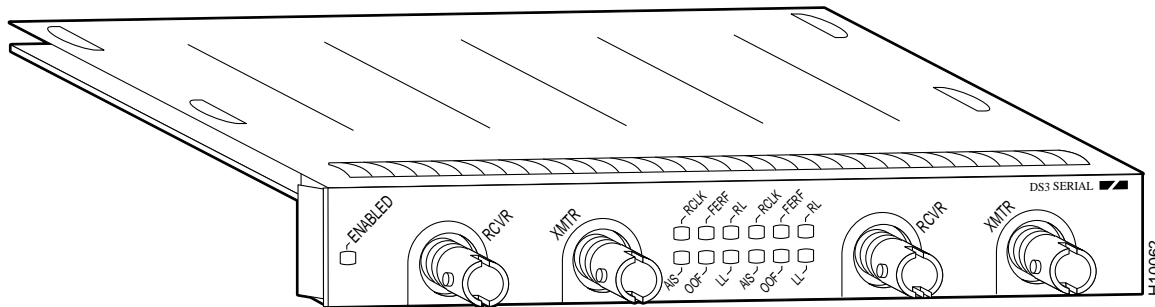


Figure 1-2 Two-Port PA-2T3 Serial Port Adapter



The PA-T3 serial port adapter can be installed in the following slots on the hardware platforms described in this document:

- VIP2—Port adapter slot 0 and port adapter slot 1
- Catalyst RSM/VIP2—Port adapter slot 0 and port adapter slot 1
- Cisco 7100 series routers—Port adapter slot 3 in the Cisco 7120 series and port adapter slot 4 in the Cisco 7140 series
- Cisco 7200 series routers—Port adapter slot 1 and slot 2 of the Cisco 7202; port adapter slot 1 through slot 4 of the Cisco 7204 and Cisco 7204VXR; port adapter slot 1 through slot 6 of the Cisco 7206 and Cisco 7206VXR
- Cisco uBR7200 series routers—Port adapter slot 1 and slot 2 of the Cisco uBR7246; port adapter slot 1 of the Cisco uBR7223

The one-port PA-T3 serial port adapter provides two network interfaces per VIP2 for Cisco 7000 series and Cisco 7500 series routers, two network interfaces per Catalyst RSM/VIP2, and one high-speed interface on the Cisco 7200 series and Cisco uBR7200 series routers. The two-port PA-2T3 serial port adapter provides four network interfaces per VIP2 for Cisco 7000 series and Cisco 7500 series routers, four network interfaces for the Catalyst RSM/VIP2, and two high-speed interfaces on the Cisco 7200 series and Cisco uBR7200 series routers. Serial network interfaces reside on modular port adapters, which provide a direct connection between the high-speed bus in the router and the external networks. The PA-T3 serial port adapter provides a full-duplex synchronous serial PA-T3 interface for transmitting and receiving data at rates of up to 34 megabits per second (Mbps).

The port adapter supports both 16- and 32-bit cyclic redundancy checks (CRCs). The default is 16-bit CRCs; to enable 32-bit CRCs, you use a configuration command. For a description of the CRC function, see the “Configuring Cyclic Redundancy Checks” section on page 8-13.

The VIP2 and Catalyst RSM/VIP2 support online insertion and removal (OIR), but individual port adapters with a VIP2 or Catalyst RSM/VIP2 do not support OIR. To replace port adapters in the Cisco 7000 series and Cisco 7500 series routers, and the Catalyst 5000 series switches, you must first remove the VIP2 or Catalyst RSM/VIP2 from the chassis and then replace port adapters as required. OIR is supported for port adapters in the Cisco 7200 series and Cisco uBR7200 series routers.

PA-T3 Serial Port Adapter Features

The PA-T3 serial port adapter provides the following features:

- Single-width port adapter for the VIP2 in all Cisco 7000 series, Cisco 7100 series, Cisco 7500 series, and Cisco 7200 series routers

- Single-width port adapter for the Catalyst RSM/VIP2 in all Catalyst 5000 series switches
- Single- or double-port T3 rate (45 Mbps) connectivity
- Full-duplex synchronous serial DS3 interface
- High-speed High-Level Data Link Control (HDLC) data
- Integrated data service unit (DSU) functionality
- Support for 16- and 32-bit cyclic redundancy checks (CRCs)
- Support for C-bit, M13, and bypass framing
- Support for ATM-Data Exchange Interface (DXI), Frame Relay, HDLC, Switched Multimegabit Data Service (SMDS), and Point-to-Point Protocol (PPP) serial encapsulations
- Support for DS3 MIB (RFC 1407)
- Support for remote and local loopback
- B3ZS line coding
- Scrambling and bandwidth reduction
- Online insertion and removal (OIR)

Management Information Base

Management Information Base (MIB) attributes are readable and writable across the Integrated Local Management Interface (ILMI) through use of the Simple Network Management Protocol (SNMP).

The one-port PA-T3 serial port adapter supports MIB-II (RFC 1213) and the DS3 interface MIB (RFC 1407).

The two-port PA-2T3 serial port adapter supports MIB-II (RFC 1213) and the DS3 interface MIB (RFC 1407).

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the PA-T3 port adapters.

- Parts and Tools Required, page 2-1
- Software and Hardware Requirements, page 2-2
- PA-T3 Port Adapter LEDs, page 2-3
- PA-T3 Receptacles and Cables, page 2-5
- Interoperability Guidelines for PA-T3 Serial Port Adapter DSUs, page 2-5
- Safety Guidelines, page 2-6
- FCC Class A Compliance, page 2-8

Parts and Tools Required

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-T3 serial port adapter and one of the following:
 - VIP2-15(=), VIP2-20=, VIP2-40(=), or VIP2-50(=) motherboard
 - Catalyst RSM/VIP2-15(=) or Catalyst RSM/VIP2-40(=) motherboard
 - Cisco 7100 series router with at least one available port adapter slot
 - Cisco 7200 series router with at least one available port adapter slot
 - Cisco uBR7200 series router with at least one available port adapter slot
- 75-ohm coaxial serial interface cables
- Number 1 Phillips screwdriver and a 3/16-inch flat-blade screwdriver
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares

Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the PA-T3 and the PA-2T3 serial port adapters in supported router platforms.

Table 2-1 PA-T3 Port Adapter Software Requirements

Platforms	Recommended Minimum Cisco IOS Release	
	PA-T3	PA-2T3
Cisco 7000 and Cisco 7500 series		
• With VIP2-15(=) or VIP2-40(=)	Cisco IOS Release 11.1(13)CA or a later release of Cisco IOS Release 11.1 CA	Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA
• With VIP2-50(=)	Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1 CA	Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA
Cisco 7200 series		
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 12.0(2)XE2 or a later release of Cisco IOS Release 12.0 XE 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 12.0(3)T or a later release of Cisco IOS Release 12.0 T
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA	Cisco IOS Release 11.1(16)CA or a later release of Cisco IOS Release 11.1 CA
• Cisco 7202	Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1 CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3 AA	Cisco IOS Release 11.1(19)CC1 or a later release of Cisco IOS Release 11.1 CC Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3 AA
Cisco uBR7200 series		
• Cisco uBR7246 and Cisco uBR7223	Cisco IOS Release 12.0(2)XA or a later release of Cisco IOS Release 12.0 XA	Cisco IOS Release 12.0(2)XA or a later release of Cisco IOS Release 12.0 XA
Cisco 7100 Series		
• 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	
Catalyst 5000 series switches		
• With Catalyst RSM/VIP2-15(=) or Catalyst RSM/VIP2-40(=)	Cisco IOS Release 12.0(4)T or a later release of Cisco IOS Release 12.0T	Cisco IOS Release 12.0(4)T or a later release of Cisco IOS Release 12.0T



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

The PA-T3 serial port adapter is considered a *high-bandwidth* port adapter; therefore, and at a minimum, Cisco recommends that the PA-T3 serial port adapter be installed on the VIP2-15 or Catalyst RSM/VIP2 motherboard (with 1 MB of SRAM and 8 MB of DRAM). Installation of the PA-T3 serial port adapter on the VIP2-10 (with 512 KB of SRAM and 8 MB of DRAM) is not recommended.

Note The VIP2 and Catalyst RSM/VIP2 supports online insertion and removal (OIR), but individual port adapters do not. To replace port adapters in the Cisco 7000 series and Cisco 7500 series routers, and the Catalyst 5000 series switches, you must first remove the VIP2 or Catalyst RSM/VIP2 from the chassis and then replace port adapters as required. OIR is supported for port adapters in the Cisco 7100 series, Cisco 7200 series, and Cisco uBR7200 series routers. Port adapters have a handle attached, but this handle is occasionally not shown in illustrations in this publication to allow a full view of detail on the port adapter's faceplate.

In the Cisco 7000 series, Cisco 7100 series, Cisco 7500 series, and Cisco uBR7200 series routers, and the Catalyst 5000 series switches, there are no restrictions on slot locations or sequence; however, in the Cisco 7200 series routers, there are specific configuration guidelines that must be observed for high-bandwidth port adapters.

For specific Cisco 7200 series routers hardware configuration information and for memory configuration guidelines, refer to the document *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*, which shipped with your Cisco 7200 series chassis and is also available on the Cisco Connection Documentation, Enterprise Series CD-ROM.

To determine if your Cisco 7000 series, Cisco 7100 series, Cisco 7500 series, Cisco 7200 series, or Cisco uBR7200 series router, or Catalyst RSM/VIP2, is compatible with the PA-T3 serial port adapter, use the **show version** command to display the current hardware configuration of the router, including the system software version that is currently loaded and running. You can check the version of the default ROM image by removing the board and checking the ROM labels, or by configuring the interface or system software to boot from ROM, restarting the system, and using the **show version** command to check the running version.

Use the **show version** command to display the current system software version. In the following example, the running system software is Release 11.1(16)CA.

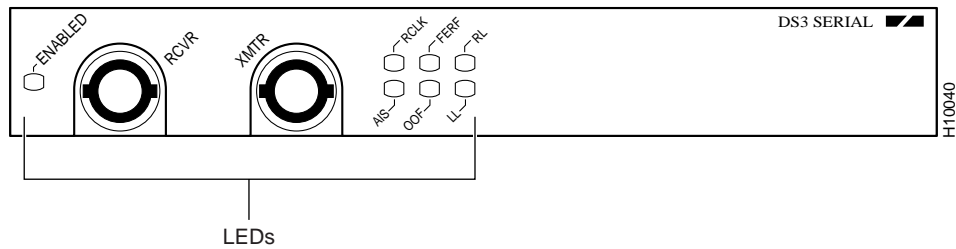
```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software, Version 11.1(16)CA
Synced to mainline version: 11.1(10.5)
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Thu 22-May-97 14:32
```

If your system lacks the required system software and microcode, contact a customer service representative for upgrade information.

PA-T3 Port Adapter LEDs

The PA-T3 has one status LED and six uplink port status LEDs (RCLK, FERF, OOF, AIS, RL, and LL) for the serial T3 port. (See Figure 2-1.)

Figure 2-1 LEDs on the PA-T3 Serial Port Adapter—Partial Front View



The PA-2T3 has one status LED and six uplink port status LEDs (RCLK, FERF, OOF, AIS, RL, and LL) for each serial PA-T3 port. (See Figure 2-2.)

Figure 2-2 LEDs on the PA-2T3 Serial Port Adapter—Partial Front View

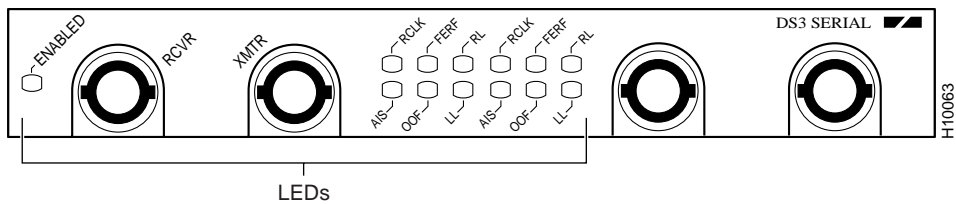


Table 2-2 describes the PA-T3’s LEDs.

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

The following conditions must be met before the PA-T3 serial port adapter is enabled:

- The port adapter contains a valid microcode version that has been downloaded successfully.
- The port adapter is correctly connected to the VIP2 or Catalyst RSM/VIP2 (Cisco 7000 series and Cisco 7500 series, or Catalyst 5000 series switches) and the midplane and is receiving power in the Cisco router.
- The bus recognizes the port adapter.

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

Table 2-2 LEDs for Uplink Port Status

LED	Color	State	Description
ENABLED	Green	On	Indicates that port adapter is ready for operation.
Uplink Port Status			
RCLK	Green	On	Indicates that a receive clock has been detected.
FERF	Yellow	On	Indicates that Frammer detected Far End Receive Failure.
OOF	Yellow	On	Indicates that Frammer detected Out of Frame.
AIS	Yellow	On	Indicates that Frammer detected Alarm Indication Signal.
RL	Yellow	On	Indicates that port is in remote loopback mode.

LED	Color	State	Description
ENABLED	Green	On	Indicates that port adapter is ready for operation.
Uplink Port Status			
LL	Yellow	On	Indicates that port is in local loopback mode.

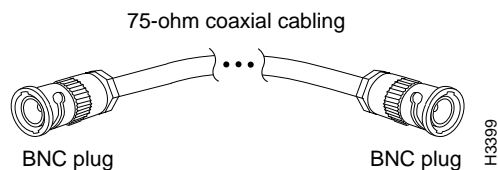
PA-T3 Receptacles and Cables

The PA-T3 port adapter serial interface cable, which is a 75-ohm coaxial cable, connects your router to a T3 serial network. Serial cables conform to EIA/TIA-612 and EIA/TIA-613 specifications. The serial ports on the PA-T3 serial port adapter are considered to be data terminal equipment (DTE) devices.

On a single PA-T3 serial port adapter, there are one or two T3 serial ports, each with two connectors (receive and transmit), where you connect the Cisco 75-ohm coaxial cable. The 75-ohm coaxial cable (Cisco part number CAB-ATM-DS3/E3) for the PA-T3 serial port adapter is available only from Cisco Systems; it is *not* available from outside commercial cable vendors.

The Cisco PA-T3 75-ohm coaxial cable (see Figure 2-3) is available only in 10-foot (3.05-meter) lengths. The typical maximum distance between stations for PA-T3 transmissions is 1300 feet (396 meters).

Figure 2-3 PA-T3 Serial Port Adapter Cable



You can test the data terminal equipment-to-data circuit-terminating equipment (DTE-to-DCE) cable connection by using the **loopback dte** command. See the “Using the loopback Command to Verify the Physical Interface” section on page 8-24 for more information.

Interoperability Guidelines for PA-T3 Serial Port Adapter DSUs

The PA-T3 serial port adapter supports several types of integrated DSUs. Table 2-3 lists the feature compatibilities of the PA-T3 serial port adapter DSUs.

Table 2-3 Feature Compatibilities of PA-T3 Serial Port Adapter DSUs

DSU	Full Rate Support	Scrambling Support	Subrate Support	MDL ¹ Support
DL3100	Yes	Yes	Yes	No
Kentrox	Yes	Yes ²	Yes ²	No
Larscom	Yes	Yes	Yes	No

¹ MDL=Maintenance Digital Link.

² PA-T3 serial port adapters support either scrambling or Kentrox subrate, not both at the same time.

Safety Guidelines

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



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

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

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

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

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

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

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

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

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

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

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis.
- Do not work alone when potentially hazardous conditions exist 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 consist of 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 A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

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.)

Note The PA-T3 serial port adapter has been designed to meet these requirements. Modifications to this product that are not authorized by Cisco Systems, Inc., could void the various approvals and negate your authority to operate the product.

