



Multichannel DS1/PRI Port Adapter Installation and Configuration

Product Number: PA-MC-2T1(=), PA-MC-4T1(=), PA-MC-8T1(=), and PA-MC-8DSX1(=)
Platforms Supported: Catalyst 5000 Family Switches with RSM/VIP2, Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches, Cisco 7100 Series Routers, Cisco 7200 Series Routers, Cisco 7200 VXR Routers, Cisco uBR7200 Series Routers, Cisco 7201 Router, Cisco 7301Router, Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 Router, Cisco 7401ASR Router, and VIP in the Cisco 7000 Series and Cisco 7500 Series Routers

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Multichannel DS1/PRI Port Adapter Installation and Configuration

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Preface

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

- [Document Revision History, page vii](#)
- [Objectives, page vii](#)
- [Organization, page viii](#)
- [Related Documentation, page viii](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page xii](#)

Document Revision History

The Document Revision History table below, beginning with version OL-3525-04, records technical changes to this document.

Document Version	Date	Change Summary
OL-3525-04	April, 2007	Adds Cisco 7201 router information.

Objectives

This document describes the installation and configuration of the multichannel DS1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) single-wide port adapters (PA-MC-2T1, PA-MC-4T1, PA-MC-8T1, and PA-MC-8DSX1), which are used in the following platforms:

- Catalyst Route Switch Module (RSM)/second-generation Versatile Interface Processor (VIP2) in all Catalyst 5000 family switches
- Catalyst 6000 family FlexWAN module in the Catalyst 6000 family switches
- Cisco 7100 series routers, consisting of the Cisco 7120 series and Cisco 7140 series
- Cisco 7200 series routers and Cisco 7200 VXR routers—which consist of the two-slot Cisco 7202, the four-slot Cisco 7204 and Cisco 7204VXR, and the six-slot Cisco 7206 and Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers—which consist of the three-slot (two cable modem card slots and one port adapter slot) Cisco uBR7223, and the six-slot (four cable modem card slots and two port adapter slots) Cisco uBR7246.

- Cisco 7201 router—single slot
- Cisco 7301 router—single slot
- Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router
- Cisco 7401ASR router—single slot
- Versatile Interface Processor (VIP) in all Cisco 7500 series routers and in Cisco 7000 series routers with the Cisco 7000 Series Route Switch Processor (RSP7000) and Cisco 7000 Series Chassis Interface (RSP7000CI)



Note Not all of the multichannel DS1/PRI port adapters are supported on each platform. For a list of the port adapters supported by each platform, see [Table 1-1](#).

Organization

This document is organized into the following sections:

Section	Title	Description
Chapter 1	Overview	Describes the multichannel DS1/PRI port adapters and describes their LEDs, cables, and receptacles.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform before the actual installation.
Chapter 3	Removing and Installing Port Adapters	Describes instructions for installing the DS1/PRI in supported platforms and for connecting cables.
Chapter 4	Removing and Installing Port Adapters	Describes how to configure the DS1/PRI on the supported platforms.

Related Documentation

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

- Cisco IOS software:

For configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.



Note You can access Cisco IOS software configuration and hardware installation and maintenance documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

- Catalyst 5000 family switches with RSM/VIP2:
 - For an online directory to quickly access documents for Cisco Catalyst 5000 series switches, refer to the *Cisco Catalyst 5000 Series Switches Install and Upgrade Guides* index at the following URL:
http://www.cisco.com/en/US/products/hw/switches/ps679/prod_installation_guides_list.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Route Switch Module Catalyst VIP2-15 and VIP2-40 Installation and Configuration Note*
 - *Catalyst 5000 Series Route Switch Module Installation and Configuration Note*
 - The installation and configuration guide and quick start for your Cisco Catalyst 5000 series switch
- Catalyst 6000 family switches with FlexWAN module:
 - For an online directory to quickly access documents for Cisco Catalyst 6000 family switches, refer to the *Cisco Catalyst 6500 Series Switches Documentation Roadmaps* index at the following URL:
http://www.cisco.com/en/US/products/hw/switches/ps708/products_documentation_roadmaps_list.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Catalyst 6000 Family FlexWAN Module Installation and Configuration Note*
 - The hardware and software publications for your Catalyst 6000 family switch
- Cisco 7000 series routers:
 - For an online directory to quickly access documents for Cisco 7000 series routers, refer to the *Cisco 7000 Series Routers Introduction* index at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps332/tsd_products_support_eol_series_home.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Cisco 7000 Hardware Installation and Maintenance* for your router.
 - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
 - *Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration*
 - *Versatile Interface Processor (VIP6-80) Installation and Configuration Guide*
- Cisco 7100 series routers:
 - For an online directory to quickly access documents for Cisco 7100 series routers, refer to the *Cisco 7100 Series Documentation* roadmap at the following URL:
http://www.cisco.com/en/US/products/hw/vpndevc/ps333/products_product_index09186a00800fa142.html
 - For hardware installation and configuration information refer to the *Cisco 7100 Series VPN Router Installation and Configuration Guide*.
 - For information on setting up a Virtual Private Network, refer to the *Cisco 7100 Series VPN Configuration Guide*.