VIP2 and the PA-T3 Port Adapter

This chapter provides information on the PA-T3 port adapter and its use on the VIP2 in Cisco 7000 series and Cisco 7500 series routers. This chapter contains the following sections:

- Overview, page 3-1
- Removing a Port Adapter, page 3-4
- Installing a Port Adapter, page 3-5

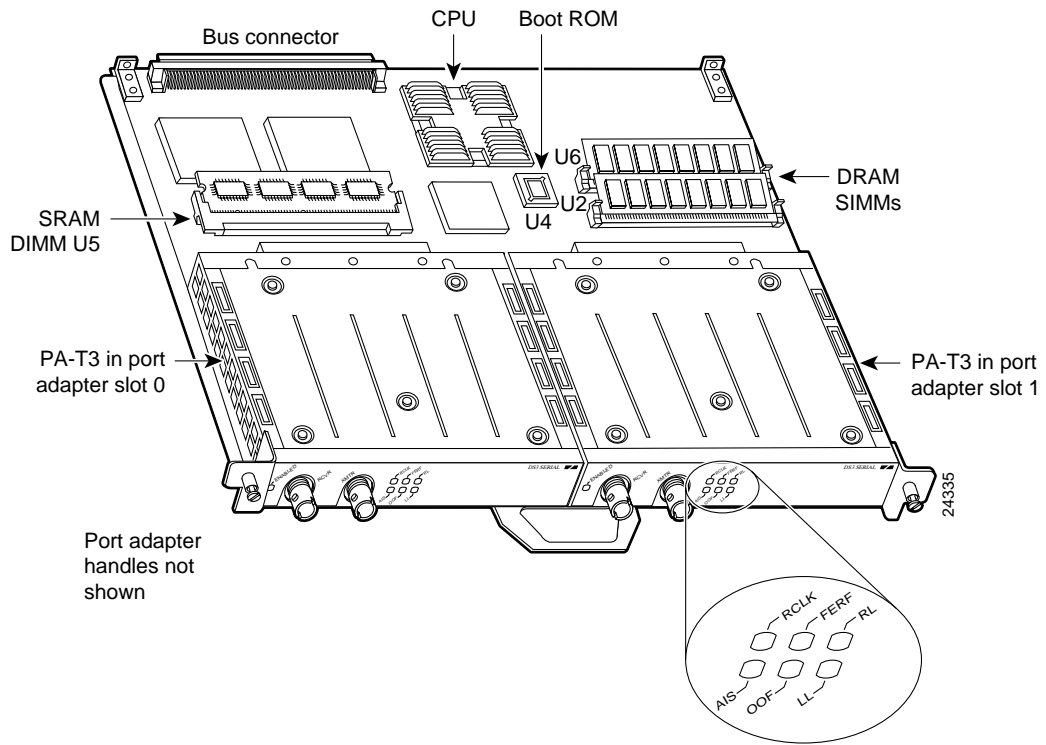
Overview

The PA-T3 serial port adapter is used on the VIP2 in Cisco 7000 series and Cisco 7500 series routers and can be installed in either port adapter slot 0 or slot 1 on the VIP2 motherboard.

Note You can have up to three T3 serial interfaces on a VIP2 motherboard. Cisco recommends a configuration of one PA-T3 serial port adapter (with one T3 serial interface) and one PA-2T3 serial port adapter (with two serial interfaces) for a total of three T3 serial interfaces per VIP2.

Figure 3-1 shows two one-port PA-T3 serial port adapters installed in port adapter slot 0 and slot 1 on a VIP2-15 or VIP2-40.

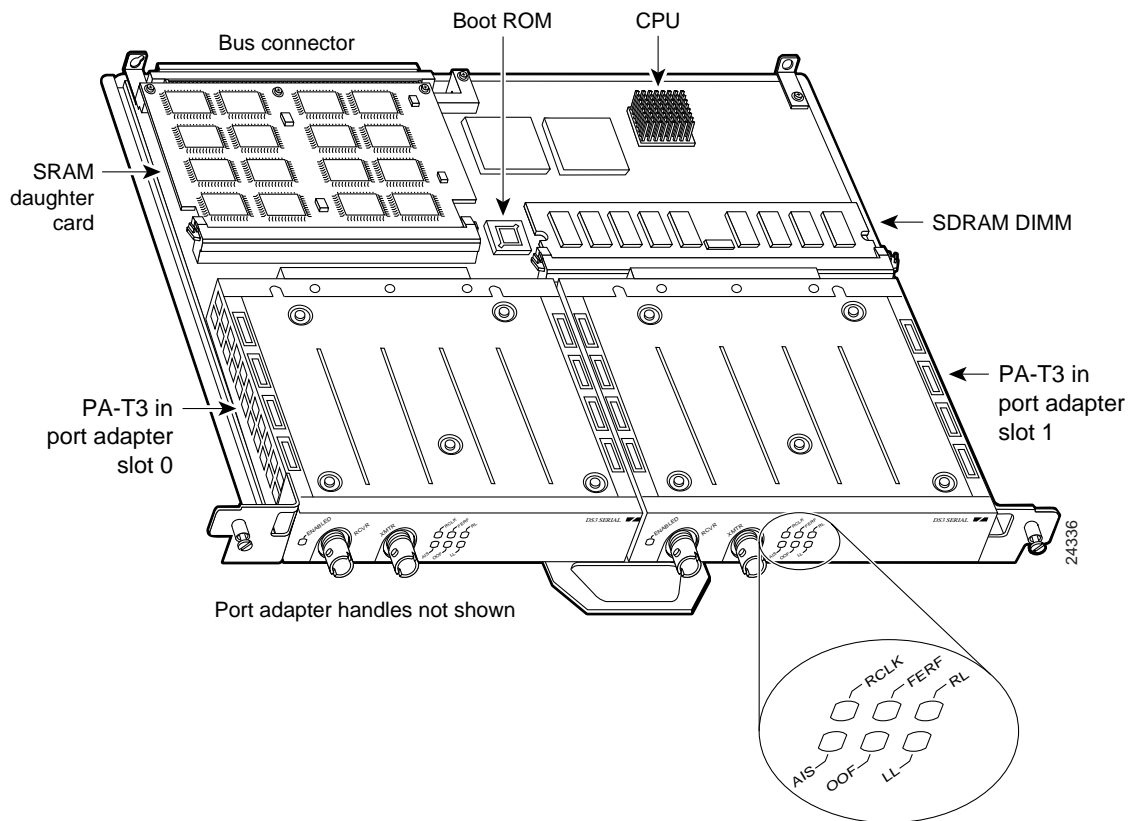
Figure 3-1 VIP2-15 or VIP2-40 with One-Port PA-T3 Serial Port Adapters in Port Adapter Slots 0 and 1



Note Port adapters have a handle attached, but this handle is not shown to allow a full view of detail on each port adapter's faceplate.

Figure 3-2 shows two one-port PA-T3 port adapters installed in port adapter slots 0 and 1 on a VIP2-50.

Figure 3-2 VIP2-50 with One-Port PA-T3 Port Adapters in Port Adapter Slots 0 and 1



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. In either case, you need a number 1 Phillips screwdriver, an antistatic mat on which you can place the removed interface processor, and an antistatic container in which you can place a failed port adapter for shipment back to the factory.

Note The PA-T3 serial port adapter can be installed on a VIP2-15, VIP2-20, or VIP2-40 motherboard; however, installation on the VIP2-10 is not recommended.



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 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. The VIP2 supports online insertion and removal (OIR), but 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 in 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.

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

Removing a Port Adapter

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

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

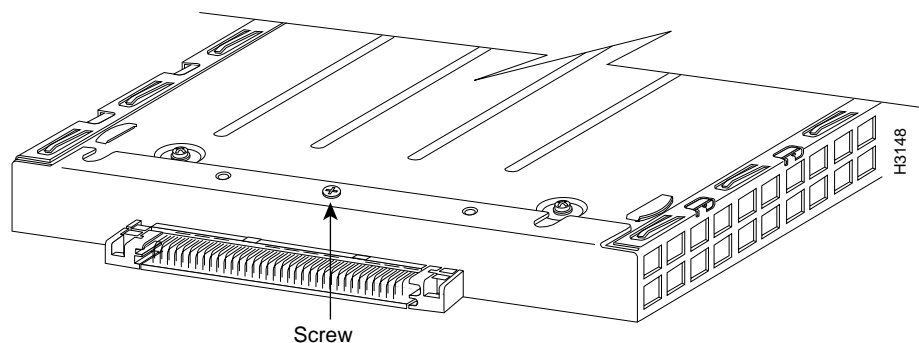
Note If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

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*, which shipped with your VIP2. Place the removed VIP2 on an antistatic mat.

Step 4 Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See Figure 3-3.) This screw secures the port adapter (or blank port adapter) to its slot.

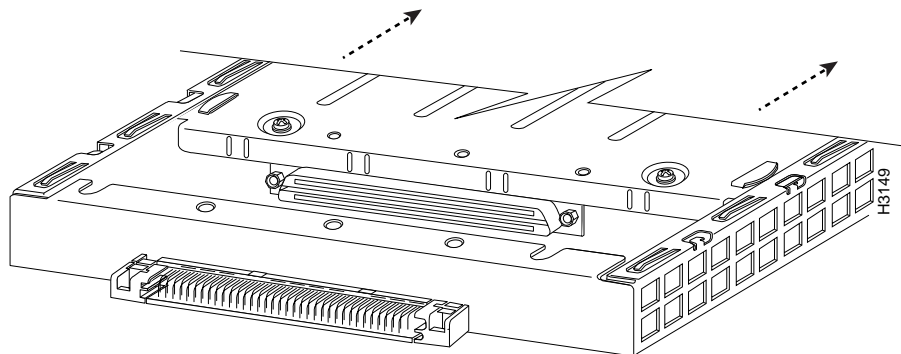
Figure 3-3 Location of Port Adapter Screw—Partial Port Adapter View



Step 5 Remove the screw that secures the port adapter (or blank port adapter).

Step 6 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 3-4.)

Figure 3-4 Pulling a Port Adapter Out of a Slot—Partial Port Adapter View



- Step 7** 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.

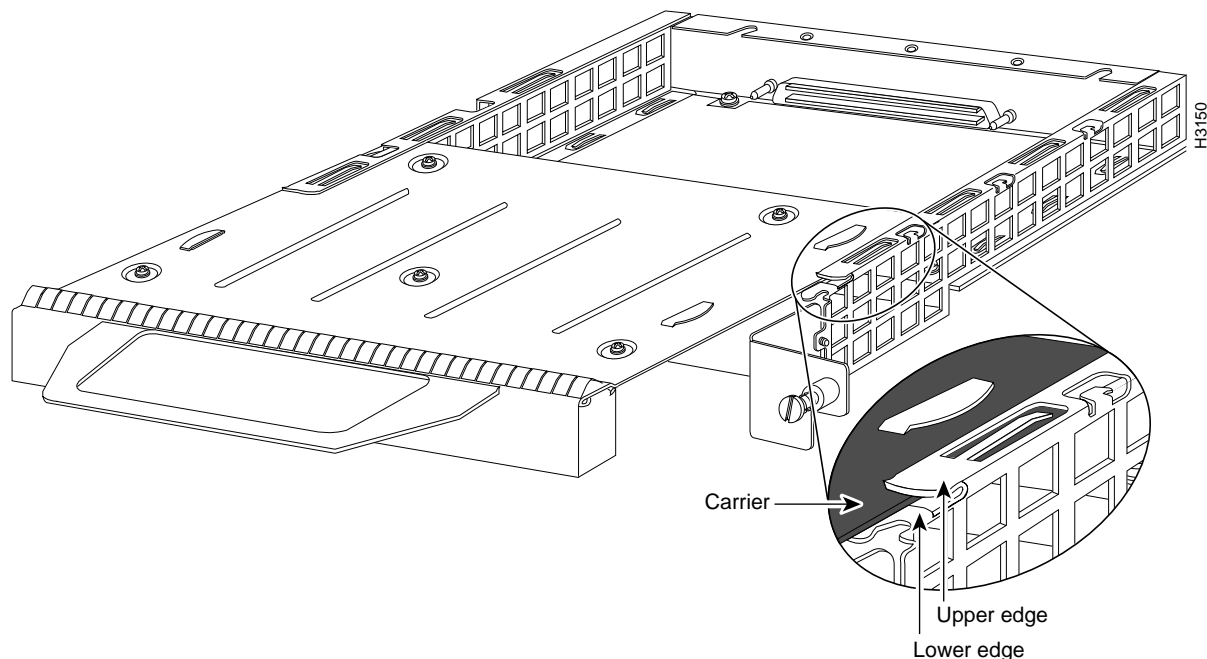
This completes the procedure for removing a new port adapter on a VIP2.

Installing a Port Adapter

Following is the standard procedure for installing a port adapter on the VIP2.

- Step 1** Remove the new port adapter from its antistatic container and position it at the opening of the slot.
- Step 2** Carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot, as shown in Figure 3-5.

Figure 3-5 Aligning a Port Adapter in a Port Adapter Slot





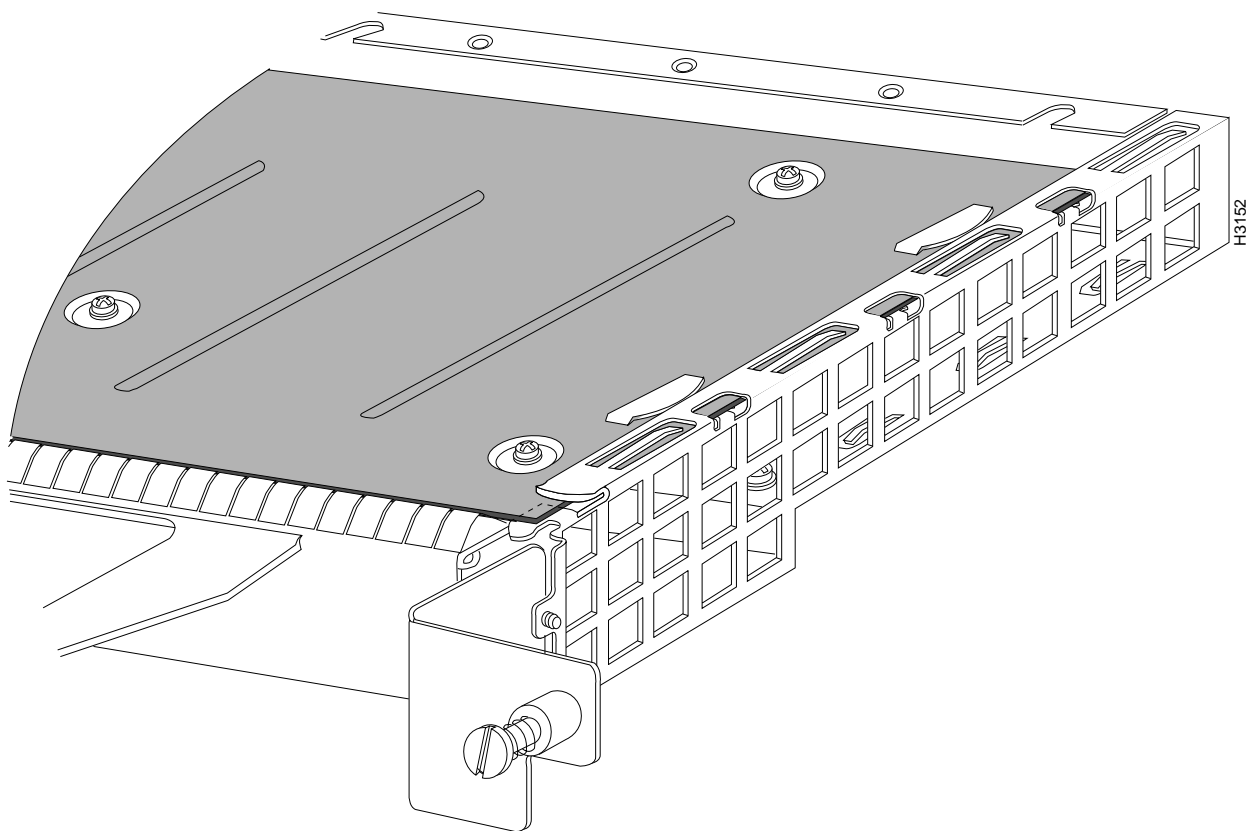
Caution To prevent jamming the carrier between the upper and the lower edges of the port adapter slot and to ensure that the edge connector at the rear of the port adapter mates with the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and the lower slot edges, as shown in the cutaway in Figure 3-5.



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, position the carrier between the upper and the lower slot edges, as shown in Figure 3-5.

Step 3 Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely seated in the connector on the motherboard. (See Figure 3-6.)

Figure 3-6 Port Adapter Installed in a Port Adapter Slot—Partial Port Adapter View



Step 4 Replace the screw in the rear of the port adapter slot. (See Figure 3-3 for its location.) Do not overtighten this screw.

Step 5 Reinstall the VIP2 in the system. (Follow the steps in the section “Installing a VIP2” in the configuration note *Second-Generation Versatile Interface Processor [VIP2] Installation and Configuration*, which shipped with your VIP2.)

Step 6 If the interface cables have been disconnected, reconnect the interface cables to the port adapters.

This completes the procedure for installing a port adapter on a VIP2. Proceed to Chapter 8, “Configuring the PA-T3 Interfaces,” for information on how to configure your port adapter interfaces.

Catalyst RSM/VIP2 and the PA-T3 Port Adapter

This chapter provides information on the PA-T3 serial port adapter and its use on the Catalyst RSM/VIP2 in the Catalyst 5000 series switches. This chapter contains the following sections:

- Overview, page 4-1
- Removing a Port Adapter, page 4-3
- Installing a Port Adapter, page 4-4

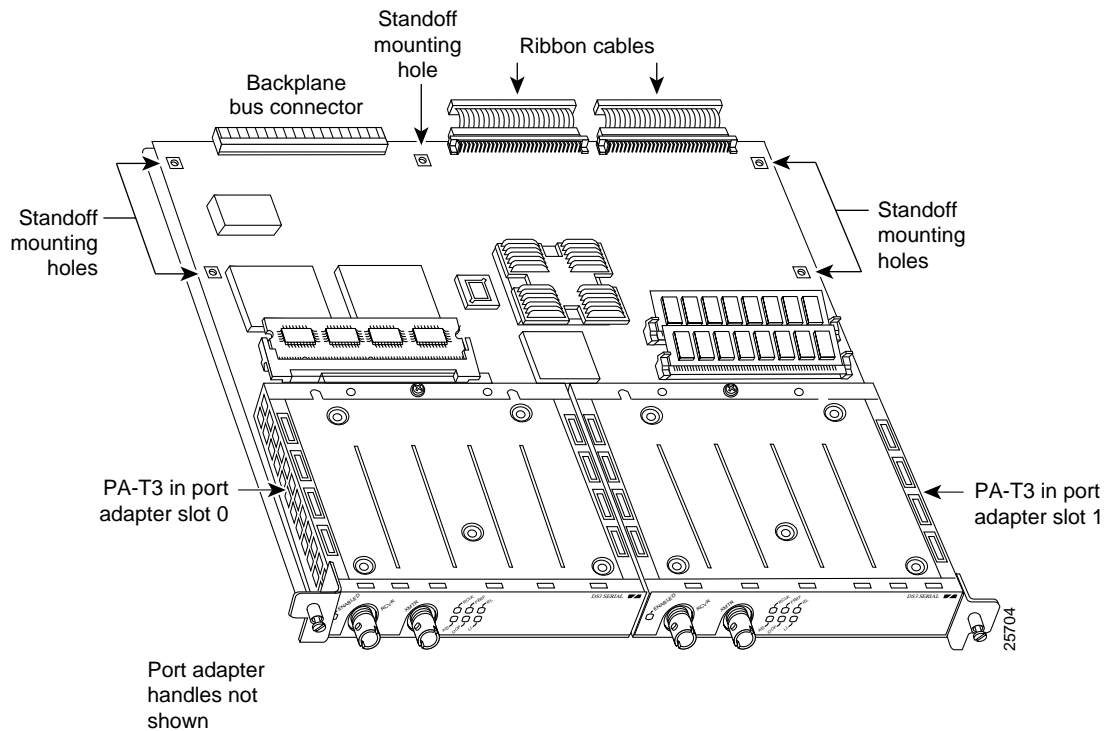
Overview

The PA-T3 serial port adapter is used on the Catalyst RSM/VIP2 in the Catalyst 5000 series switches and can be installed in either port adapter slot 0 or slot 1 on the Catalyst RSM/VIP2 motherboard.

Note You can have up to three T3 serial interfaces on a Catalyst RSM/VIP2 motherboard. Cisco recommends a configuration of one PA-T3 serial port adapter (with one T3 serial interface) and one PA-2T3 serial port adapter (with two serial interfaces) for a total of three T3 serial interfaces per Catalyst RSM/VIP2.

Figure 4-1 shows two one-port PA-T3 serial port adapters installed in port adapter slot 0 and slot 1 on a Catalyst RSM/VIP2-15 or Catalyst RSM/VIP2-40.

Figure 4-1 Catalyst RSM/VIP2-15 or Catalyst RSM/VIP2-40 with One-Port PA-T3 Serial Port Adapters in Port Adapter Slots 0 and 1



Note Port adapters have a handle attached, but this handle is not shown to allow a full view of detail on each port adapter's faceplate.

Depending on the circumstances, you might need to install a new port adapter on a Catalyst RSM/VIP2 motherboard or replace a failed port adapter in the field. In either case, you need a number 1 Phillips screwdriver, an antistatic mat on which you can place the removed interface processor, and an antistatic container in 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 Catalyst RSM/VIP2 motherboard or attempt to install other port adapters on the Catalyst RSM/VIP2 motherboard while the system is operating. To install or replace port adapters, first remove the Catalyst RSM/VIP2 from the chassis.

Note Each port adapter 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. The Catalyst RSM/VIP2 supports online insertion and removal (OIR), but individual port adapters do not. To replace port adapters, you must first remove the Catalyst RSM/VIP2 from the chassis and then install or replace port adapters as required. If a blank port adapter is installed on the Catalyst RSM/VIP2 in which you want to install a new port adapter, you must first remove the Catalyst RSM/VIP2 from the chassis and then remove the blank port adapter.

When only one port adapter is installed on a Catalyst RSM/VIP2, you must use a blank port adapter to fill the empty slot. This allows the Catalyst RSM/VIP2 and the Catalyst RSM/VIP2 chassis to conform to electromagnetic interference (EMI) emissions requirements and encourages air to flow through the chassis properly. If you plan to install a new port adapter, you must first remove the blank port adapter.

Removing a Port Adapter

Following is the standard procedure for removing any type of port adapter on the Catalyst RSM/VIP2:

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

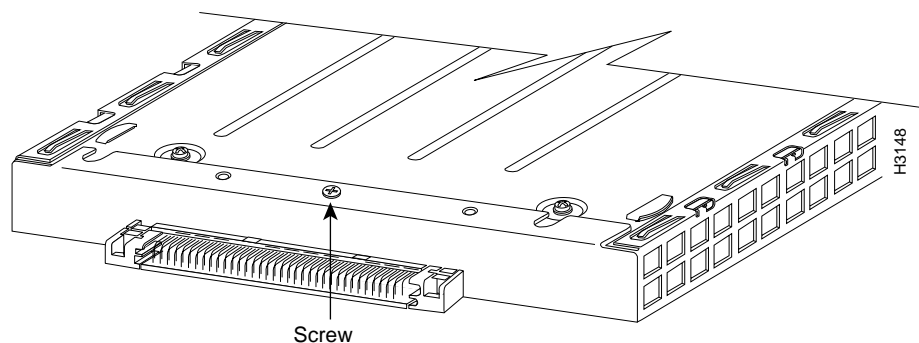
Note If you want to install a new port adapter on a Catalyst RSM/VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

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 the Catalyst RSM/VIP2 with cables attached; however, we do not recommend it.

Step 3 To remove the Catalyst RSM/VIP2 from the chassis, follow the steps in the *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note* (Document Number 78-4780-01) which shipped with your Catalyst RSM/VIP2. Place the removed Catalyst RSM/VIP2 on an antistatic mat.

Step 4 Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See Figure 4-2.) This screw secures the port adapter (or blank port adapter) to its slot.

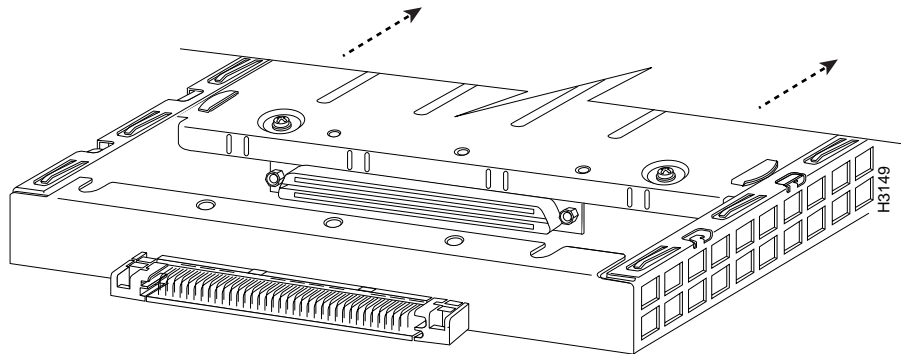
Figure 4-2 Location of Port Adapter Screw—Partial Port Adapter View



Step 5 Remove the screw that secures the port adapter (or blank port adapter).

Step 6 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 4-3.)

Figure 4-3 Pulling a Port Adapter Out of a Slot—Partial Port Adapter View



- Step 7** 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.

This completes the procedure for removing a new port adapter on a Catalyst RSM/VIP2.

Installing a Port Adapter

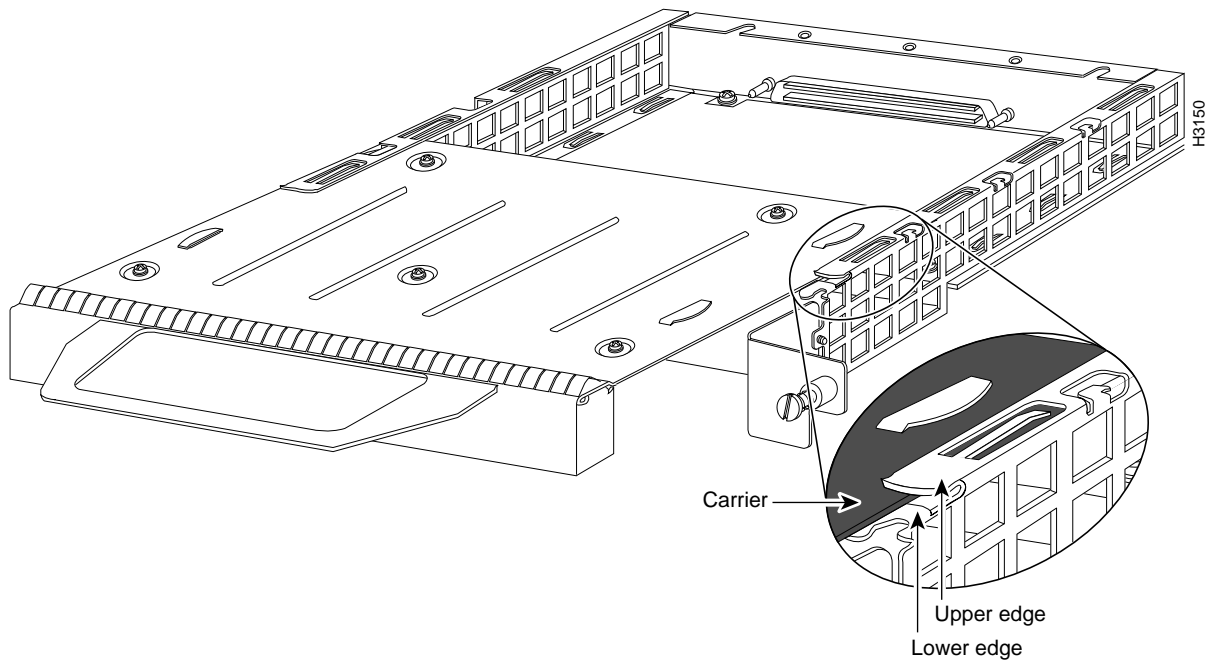
Following is the standard procedure for installing a port adapter on the Catalyst RSM/VIP2.

- 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 Catalyst RSM/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 the Catalyst RSM/VIP2 with cables attached; however, we do not recommend it.
- Step 1** Remove the new port adapter from its antistatic container and position it at the opening of the slot.
- Step 2** Carefully align the port adapter carrier between the upper and the lower edges of the port adapter slot, as shown in Figure 4-4.

Figure 4-4 Aligning a Port Adapter in a Port Adapter Slot



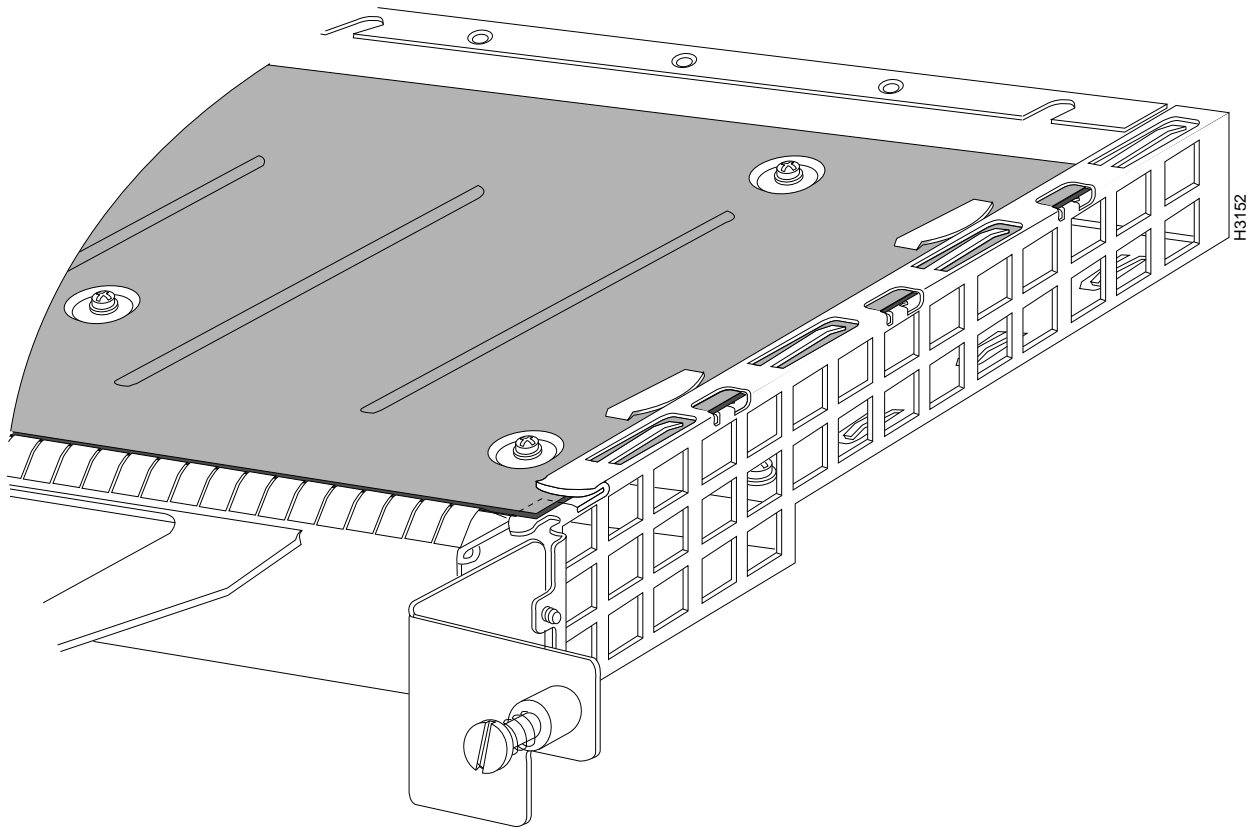
Caution To prevent jamming the carrier between the upper and the lower edges of the port adapter slot and to ensure that the edge connector at the rear of the port adapter mates with the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and the lower slot edges, as shown in the cutaway in Figure 4-4.



Caution To ensure a positive ground attachment between the port adapter carrier and the Catalyst RSM/VIP2 motherboard and port adapter slot, and to ensure that the connectors at the rear of the port adapter and slot mate properly, position the carrier between the upper and the lower slot edges, as shown in Figure 4-4.

Step 3 Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely seated in the connector on the motherboard. (See Figure 4-5.)

Figure 4-5 Installing a Port Adapter in a Port Adapter Slot—Partial Port Adapter View



- Step 4** Replace the screw in the rear of the port adapter slot. (See Figure 4-2 for its location.) Do not overtighten this screw.
- Step 5** To reinstall the Catalyst RSM/VIP2 in the system, follow the steps in the *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note* (Document Number 78-4780-01) which shipped with your Catalyst RSM/VIP2 .
- Step 6** If the interface cables have been disconnected, reconnect the interface cables to the port adapters.

This completes the procedure for installing a port adapter on a Catalyst RSM/VIP2. Proceed to Chapter 8, “Configuring the PA-T3 Interfaces,” for information on how to configure your port adapter interfaces.

Cisco 7200 Series and the PA-T3 Port Adapter

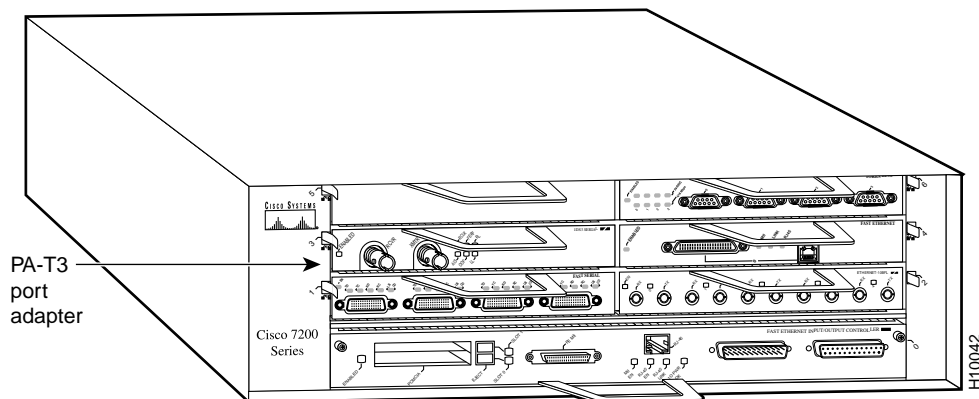
This chapter provides information on the PA-T3 port adapter and its use in Cisco 7200 series routers. This chapter contains the following sections:

- Overview, page 5-1
- Removing a Port Adapter, page 5-2
- Installing a Port Adapter, page 5-3

Overview

The PA-T3 serial port adapter can be installed in any available port adapter slot in Cisco 7200 series routers (which consist of the two-slot Cisco 7202, four-slot Cisco 7204 and Cisco 7204VXR, and six-slot Cisco 7206 and Cisco 7206VXR). Figure 5-1 shows a one-port PA-T3 serial port adapter installed in port adapter slot 3 of a Cisco 7206.

Figure 5-1 Cisco 7206 with a PA-T3 Serial Port Adapter in Port Adapter Slot 3



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 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 online insertion and removal; therefore, you do not have to power down the Cisco 7200 series routers when removing and replacing a port adapter.

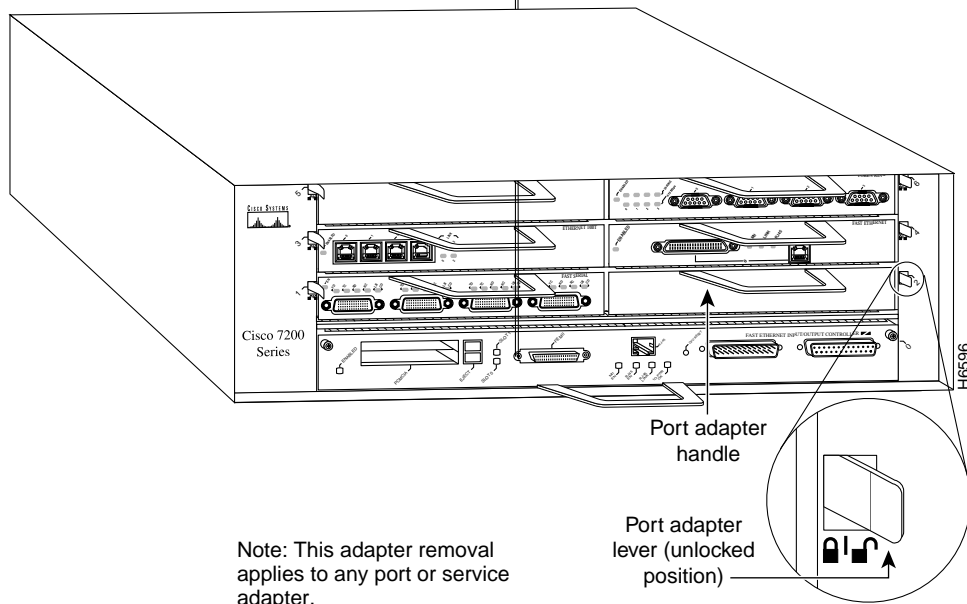
When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to EMI emissions requirements and to allow proper airflow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove a blank 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-preventive 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. (See Figure 5-2.)

Figure 5-2 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 halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

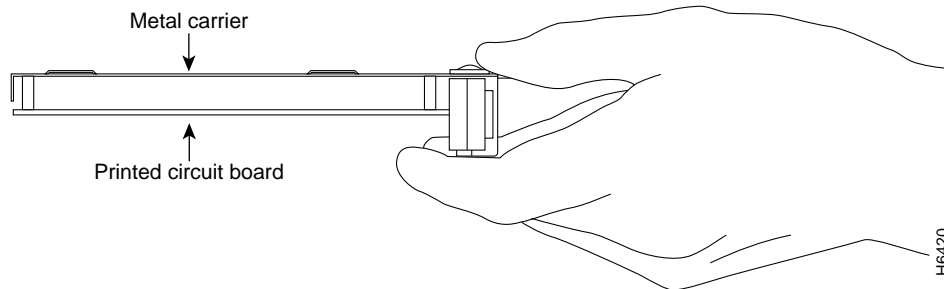
Note As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

- Step 4** With the port adapter halfway 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. (See Figure 5-3.)

Figure 5-3 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.

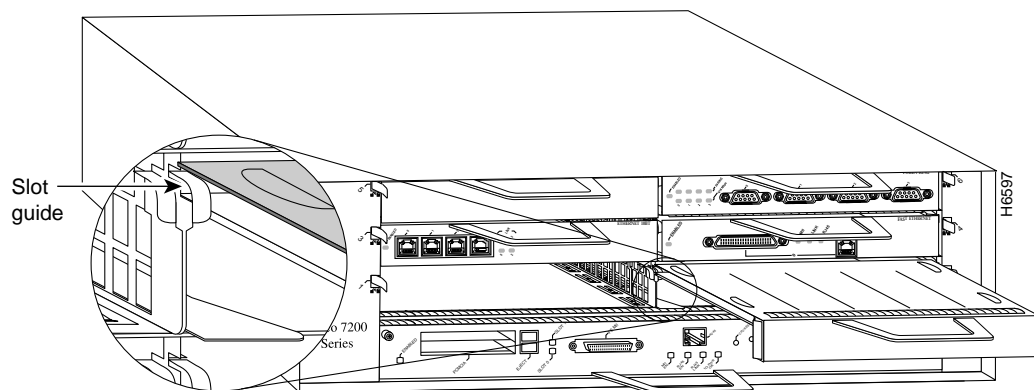
This completes the procedure for removing a port adapter from a Cisco 7200 series router.

Installing a Port Adapter

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

- Step 1** Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See Figure 5-4.)
- Step 2** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
- Step 3** Use both hands to grasp the port adapter by its metal carrier edges and position the port adapter so that its components are downward. (See Figure 5-3.)
- Step 4** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 5-4.)

Figure 5-4 Aligning the Port Adapter Metal Carrier Between the Slot Guides—Cisco 7206 Shown



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

Step 5 With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



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

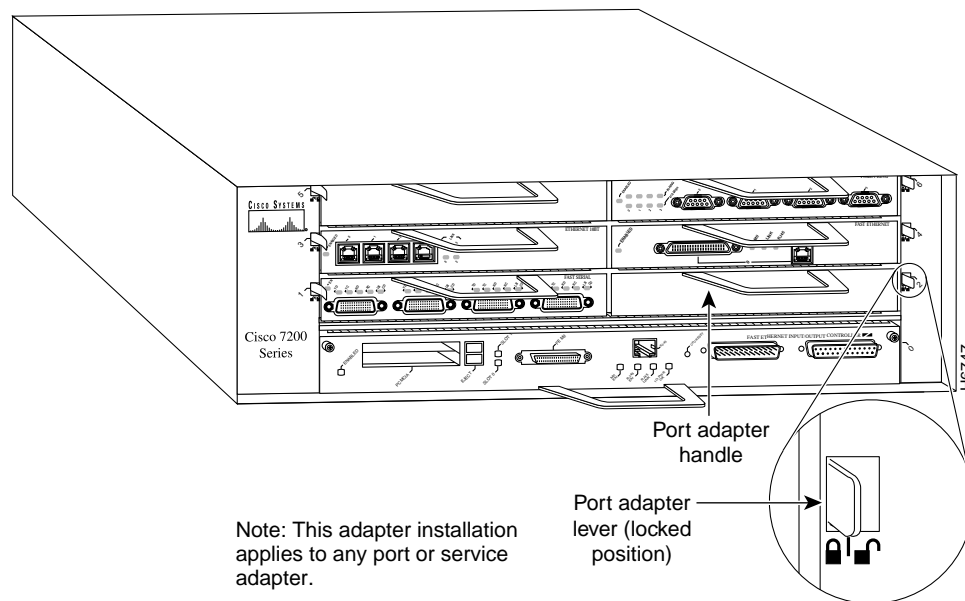
Step 6 With the port adapter halfway in the slot, connect all required cables to the port adapter.

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 seating the port adapter in the router midplane, move the port adapter lever to the locked position. Figure 5-5 shows the port adapter lever in the locked position.

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

Figure 5-5 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. Proceed to Chapter 8, “Configuring the PA-T3 Interfaces,” for information on how to configure your port adapter interfaces.

Cisco uBR7200 Series and the PA-T3 Port Adapter

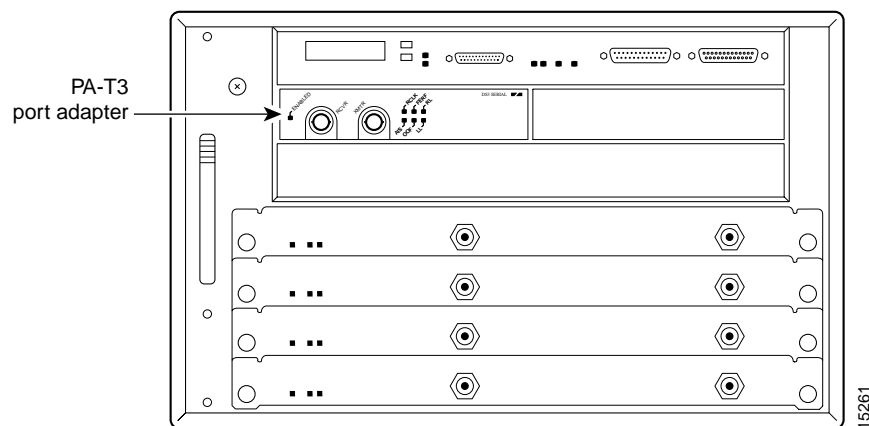
This chapter provides information on the PA-T3 port adapter and its use in the Cisco uBR7200 series universal broadband routers. This chapter includes the following sections:

- Overview, page 6-1
- Removing a Port Adapter, page 6-2
- Installing a Port Adapter, page 6-4

Overview

The PA-T3 port adapter can be installed in any of the available port adapter slots in the Cisco uBR7200 series routers. Figure 6-1 shows a PA-T3 port adapter installed in port adapter slot 2 of a Cisco uBR7200 series router.

Figure 6-1 Cisco uBR7200 Series with a PA-T3 Port Adapter in Port Adapter Slot 2



Depending on the circumstances, you might need to install a new port adapter or replace a failed port adapter in a Cisco uBR7200 series router. In either case no tools are necessary; all port adapters available for the Cisco uBR7200 series routers connect directly to the router midplane and are locked into position by a port adapter retention clip (Cisco uBR7246) or lever (Cisco uBR7223). When removing and replacing a port adapter, you 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 Cisco uBR7200 series routers support OIR; therefore, you do not have to power down the router when removing and replacing a PA-T3 port adapter.

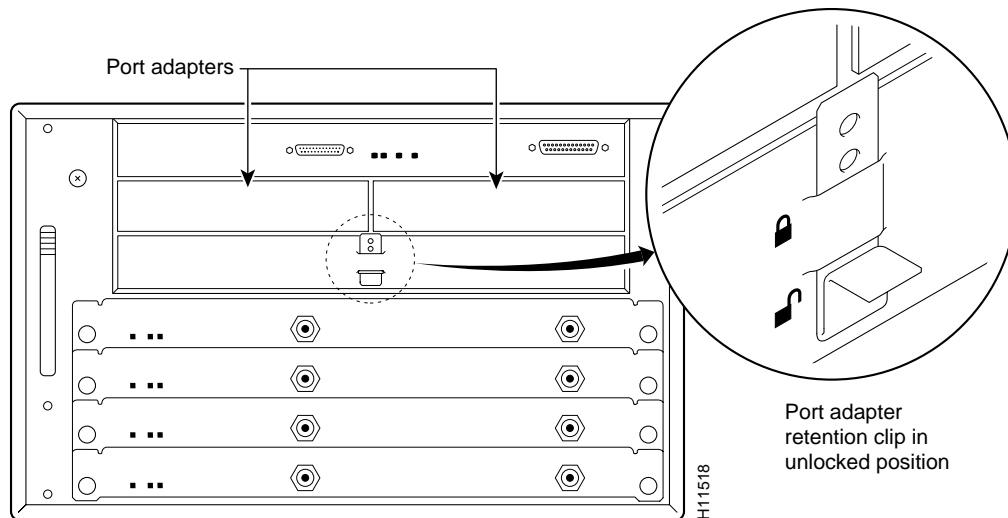
When a port adapter slot is not in use, blank port adapters must fill empty slots to allow the router to conform to EMI emissions requirements and to allow proper airflow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove the blank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

Removing a Port Adapter

Following is the procedure for removing a port adapter from a Cisco uBR7200 series router:

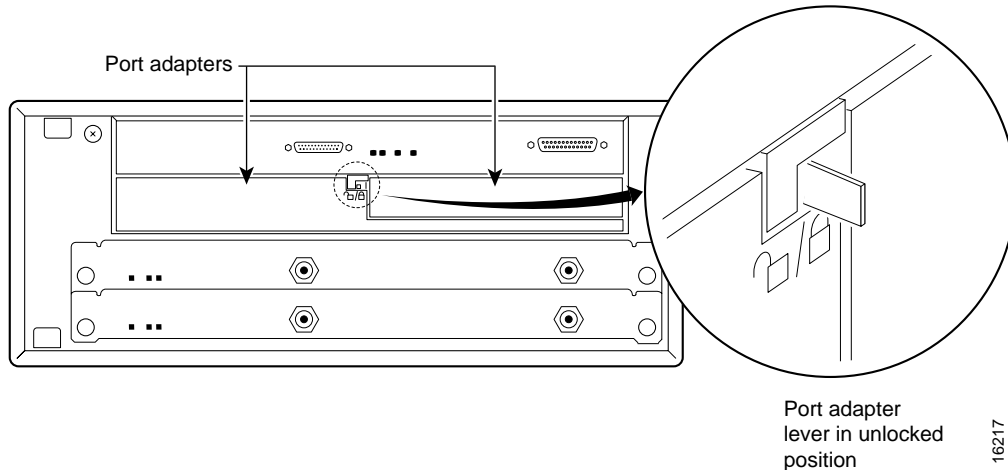
- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
- Step 2** Place the port adapter retention clips or levers in the unlocked position:
- For a Cisco uBR7246, place the port adapter retention clip for the desired port adapter slot in the unlocked position. The retention clip remains in the unlocked position. (See Figure 6-2.)

Figure 6-2 Placing the Port Adapter Retention Clip in the Unlocked Position—Cisco uBR7246



- For a Cisco uBR7223, place the port adapter lever in the unlocked position. (See Figure 6-3.)

Figure 6-3 Placing the Port Adapter Lever in the Unlocked Position—Cisco uBR7223



Step 3 Grasp the handle on the port adapter and pull the port adapter from the router midplane, 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.

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

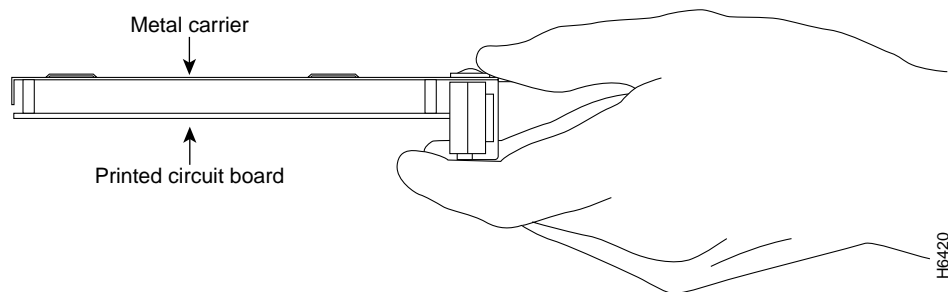
Step 4 With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

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. (See Figure 6-4.)

Figure 6-4 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.

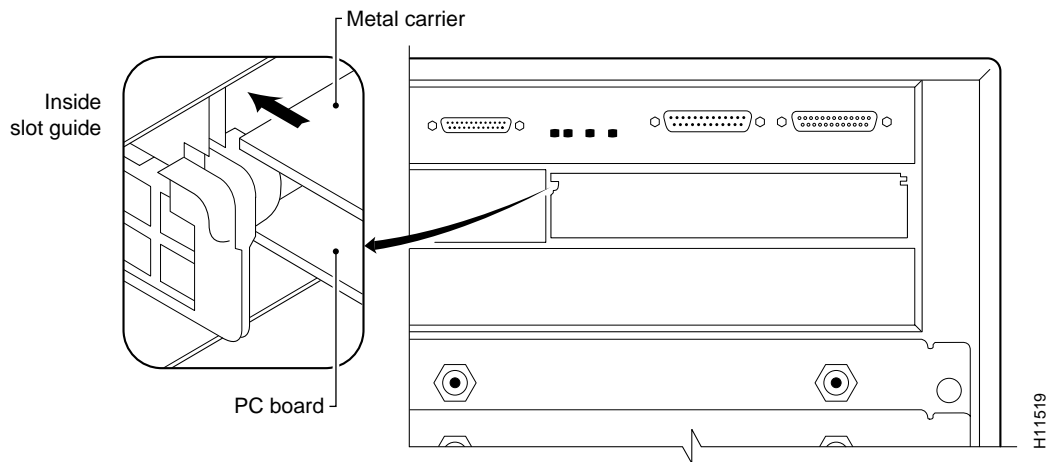
This completes the procedure for removing a port adapter from a Cisco uBR7200 series router.

Installing a Port Adapter

Following is the procedure for installing a new port adapter in a Cisco uBR7200 series router:

- Step 1** Attach an ESD-preventive 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. (See Figure 6-4.)
- Step 3** Align the left and the right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 6-5.)

Figure 6-5 Aligning the Port Adapter Metal Carrier Between the Slot Guides



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

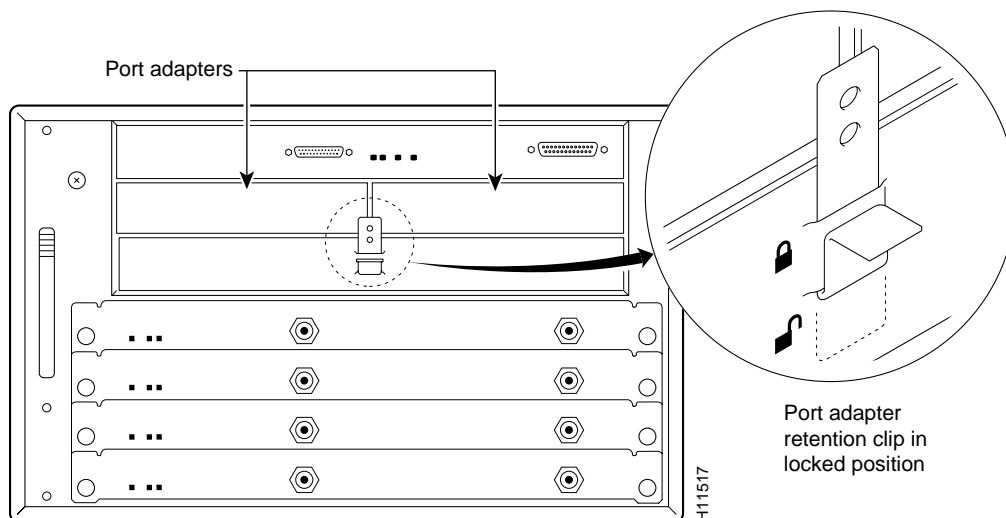


Caution Do not slide the port adapter all the way into the slot until you have connected all required cables. Trying to do so disrupts normal operation of the router.

- Step 5** With the port adapter halfway in the slot, connect all required cables to the port adapter.
- Step 6** After connecting the cables, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane.
- Step 7** Place the port adapter retention clips or levers in the locked position:
 - For a Cisco uBR7246, slide the port adapter retention clip up to the locked position. (See Figure 6-6).

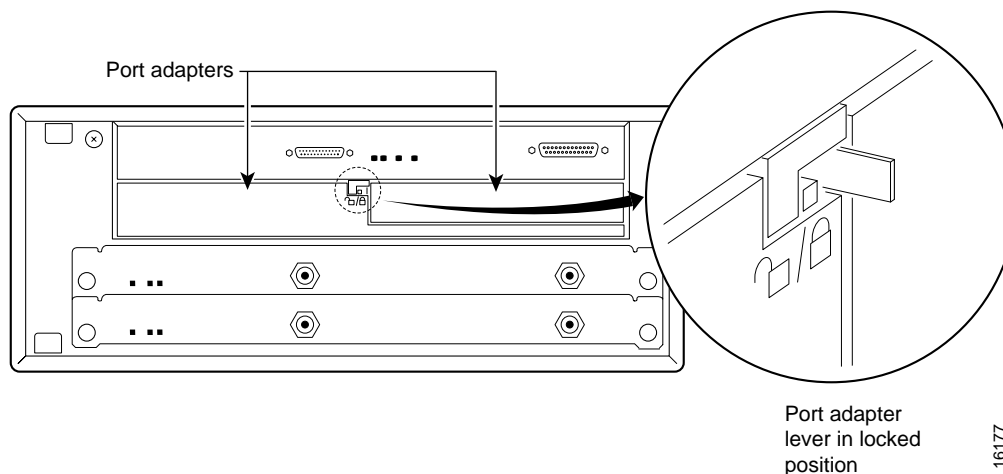
Note If the retention clip does not slide up to the locked position, the port adapter is not completely seated in the midplane. Carefully pull the port adapter halfway out of the slot, reinsert it, and slide the retention clip up to the locked position.

Figure 6-6 Placing the Port Adapter Retention Clip in the Locked Position—Cisco uBR7246 Shown



- For a Cisco uBR7223, place the port adapter lever in the locked position. (See Figure 6-7.)

Figure 6-7 Placing the Port Adapter Lever in the Locked Position—Cisco uBR7223 Shown



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

This completes the procedure for installing a port adapter in a Cisco uBR7200 series router. Proceed to Chapter 8, “Configuring the PA-T3 Interfaces,” for information on how to configure your port adapter interfaces.

Configuring the PA-T3 Interfaces

To continue your PA-T3 port adapter installation, you must configure the PA-T3 interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms are noted. This chapter contains the following sections:

- Using the EXEC Command Interpreter, page 8-2
- Identifying Port Adapter Slot and T3 Interface Port Numbers, page 8-2
- Shutting Down an Interface, page 8-7
- Performing a Basic Configuration, page 8-10
- Configuration Example, page 8-11
- Customizing the PA-T3 Serial Port Adapter, page 8-12
- Configuring Cyclic Redundancy Checks, page 8-13
- Checking the Configuration, page 8-14

If you installed a new PA-T3 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 PA-T3 port adapter that was previously configured, the system recognizes the new PA-T3 port adapter interfaces and brings each of them up in their existing configuration.

After you verify that the new PA-T3 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 need, such as the following:

- Protocols you plan to route on each new interface
- IP addresses if you will configure the interfaces for IP routing
- Use of bridging on the new interfaces
- Timing source for each new interface and clock speeds for external timing

For a summary of the configuration options available and instructions for configuring interfaces on the PA-T3 port adapter, refer to the appropriate configuration publications listed in the “Related Documentation” section on page vi.

Configuration commands are executed from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain access. (See the “Using the EXEC Command Interpreter” section on page 8-2 for an explanation of the privileged level of the EXEC.)

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 is 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#
```

Proceed to the following sections to configure the new interfaces.

Identifying Port Adapter Slot and T3 Interface Port Numbers

This section describes how to identify port adapter slot and PA-T3 interface port numbers for the Cisco 7200 series routers, the Cisco uBR7200 series routers, the VIP2, and the Catalyst RSM/VIP2.

Cisco 7200 Series and Cisco uBR7200 Series Ports

Physical port addresses specify the actual physical location of each interface port on a Cisco 7200 series router (see Figure 8-1) or a Cisco uBR7200 series router (see Figure 8-2). 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 PA-T3 serial port adapter is installed.
- The second number identifies the interface port on each PA-T3 serial port adapter; the interface port is always numbered as interface 0 for the one-port PA-T3 serial port adapter and 0 or 1 for a two-port PA-2T3 serial port adapter.

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

In Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204 and Cisco 7204VXR, and slot 6 for the Cisco 7206 and Cisco 7206VXR. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present. Figure 8-1 shows the port adapter slots and interface ports of a Cisco 7206. The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

Note The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

For example, the serial port on a one-port PA-T3 serial port adapter in port adapter slot 3 has the address 3/0. (See Figure 8-1.) If the PA-T3 serial port adapter is in port adapter slot 1, this same interface port is numbered 1/0. The serial ports on a two-port PA-2T3 serial port adapter in port adapter slot 3 has the address 3/0 and 3/1.

Note The PA-T3 serial port adapter is considered a high-bandwidth port adapter; you must observe specific configuration guidelines. Refer to the publication *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*, which shipped with your Cisco 7200 series chassis and is also available on the Cisco Connection Documentation, Enterprise Series CD-ROM.

Figure 8-1 Serial Port Number Example—Cisco 7206

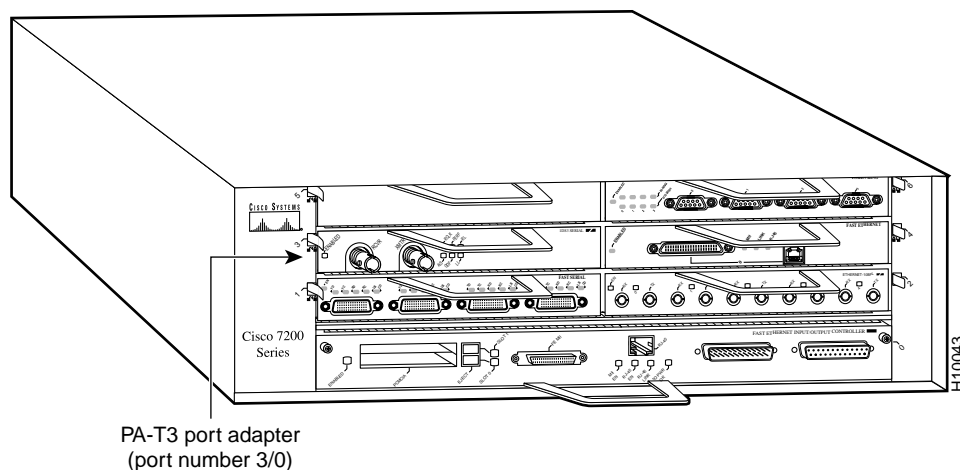
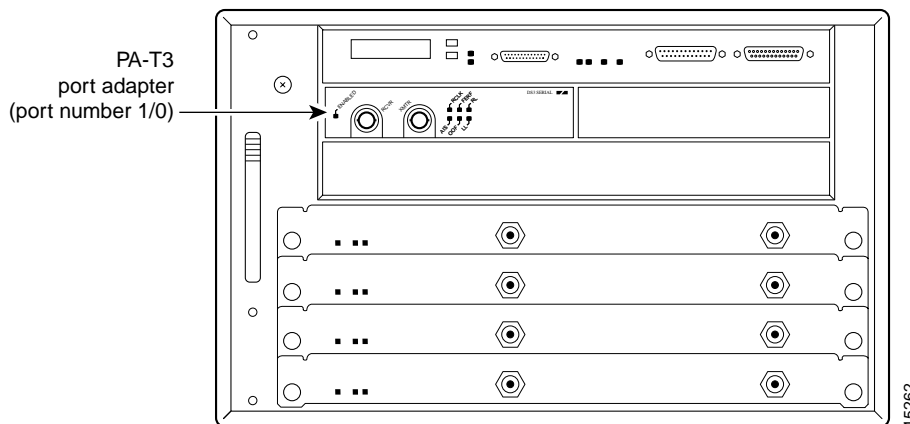


Figure 8-2 shows the interface ports of a PA-T3 port adapter in slot 2 of a Cisco uBR7200 series router. The port adapter slots are numbered slot 1 and slot 2 for the Cisco uBR7246 and slot 1 for the Cisco uBR7223 (slot 0 is always reserved for the Fast Ethernet port on the I/O controller—if present). The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter. Port adapters can occupy any port adapter slot; there are no restrictions.

For example, the serial port on a one-port PA-T3 serial port adapter in port adapter slot 1 has the address 1/0. (See Figure 8-2.) If the PA-T3 serial port adapter is in port adapter slot 2, this same interface port is numbered 2/0. The serial ports on a two-port PA-2T3 serial port adapter in port adapter slot 2 have the address 2/0 and 2/1.

Figure 8-2 PA-T3 Interface Port Address Example—Cisco uBR7246



You can identify interface ports by physically checking the port adapter slot number/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.

VIP2 Ports

This section describes how to identify chassis slot, port adapter, and T3 interface port numbers on the VIP2.

Note Although the processor slots in the 7-slot Cisco 7000 and Cisco 7507 and 13-slot Cisco 7513 are vertically oriented and those in the 5-slot Cisco 7010 and 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 8-3.) Each address is composed of a three-part number in the format *chassis slot/port adapter/interface port*, as follows:

- The first number identifies the chassis slot in which the VIP2 is installed (as shown in the sample system in Figure 8-3).
- The second number identifies the physical port adapter slot on the VIP2, and is either 0 or 1.
- The third number identifies the interface port on each PA-T3 serial port adapter, which is always numbered as interface 0 for the one-port PA-T3 serial port adapter and 0 or 1 for the two-port PA-T3 serial port adapter.

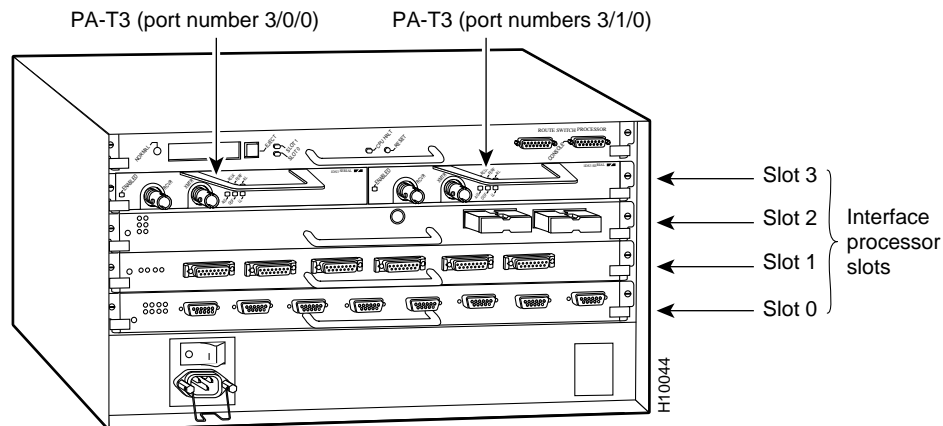
Interface ports on the VIP2 maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP2 to a different slot, the first number in the address changes to reflect the new chassis slot number.

Figure 8-3 shows the port adapter slots and interface ports of a sample Cisco 7505 system. On the VIP2, 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 serial port on a one-port PA-T3 serial port adapter in the first port adapter slot in chassis slot 3, is numbered 3/0/0. (See Figure 8-3.) If the PA-T3 serial port adapter is in port adapter slot 1, this same port is numbered 3/1/0. The serial ports on a two-port PA-T3 serial port adapter in the first port adapter slot in chassis slot 3 are numbered 3/0/0 and 3/0/1.

Port adapters can occupy either port adapter slot; there are no restrictions.

Figure 8-3 Serial 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 **show** commands to display information about a specific interface or all interfaces in the router.

Catalyst RSM/VIP2 Ports

This section describes how to identify the port adapter and T3 interface port numbers on the Catalyst RSM/VIP2.

In the Catalyst RSM/VIP2, physical port addresses specify the actual physical location of each interface port. Each address is composed of a two-part number in the format *port adapter/interface port*, as follows:

- The first number identifies the physical port adapter slot on the Catalyst RSM/VIP2, and is either 0 or 1.
- The second number identifies the interface port on each PA-T3 serial port adapter, which is always numbered as interface 0 for the one-port PA-T3 serial port adapter and 0 or 1 for the two-port PA-T3 serial port adapter.

Figure 8-4 shows the port adapter slots and interface ports of a sample Catalyst 5509 switch. On the Catalyst RSM/VIP2, 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 serial port on a one-port PA-T3 serial port adapter in the first port adapter slot is numbered 0/0. (See Figure 8-4.) If the PA-T3 serial port adapter is in port adapter slot 1, this same port is numbered 1/0. The serial ports on a two-port PA-T3 serial port adapter in the first port adapter slot are numbered 0/0 and 0/1.

Port adapters can occupy either port adapter slot; there are no restrictions.

Figure 8-4 PA-T3 Serial Port Adapter in the Catalyst 5509

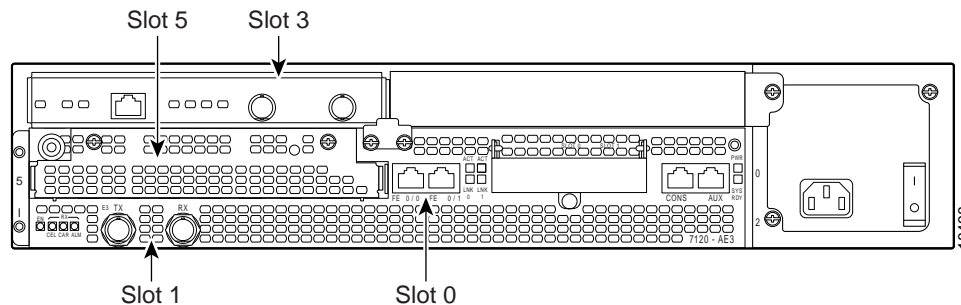
You can identify interface ports by physically checking the port-adapter/interface port location by using **show** commands to display information about a specific interface or all interfaces in the router.

Cisco 7100 Series Ports

In the Cisco 7100 series routers, the *slot number* is the location in the chassis where the interface resides and the *port number* is the physical port. Interfaces in the Cisco IOS software are identified by a type, slot number, and port number. For example, serial 3/1 indicates port 1 on the serial port adapter in slot 3.

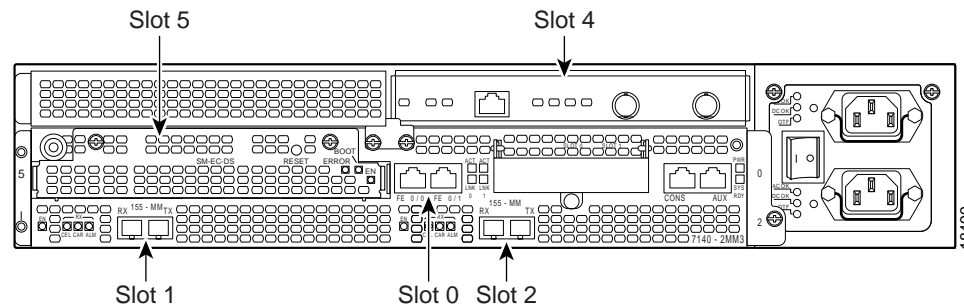
Slots in the Cisco 7120 series routers are numbered as shown in Figure 8-5. The fixed LAN interface is slot 0, the fixed WAN interface is slot 1, and the modular port adapter interface is slot 3. In the Cisco 7120 series routers, slots 2 and 4 are not used. Slot 5 is the service module.

Figure 8-5 Port Adapter Slot Numbering—Cisco 7120 Series



Slots in the Cisco 7140 series routers are numbered as shown in Figure 8-6. The fixed LAN interface is slot 0, the fixed WAN interfaces are slots 1 and 2, and the modular port adapter interface is slot 4. Slot 3 is not used. Slot 5 is the service adapter.

Figure 8-6 Port Adapter Slot Numbering—Cisco 7140 Series



Shutting Down an Interface

Before you remove an interface that you will not replace, replace a compact serial 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 interface processor. 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 8-2 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 Ctrl-Z.
Router(config)#
```

Step 3 Specify the slot/port address of the first interface that you want shut down by entering the subcommand interface as described in .

Table 8-1 Interface Subcommand Syntax

Platform	Command	Example
Cisco 7200 series or Cisco uBR7200	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (port adapter slot number/0)	Router(config)# interface serial 1/0
VIP2	interface , followed by the <i>type (serial)</i> and <i>slot/port</i> (interface processor slot number/0)	Router(config)# interface serial 1/1/0
Catalyst RSM/VIP2	interface , followed by the <i>type (serial)</i> and <i>port adapter slot number/interface port number</i> (port adapter slot number/0)	Router(config)# interface serial 0/0

Table 8-1 Interface Subcommand Syntax (continued)

Platform	Command	Example
Cisco 7120	interface , followed by the <i>type (serial)</i> and <i>port adapter number/interface port number</i>	Router(config)# interface serial 3/0
Cisco 7140	interface , followed by the <i>type (serial)</i> and <i>port adapter number/interface port number</i>	Router(config)# interface serial 4/0

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

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

Step 5 To shut down additional interfaces, enter the slot/port address (or slot/port address/interface port for a VIP2) of each additional interface followed by the **shutdown** command. When you have entered all the interfaces to be shut down, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter prompt.

The example that follows is for the Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series routers:

```
Router(config-if)# interface serial 1/0
Router(config-if)# shutdown
Router(config-if)# interface serial 1/1
Router(config-if)# shutdown
Ctrl-Z
Router#
```

The example that follows is for a VIP2:

```
Router(config-if)# interface serial 1/1/0
Router(config-if)# shutdown
Router(config-if)# interface serial 1/1/1
Router(config-if)# shutdown
Ctrl-Z
Router#
```

The example that follows is for a Catalyst RSM/VIP2:

```
Router(config-if)# interface serial 1/0
Router(config-if)# shutdown
Router(config-if)# interface serial 1/1
Router(config-if)# shutdown
Ctrl-Z
Router#
```

Step 6 Write the new configuration to memory as follows:

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

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

Step 7 Verify that new interfaces are now in the correct state (shutdown). To do so on the Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series routers, use the **show interfaces serial slot/port** command to display the specific interface, or use the **show interfaces** command, without variables, to display the status of all interfaces in the system.

The example that follows is for Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series routers:

```
Router# show interfaces serial 1/0

Serial 1/0 is administratively down, line protocol is down
Hardware is M1T-T3 pa
[display text omitted]
```

To verify that new interfaces are now in the correct state (shutdown) on a VIP2, use the **show interfaces serial slot/port adapter/interface** command to display the specific interface, or use the **show interfaces** command, without variables, to display the status of all interfaces in the system.

The example that follows is for a VIP2:

```
Router# show interfaces serial 1/1/0

Serial 1/1/0 is administratively down, line protocol is down
Hardware is cyBus PODS3 Serial
[display text omitted]
```

To verify that new interfaces are now in the correct state (shutdown) on a Catalyst RSM/VIP2, use the **show interfaces serial port adapter/interface** command to display the specific interface, or use the **show interfaces** command, without variables, to display the status of all interfaces in the system.

The example that follows is for a Catalyst RSM/VIP2:

```
Router# show interfaces serial 1/0

Serial 1/0 is administratively down, line protocol is down
Hardware is cyBus PODS3 Serial
[display text omitted]
```

- Step 8** Reenable the interfaces. To do so, repeat the previous steps, but use the **no shutdown** command in Step 4, and then write the new configuration to memory as follows.

The example that follows is for the Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series routers:

```
Router(config)# interface serial 1/0
Router(config-if)# no shutdown
Ctrl-Z
Router#

Router# copy running-config startup-config
[OK]
Router# show interfaces serial 1/0
Serial 1/0 is up, line protocol is up
Hardware is M1T-T3 pa
[display text omitted]
```

The example that follows is for a VIP2:

```
Router(config)# interface serial 1/1/0
Router(config-if)# no shutdown
Ctrl-Z
Router#

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

Serial 1/1/0 is up, line protocol is up
  Hardware is M1T-T3 pa
  [display text omitted]
```

The example that follows is for a Catalyst RSM/VIP2:

```
Router(config)# interface serial 1/0
Router(config-if)# no shutdown
Ctrl-Z
Router#

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

Serial 1/0 is up, line protocol is up
  Hardware is M1T-T3 pa
  [display text omitted]
```

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

Performing a Basic Configuration

The following steps make up a basic interface configuration for the PA-T3 serial port adapter. 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:

```
router# disable

router>
```

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

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

Step 2 Specify the interface to configure:

- For a Cisco 7200 series, Cisco 7100 series, or Cisco uBR7200 series router, specify the interface to configure by entering the subcommand **interface serial** followed by the *slot/port* (port adapter slot number and interface port number). The example that follows is for the interface of the port adapter in slot 3:

```
router(config)# interface serial 3/0
```

- For a VIP2, specify the interface to configure by entering the subcommand **interface serial**, followed by the *slot/port-adapter/port* (interface processor slot number, port adapter slot number, and interface port number). The example that follows is for the interface of the first port adapter on a VIP2 in interface processor slot 1:

```
router(config)# interface serial 1/0/0
```

- For a Catalyst RSM/VIP2, specify the interface to configure by entering the subcommand **interface serial**, followed by the *port-adapter/port* (port adapter slot number and interface port number). The example that follows is for the interface of the first port adapter on a Catalyst RSM/VIP2 in slot 0:

```
router(config)# interface serial 0/0
```

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

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

- Step 4** In interface configuration mode, choose the internal clock source by entering the **clock source** configuration subcommand, as in the following example:

```
router(config-if)# clock source internal
```

Use the **no** form of this command to restore the default clock source, which is line.

- Step 5** In interface configuration mode, change the shutdown state to up and enable the interface as follows:

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

- Step 6** Configure additional interfaces as required.

- Step 7** When you have included all of the configuration subcommands to complete the configuration, press **Ctrl-Z** to exit configuration mode.

- Step 8** Write the new configuration to nonvolatile memory as follows:

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

To check the interface configuration using **show** commands, proceed to the section “Using show Commands to Display Interface and System Information” section on page 8-15.

Configuration Example

The following example shows a typical configuration for the PA-T3 serial port adapter on a Cisco 7500 series router:

```
router> enable
router# configure terminal
router(config)# interface serial
router(config)# interface serial 1/0/0
router(config)# ip address 10.0.0.0 10.255.255.255
router(config-if)# clock source internal
router(config-if)# no shutdown
router(config-if)# ^Z
```

Customizing the PA-T3 Serial Port Adapter

You can customize the PA-T3 serial port adapter. The features you can customize have default values that probably suit your environment and do not require change. However, you might need to enter configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. Perform the tasks in the following sections if you need to customize the PA-T3 serial port adapter.

Setting the Bandwidth

In interface configuration mode, reduce effective bandwidth (range of 22 to 44210 kbps) by entering the **dsu bandwidth** configuration subcommand, as in the following example:

```
router(config-if)# dsu bandwidth 16000
```

Use the **no** form of this command to return to the default, which is 44210.

Note The local port configuration must match the remote port configuration. For example, if you reduce the effective bandwidth to 16000 on the local port, you must do the same on the remote port.

Defining the DSU Mode

In interface configuration mode, define the DSU interoperability mode by entering the **dsu mode [0 | 1 | 2]** configuration subcommand, as in the following example:

```
router(config-if)# dsu mode 1
```

Use the **no** form of this command to return to the default, which is 0.

Note The local port configuration must match the remote port configuration. For example, if you define the DSU interoperability mode as 1 on the local port, you must do the same on the remote port. You need to know what type of DSU is at the remote port to find out if it interoperates with the PA-T3 port adapter. For T3 serial interfaces, specify mode 0 for connection from a T3 serial port adapter to another PA-T3 serial port adapter or a Digital Link DSU (DL3100). Specify mode 1 for connection from a PA-T3 serial port adapter to a Kentrox DSU. Specify mode 2 for connection from a PA-T3 serial port adapter to a Larscom DSU.

See the “Interoperability Guidelines for PA-T3 Serial Port Adapter DSUs” section on page 2-5 for information regarding DSU feature compatibilities.

Enabling T3 Scrambling

In interface configuration mode, enable T3 scrambling by entering the **scramble** configuration subcommand, as in the following example:

```
router(config-if)# scramble
```

Use the **no** form of this command to restore the default value, which is disabled.

Note The local port configuration must match the remote port configuration. For example, if you enable scrambling on the local port, you must do the same on the remote port.

See the “Interoperability Guidelines for PA-T3 Serial Port Adapter DSUs” section on page 2-5 for information regarding DSU feature compatibilities.

Specifying T3 Framing

In interface configuration mode, specify T3 framing by entering the **framing {c-bit | m13 | bypass}** configuration subcommand, as in the following example:

```
router(config-if)# framing c-bit
```

Use the **no** form of this command to return to the default, which is C-bit framing.

Note If you use the **bypass** option, scrambling must be set to the default, disabled; the DSU mode must be set to the default, 0; and the DSU bandwidth must be set to the default, 44210.

Setting the Cable Length

In interface configuration mode, set the cable length (range of 0 to 450 feet), as in the following example:

```
router(config-if)# cablelength 250
```

Use the **no** form of this command to return to the default, which is 10 feet.

Configuring Cyclic Redundancy Checks

The PA-T3 serial port adapter uses a 16-bit CRC by default; it also supports a 32-bit CRC.

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The sender of a data frame divides the bits in the frame message by a predetermined number to calculate a remainder or *frame check sequence* (FCS). Before sending the frame, the sender appends the FCS value to the message so that the frame contents are exactly divisible by the predetermined number. The receiver divides the frame contents by the same predetermined number that the sender used to calculate the FCS. If the result is not 0, the receiver assumes that a transmission error occurred and sends a request to the sender to resend the frame.

Note To enable 32-bit CRC on an interface, follow Steps 1 and 2 of the preceding procedure (enter configuration mode and specify the slot and port address [and the interface port number for a VIP2] of the PA-T3 serial port adapter), and then enter the command **crc 32**. Enter **Ctrl-Z** to exit from configuration mode.

For a Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series router, use the following example:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)#
router(config)# interface serial 3/0
router(config-int)# crc 32
Ctrl-z
```

For a VIP2, use the following example:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)#
router(config)# interface serial 1/0/0
router(config-if)# crc 32
Ctrl-z
```

For a Catalyst RSM/VIP2, use the following example:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)#
router(config)# interface serial 0/0
router(config-if)# crc 32
Ctrl-z
```

To disable CRC-32 and return to the default CRC-16 setting, specify the slot and port address (and the interface port number for a VIP2) and use the **no crc 32** command. For complete command descriptions and instructions, refer to the related software documentation.

Note When enabling a 32-bit CRC on an interface, ensure that the remote device is also configured for a 32-bit CRC. Both the sender and the receiver must use the same CRC setting.

To check the interface configuration using **show** commands, proceed to the following 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, the **ping** command to check connectivity, and the **loopback** command to troubleshoot the physical interface.

Using show Commands to Verify Status

Use the **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 PA-T3 serial port adapter appears in the correct slot.

- Step 3** Specify one of the new interfaces:
- For Cisco 7100 series, Cisco 7200 series, and Cisco uBR7200 series routers, specify one of the new interfaces with the **show interfaces** *type port adapter 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.
 - For a VIP2, specify one of the new interfaces with the **show interfaces** *type slot/port adapter/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.
 - For a Catalyst RSM/VIP2, specify one of the new interfaces with the **show interfaces** *port adapter/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** Specify the new serial interface:
- For Cisco 7100 series, Cisco 7200 series, Cisco uBR7200 series routers, specify the new serial interface with the **show controllers serial** *port adapter slot number/interface port number* command, and verify that the first line of the display specifies the interface with the correct slot number.
 - For a VIP2, specify information that is specific to the new serial interface with the **show controllers serial** *slot/port adapter/interface* command, and verify that the first line of the display specifies the interface with the correct slot number.
 - For a Catalyst RSM/VIP2, specify information that is specific to the new serial interface with the **show controllers serial** *port adapter/interface* command, and verify that the first line of the display specifies the interface with the correct slot number.
- Step 5** Display the protocols configured for the entire system and for the specific interfaces with the **show protocols** command. If necessary, return to configuration mode to add or remove protocol routing on the system or on specific interfaces.
- Step 6** 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, ask a service representative for assistance.

Using show Commands to Display Interface and System Information

For a Cisco 7100 series, Cisco 7200 series, or Cisco uBR7200 series router, 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]*.

The following example of the **show interfaces type slot/port** command shows all of the information specific to the serial PA-T3 port (interface port 0) in port adapter slot 2:

```
router# show interfaces serial 2/0

Serial2/0 is up, line protocol is up
Hardware is MLT-T3 pa
MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive not set
Last input 00:00:01, output 00:00:03, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/64/0 (size/threshold/drops)
  Conversations 0/1 (active/max active)
  Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 18958 packets input, 4172738 bytes, 0 no buffer
  Received 5073 broadcasts, 0 runts, 0 giants
    0 parity
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 18294 packets output, 4552579 bytes, 0 underruns
  0 output errors, 0 applique, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions
rxLOS inactive, rxLOF inactive, rxAIS inactive
txAIS inactive, rxRAI inactive, txRAI inactive

router#
```

For a VIP2, 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 this example, a one-port PA-T3 serial port adapter-configured VIP2 is in chassis slot 10, in port adapter slot 0.

```
router# show interfaces serial 10/0/0

Serial10/0/0 is up, line protocol is up
Hardware is cyBus PODS3 Serial
MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive not set
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 14771 packets input, 3032919 bytes, 0 no buffer
  Received 2664 broadcasts, 0 runts, 0 giants
    0 parity
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 15775 packets output, 2808513 bytes, 0 underruns
  0 output errors, 0 applique, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions
rxLOS inactive, rxLOF inactive, rxAIS inactive
txAIS inactive, rxRAI inactive, txRAI inactive

router#
```

For a Catalyst RSM/VIP2, the **show interfaces port-adapter/port** command displays status information for the interfaces you specify. In this example, a one-port PA-T3 serial port adapter-configured Catalyst RSM/VIP2 is in port adapter slot 0.

```
router# show interfaces serial 0/0
Serial0/0 is up, line protocol is up
Hardware is cyBus PODS3 Serial
MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive not set
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  14771 packets input, 3032919 bytes, 0 no buffer
  Received 2664 broadcasts, 0 runts, 0 giants
    0 parity
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  15775 packets output, 2808513 bytes, 0 underruns
  0 output errors, 0 applique, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions
  rxLOS inactive, rxLOF inactive, rxAIS inactive
  txAIS inactive, rxRAI inactive, txRAI inactive
router#
```

For Cisco 7100 series, Cisco 7200 series, and Cisco uBR7200 series routers, use the **show controllers** command to display all the current interface processors and their interfaces. Following is an example of the **show controllers** command that shows serial port 2/0 on a one-port PA-T3 serial port adapter installed in chassis slot 2 for a Cisco 7200 series router:

```
router# show controllers 2/0

M1T-Serial: show controller:
PAS unit 0, subunit 0, f/w version 1-23, rev ID 0x1, version 2
idb = 0x608PA-T3340, ds = 0x608E50C0, ssb=0x608E5A84
Clock mux=0x35, ucmd_ctrl=0x8, port_status=0x25
maxdgram=4474, bufpool=64Kb, 128 particles
      TM=down CA=up LC=down
line state: up
Serial DTE cable
```

(Additional display text omitted from this example.)

For Cisco 7100 series, Cisco 7200 series, Cisco uBR7200 series routers, use the **show controllers serial** command, using arguments such as the slot and port number (slot/port), to display information that is specific to the serial interface hardware. Following is an example of the **show controllers serial slot/port** command that shows the serial port adapter installed on a Cisco 7200 series router in chassis slot 3:

```
router# show controllers serial 3/0

M1T-T3 pa: show controller:
PAS unit 0, subunit 0, f/w version 2-55, rev ID 0x2800001, version 2
idb = 0x60C03278, ds = 0x60C07704, ssb=0x60C05298
Clock mux=0x30, ucmd_ctrl=0x0, port_status=0x0
Serial config=0x8, line config=0x1B0202
maxdgram=4480, bufpool=128Kb, 256 particles

  rxLOS active, rxLOF inactive, rxAIS inactive
  txAIS active, rxRAI inactive, txRAI active
```

```
line state: down
PA-T3 DTE cable, received clockrate 1582

base0 registers=0x3F000000, base1 registers=0x3F002000
mxt_ds=0x60CD2308, rx ring entries=128, tx ring entries=256
rxring=0x4B0AB940, rxr shadow=0x60CB06E4, rx_head=95
txring=0x4B0ABE20, txr shadow=0x60CB12C0, tx_head=0, tx_tail=0,
tx_count=0
throttled=0, enabled=0, disabled=0, halted=0
rx_no_eop_err=3231, rx_no_stp_err=0, rx_no_eop_stp_err=0
rx_no_buf=0, rx_soft_overrun_err=0, dump_err= 3465869
tx_underrun_err=1, tx_soft_underrun_err=0, tx_limited=1
tx_fullring=0, tx_started=121324
    Framing is c-bit, Clock Source is Line, Bandwidth limit is 44210.,
DSU mode 0 Cable length is 50
    Data in current interval (407 seconds elapsed):
        406 Line Code Violations, 0 P-bit Coding Violation
        0 C-bit Coding Violation
        0 P-bit Err Secs, 0 P-bit Severely Err Secs
        0 Severely Err Framing Secs, 0 Unavailable Secs
        408 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs
    Total Data (last 24 hours)
        86400 Line Code Violations, 0 P-bit Coding Violation,
        0 C-bit Coding Violation,
        0 P-bit Err Secs, 0 P-bit Severely Err Secs,
        0 Severely Err Framing Secs, 0 Unavailable Secs,
        86400 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs

    Transmitter is sending remote alarm.

    Receiver has loss of signal.
    Last FEAC code received: LOS
    FEBE since last read: 0
    F-bit errors since last read: 24
    M-bit errors since last read: 2

PIO A: 738, PIO B: 60B, Gapper register: 1094
Framer register information:
reg 0: C0      reg 1: C5      reg 2: 0      reg 3: 27
reg 4: 5       reg 5: 8E      reg 6: 8E     reg 7: CB
reg 8: 80      reg 9: 0       reg A: 0      reg B: 0
reg C: E       reg D: 0       reg E: B8     reg F: E
reg 10: CB     reg 11: 0      reg 12: 0     reg 13: 0
reg 14: 0

router#
```

For a VIP2, use the **show controllers serial** command, using arguments such as those that specify the slot, port adapter, and port number (slot/port-adapter/port), to display information that is specific to the serial interface hardware. Following is an example of the **show controllers serial type slot/port adapter/interface** command that shows serial port 10/0/0 on a one-port PA-T3 serial port adapter installed on a VIP2 in chassis slot 0:

```
router# show controllers serial 10/0/0
Serial10/0/0 -
    Mx PA-T3(1) HW Revision 0x2, FW Revision 2.55
    Framing is c-bit, Clock Source is Line, Bandwidth limit is 44210.,
DSU mode 0 Cable length is 50
    Data in current interval (325 seconds elapsed):
        0 Line Code Violations, 0 P-bit Coding Violation
        0 C-bit Coding Violation
```

```

    0 P-bit Err Secs, 0 P-bit Severely Err Secs
    0 Severely Err Framing Secs, 0 Unavailable Secs
    0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs
    Total Data (last 24 hours)
    0 Line Code Violations, 0 P-bit Coding Violation,
    0 C-bit Coding Violation,
    0 P-bit Err Secs, 0 P-bit Severely Err Secs,
    0 Severely Err Framing Secs, 0 Unavailable Secs,
    0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs

    No alarms detected.
router#

```

For a Catalyst RSM/VIP2, use the **show controllers serial** command, using arguments such as those that specify the port adapter and port number (port-adapter/port), to display information that is specific to the serial interface hardware. Following is an example of the **show controllers serial port adapter/interface** command that shows serial port 0/0 on a one-port PA-T3 serial port adapter installed on a Catalyst RSM/VIP2:

```

router# show controllers serial 0/0
Serial0/0 -
    Mx PA-T3(1) HW Revision 0x2, FW Revision 2.55
    Framing is c-bit, Clock Source is Line, Bandwidth limit is 44210.,
DSU mode 0 Cable length is 50
    Data in current interval (325 seconds elapsed):
    0 Line Code Violations, 0 P-bit Coding Violation
    0 C-bit Coding Violation
    0 P-bit Err Secs, 0 P-bit Severely Err Secs
    0 Severely Err Framing Secs, 0 Unavailable Secs
    0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs
    Total Data (last 24 hours)
    0 Line Code Violations, 0 P-bit Coding Violation,
    0 C-bit Coding Violation,
    0 P-bit Err Secs, 0 P-bit Severely Err Secs,
    0 Severely Err Framing Secs, 0 Unavailable Secs,
    0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely
Errored Secs

    No alarms detected.
router#

```

The **show version** (or **show hardware**) command displays the configuration of the system hardware (the number of each port adapter type installed), the software version, the names and sources of configuration files, and the boot images. Following is an example of the output from the **show version** command on a Cisco 7200 series router:

```

router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Version 11.1(16)CA
Synced to mainline version: 11.1(13.5)
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Sat 06-Sep-97 02:12 by paking
Image text-base: 0x60010900, data-base: 0x60A42000

ROM: System Bootstrap, Version 11.1(5) [mkamson 5], RELEASE SOFTWARE (fc1)
ROM: 7200 Software (C7200-BOOT-M), Version 11.1(6), RELEASE SOFTWARE (fc1)

```

```
byron uptime is 22 minutes
System restarted by reload
System image file is "c7200-p-mz", booted via tftp from 10.0.0.0

cisco 7206 (NPE150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (512KB Level 2 Cache)
Last reset from power-on
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
4 Ethernet/IEEE 802.3 interfaces.
1 Serial network interface.
1 FDDI network interface.
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```

Following is an example of the **show version** command used with a Cisco 7500 series router:

```
router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Version 11.1(16)CA
Synced to mainline version: 11.1(13.5)
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Sat 06-Sep-97 02:12 by paking
Image text-base: 0x60010900, data-base: 0x60A42000

ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM SOFTWARE
ROM: GS Software, Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)

keats uptime is 22 minutes
System restarted by reload
System image file booted via tftp from 10.0.0.0

Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, 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).
Chassis Interface.
3 VIP2 controllers (1 FastEthernet)(4 Ethernet)(1 Fddi)(2 PA-T3).
4 Ethernet/IEEE 802.3 interfaces.
1 FastEthernet/IEEE 802.3 interface.
2 Serial network interfaces.
1 FDDI network interface.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```


To determine which type of port adapter is installed in your system, use the **show diag slot** command. Specific port adapter information is displayed, as shown in the following example of a one-port PA-T3 serial port adapter in chassis slot 3 on a Cisco 7200 series router:

```
router# show diag 3

Slot 3:
PA-T3 PA port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 3d19h ago
Hardware revision 0.1          Board revision UNKNOWN
Serial number 4526750          Part number 73-2616-01
Test history 0x0              RMA number 00-00-00
EEPROM format version 0
EEPROM contents (hex):
 0x20: 00 70 00 01 00 45 12 9E 49 0A 38 01 00 00 00 00
 0x30: 00 00 00 00 97 05 01 00 FF FF FF FF FF FF FF FF
```

The following example shows a one-port PA-T3 serial port adapter in chassis slot 10 on a VIP2:

```
router# show diag 10

Slot 10:
Physical slot 10, ~physical slot 0x5, logical slot 10, 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 2.4, board revision D0
Serial number: 04481599 Part number: 73-1684-03
Test history: 0x00      RMA number: 00-00-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
 0x20: 01 15 02 04 00 44 62 3F 49 06 94 03 00 00 00 00
 0x30: 68 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4      Insertion time: 0x14AC (3d19h ago)

Controller Memory Size: 32 MBytes DRAM, 2048 KBytes SRAM

PA Bay 0 Information:
PA-T3 Serial PA, 1 ports
EEPROM format version 0
HW rev 0.1, Board revision UNKNOWN
Serial number: 04526751 Part number: 73-2616-01

PA Bay 1 Information:
PA-T3 Serial PA, 1 ports
EEPROM format version 0
HW rev 0.1, Board revision UNKNOWN
Serial number: 04526749 Part number: 73-2616-01
```

The following example shows a one-port PA-T3 serial port adapter on a Catalyst RSM/VIP2:

```
router# show diag 0

Slot 0:
Physical slot 0, ~physical slot 0x5, logical slot 0, 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 2.4, board revision D0
Serial number: 04481599 Part number: 73-1684-03
Test history: 0x00 RMA number: 00-00-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
0x20: 01 15 02 04 00 44 62 3F 49 06 94 03 00 00 00 00
0x30: 68 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4 Insertion time: 0x14AC (3d19h ago)
```

Note The slot values displayed by some commands (such as **show diag** and **show controllers cbus**) are not relevant to any physical connection; you should disregard these slot values for the Catalyst RSM/VIP2.

For a VIP2, use the **show controllers cbus** command to display all of the current interface processors and their interfaces. Following is an example of the **show controllers cbus** command that shows serial port 1/0/0 on a one-port PA-T3 serial port adapter installed on a VIP2 in chassis slot 1:

```
router# show controllers cbus 1/0/0

MEMD at 40000000, 2097152 bytes (unused 4288, recarves 1, lost 0)
RawQ 48000100, ReturnQ 48000108, EventQ 48000110
BufhdrQ 48000138 (2810 items), LovltrQ 48000150 (20 items, 2016 bytes)
IpcbufQ 48000160 (32 items, 4096 bytes)
IpcbufQ_classic 48000158 (8 items, 4096 bytes)
3570 buffer headers (48002000 - 4800FF10)
pool0: 9 buffers, 256 bytes, queue 48000140
pool1: 458 buffers, 1536 bytes, queue 48000148
pool2: 229 buffers, 4512 bytes, queue 48000168
pool3: 4 buffers, 4544 bytes, queue 48000170
slot0: VIP2, hw 2.4, sw 21.40, ccb 5800FF20, cmdq 48000080, vps 8192
software loaded from system
IOS (tm) VIP Software (SVIP-DW-M), Version 11.1(16)CA
ROM Monitor version 17.0
Ethernet0/0/0, addr 00e0.f7d7.cb00 (bia 00e0.f7d7.cb00)
gfreeq 48000148, lfreeq 48000178 (1536 bytes), throttled 0
rxlo 4, rxhi 273, rxcurr 2, maxrxcurr 4
txq 48001A00, txacc 48001A02 (value 152), txlimit 152
```

```

Ethernet0/0/1, addr 00e0.f7d7.cb01 (bia 00e0.f7d7.cb01)
  gfreeq 48000148, lfreeq 48000180 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A08, txacc 48001A0A (value 0), txlimit 152
Ethernet0/0/2, addr 00e0.f7d7.cb02 (bia 00e0.f7d7.cb02)
  gfreeq 48000148, lfreeq 48000188 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A10, txacc 48001A12 (value 0), txlimit 152
Ethernet0/0/3, addr 00e0.f7d7.cb03 (bia 00e0.f7d7.cb03)
  gfreeq 48000148, lfreeq 48000190 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A18, txacc 48001A1A (value 0), txlimit 152

```

(Additional displayed text omitted from this example.)

For a Catalyst RSM/VIP2, use the **show controllers cbus** command to display all of the interfaces. Following is an example of the **show controllers cbus** command that shows serial port 0/0 on a one-port PA-T3 serial port adapter installed on a Catalyst RSM/VIP2:

```

router# show controllers cbus 0/0

MEMD at 40000000, 2097152 bytes (unused 4288, recarves 1, lost 0)
RawQ 48000100, ReturnQ 48000108, EventQ 48000110
BufhdrQ 48000138 (2810 items), LovltrQ 48000150 (20 items, 2016 bytes)
IpcbufQ 48000160 (32 items, 4096 bytes)
IpcbufQ_classic 48000158 (8 items, 4096 bytes)
3570 buffer headers (48002000 - 4800FF10)
pool0: 9 buffers, 256 bytes, queue 48000140
pool1: 458 buffers, 1536 bytes, queue 48000148
pool2: 229 buffers, 4512 bytes, queue 48000168
pool3: 4 buffers, 4544 bytes, queue 48000170
slot0: VIP2, hw 2.4, sw 21.40, ccb 5800FF20, cmdq 48000080, vps 8192
software loaded from system
IOS (tm) VIP Software (SVIP-DW-M), Version 11.1(16)CA
ROM Monitor version 17.0
Ethernet0/0, addr 00e0.f7d7.cb00 (bia 00e0.f7d7.cb00)
  gfreeq 48000148, lfreeq 48000178 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 2, maxrxcurr 4
  txq 48001A00, txacc 48001A02 (value 152), txlimit 152
Ethernet0/1, addr 00e0.f7d7.cb01 (bia 00e0.f7d7.cb01)
  gfreeq 48000148, lfreeq 48000180 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A08, txacc 48001A0A (value 0), txlimit 152
Ethernet0/2, addr 00e0.f7d7.cb02 (bia 00e0.f7d7.cb02)
  gfreeq 48000148, lfreeq 48000188 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A10, txacc 48001A12 (value 0), txlimit 152
Ethernet0/3, addr 00e0.f7d7.cb03 (bia 00e0.f7d7.cb03)
  gfreeq 48000148, lfreeq 48000190 (1536 bytes), throttled 0
  rxlo 4, rxhi 273, rxcurr 0, maxrxcurr 0
  txq 48001A18, txacc 48001A1A (value 0), txlimit 152

```

(Additional displayed text omitted from this example.)

Note The slot values displayed by some commands (such as **show diag** and **show controllers cbus**) are not relevant to any physical connection; you should disregard these slot values for the Catalyst RSM/VIP2.

For complete command descriptions and examples for the Cisco 7100 series routers, Cisco 7200 series routers, Cisco uBR7200 series routers, VIP2 and Catalyst RSM/VIP2, refer to the publications listed in the “Related Documentation” section on page vi.

Using the ping Command to Verify Network Connection

The **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. After you verify that the system has booted successfully and is operational, you can use the **ping** command to verify the status of interface ports. Refer to the publications listed in the “Related Documentation” section on page vi 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 timeout is displayed as a period (.). A series of exclamation points (!!!!) indicates a good connection; a series of periods (.....) or the message [timed out] or [failed] indicates that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 10.0.0.0:

```
router# ping 10.0.0.0 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.0.0.0, 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. Refer to the publications listed in the “Related Documentation” section on page vi for complete descriptions of interface subcommands and the available configuration options.

Using the loopback Command to Verify the Physical Interface

Use the **loopback {dte | local | network {line | payload} | remote}** command to troubleshoot the PA-T3 serial port adapter at the physical interface level. The command loops all packets from the PA-T3 interface either back to the interface or from the network back out toward the network. Use the **no** form of the command to remove the loop.

The following examples of the **loopback {dte | local | network {line | payload} | remote}** command configure loopback modes on serial port 0 of a one-port PA-T3 serial port adapter installed in chassis slot 6 of a Cisco 7200 series router:

- Set the interface into loopback data terminal equipment (DTE) mode as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 6/0
router(config-if)# loopback dte
```

Loopback DTE loops the router output data back toward the router (after the line interface unit [LIU]).

- Set the interface into local loopback mode as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 6/0  
router(config-if)# loopback local
```

Local loopback loops the router output data back toward the router at the framer.

- Set the interface into network line loopback mode as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 6/0  
router(config-if)# loopback network line
```

Network line loopback loops the data back toward the network (before the framer).

- Set the interface into network payload loopback mode as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 6/0  
router(config-if)# loopback network payload
```

Network payload loopback loops just the payload data back toward the network at the PA-T3 framer.

- Set the interface into remote loopback mode as follows:

```
Router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# interface serial 6/0  
router(config-if)# loopback remote
```

Remote loopback loops the data back toward the network (before the framer at the remote T3 device).

Note Remote loopback mode works with C-bit framing only. The other loopback modes listed above work with C-bit, M13, and bypass framing. See the “Specifying T3 Framing” section on page 8-13 for information on configuring C-bit framing.

Cisco 7100 Series and the PA-T3 Port Adapter

This chapter provides information on the PA-T3 port adapter and its use in the Cisco 7100 series routers. This chapter contains the following sections:

- Overview, page 7-1
- Removing a Port Adapter, page 7-2
- Installing a Port Adapter, page 7-3

Overview

The PA-T3 serial port adapter 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 7-1 shows port adapter slot 3 of a Cisco 7120 series router. Figure 7-2 shows port adapter slot 4 of a Cisco 7140 series router.

Figure 7-1 Cisco 7120 Series Router—Port Adapter Slot 3 Location

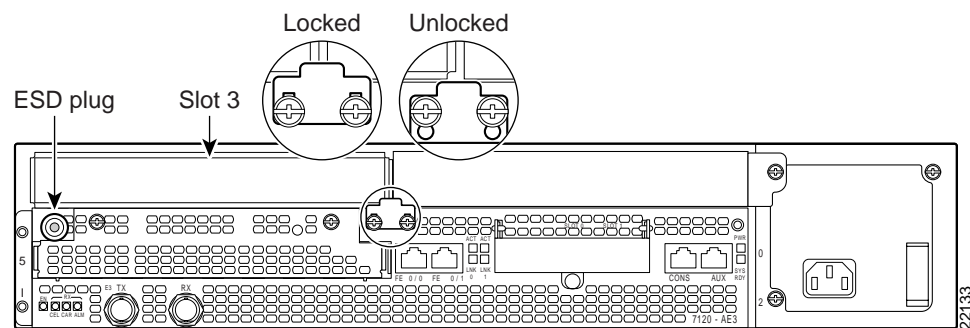
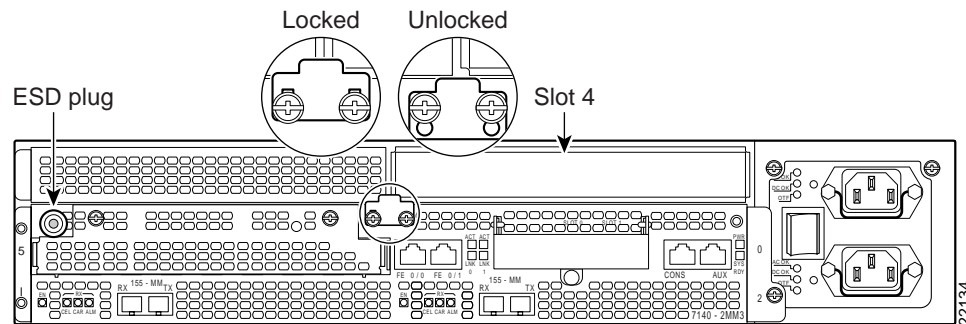


Figure 7-2 Cisco 7140 Series Router—Port Adapter Slot 4 Location



Depending on your circumstances, you might need to install a new port adapter in a Cisco 7100 series router or replace a failed port adapter in the field. All port adapters available for the Cisco 7100 series connect directly to the router and are locked into position by a locking tab with two screws (see Figure 7-1 or Figure 7-2). You need a number 2 Phillips screwdriver to loosen the screws.

Note The Cisco 7100 series routers support online insertion and removal (OIR); therefore, you do not have to power down the router when removing and replacing a 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 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 a blank port adapter.

Removing a Port Adapter

Following is the procedure for removing a port adapter from a Cisco 7100 series router:

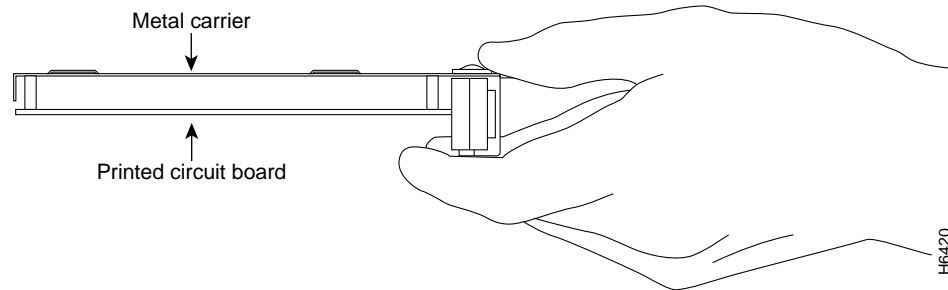
- Step 1** Attach an ESD-preventive wrist strap between you and the chassis. See Figure 7-1 or Figure 7-2 for the location of the ESD plug.
- Step 2** Use a number 2 Phillips screwdriver to loosen the screws on the locking tab; then slide the tab down to the unlocked position. (See Figure 7-1 or Figure 7-2.)
- Step 3** Grasp the handle on 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.

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

- Step 4** With the port adapter halfway 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. (See Figure 7-3.)

Figure 7-3 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.
- Step 7** Install a blank port adapter or replacement port adapter to maintain proper flow of cooling air across the internal components. For procedures on how to install a port adapter, see the next section, “Installing a Port Adapter.”

Note The blank port adapter is available from Cisco Systems as a spare. The blank port adapter product number is MAS-7100-PABLANK.

This completes the procedure for removing a port adapter from a Cisco 7100 series router.

Installing a Port Adapter

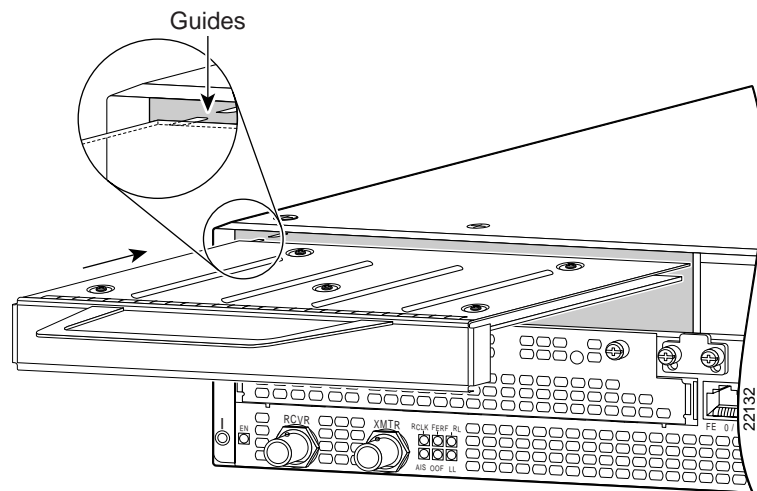
Following is the procedure for installing a new port adapter in a Cisco 7100 series router:

- Step 1** Attach an ESD-preventive wrist strap between you and the chassis. See Figure 7-1 for the location of the ESD plug.
- Step 2** Ensure that the locking tab is down in the unlocked position. If it is locked, use a number 2 Phillips to loosen the screws; then slide the tab down to the unlocked position. (See Figure 7-1 or Figure 7-2.)
- Step 3** Remove the new port adapter from its antistatic container and position it at the opening of the slot.
- Step 4** Use both hands to grasp the port adapter by its metal carrier edges, and position the port adapter so that its components face downward. (See Figure 7-3.)
- Step 5** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (See Figure 7-4.)
- Step 6** With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



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

Figure 7-4 **Aligning the Single-Width Port Adapter Between the Slot Guides**



- Step 7** With the port adapter halfway in the slot, connect all required cables to the port adapter.
- Step 8** 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.
- Step 9** After seating the port adapter in the router, slide the locking tab up to the locked position and tighten the screws. (Figure 7-1 or Figure 7-2 shows the locking tab in the locked position.)

Note If the port adapter lever is not in the locked position, the port adapter is not completely seated in the router. Carefully pull the port adapter halfway out of the slot, reinsert it, and move the port adapter lever to the locked position.

This completes the procedure for installing a new port adapter in a Cisco 7100 series router. Proceed to Chapter 8, “Configuring the PA-T3 Interfaces,” for information on configuring your port adapter interfaces.

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