- Cisco 7200 series routers:
 - For an online directory to quickly access documents for Cisco 7200 series routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
 - For hardware installation and configuration information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the online installation and configuration guide and quick start for your Cisco 7200 series router.
 - For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
 - For information on network processing engines or network services engines, refer to the *Network Processing Engine and Network Services Engine Installation and Configuration* document.
- Cisco 7200 VXR routers:
 - For an online directory to quickly access documents for Cisco 7200 VXR routers, refer to the *Cisco 7200 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps341/products_documentation_roadmap09186a00801c0915.html
 - For hardware installation and maintenance information, refer to the *Cisco 7200 VXR Installation and Configuration Guide* or the *Cisco 7200 VXR Routers Quick Start Guide*.
- Cisco uBR7200 series routers:
 - For an online directory to quickly access documents for Cisco uBR7200 Universal Broadband routers, refer to the *Cisco uBR7200 Universal Broadband Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/cable/ps2217/products_documentation_roadmap09186a00805e0d0c.html
- Cisco 7201 router:
 - For an online directory to quickly access documents for the Cisco 7201 router, refer to the *Cisco 7201 Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/customer/products/hw/routers/ps341/products_documentation_roadmap09186a00807f635a.html
 - For hardware installation and maintenance information, refer to the *Cisco 7201 Installation and Configuration Guide* or the *Cisco 7201 Router Quick Start Guide*.
- Cisco 7301 router:
 - For an online directory to quickly access documents for the Cisco 7301 router, refer to the *Cisco 7301 Internet Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps352/products_documentation_roadmap09186a00801c0f21.html
 - For hardware installation and maintenance information, refer to the *Cisco 7301 Installation and Configuration Guide* or the *Cisco 7301 Router Quick Start Guide*.

- Cisco 7304 PCI port adapter carrier card in Cisco 7304 router:
 - For an online directory to quickly access documents for the Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7301 router, refer to the *Cisco 7304 Router Line Card, Carrier Card, Port Adapter, Modular Services Card, and Shared Port Adapter Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps352/products_documentation_roadmap09186a00801c0f5e.html
 - For hardware installation and maintenance information, refer to the *Cisco 7304 PCI Port Adapter Carrier Card Installation and Configuration Guide*.
- Cisco 7401ASR routers:
 - For an online directory to quickly access documents for the Cisco 7401ASR router, refer to the *Cisco 7401ASR Router Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps354/products_documentation_roadmap09186a00801c0fd5.html
 - For hardware installation and maintenance information, refer to the *Cisco 7401ASR Installation and Configuration Guide* or the *Cisco 7401ASR Router Quick Start Guide*.
- Cisco 7500 series routers:
 - For an online directory to quickly access documents for the Cisco 7500 series routers, refer to the *Cisco 7500 Series Routers Documentation Roadmap* at the following URL:
http://www.cisco.com/en/US/products/hw/routers/ps359/products_documentation_roadmap09186a00801c0f9b.html
 - For hardware installation and maintenance information, refer to the following documents:
 - *Cisco 7500 Series Installation and Configuration Guide* or the quick start for your Cisco 7500 series router.
 - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
 - *Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration*
 - *Versatile Interface Processor (VIP6-80) Installation and Configuration Guide*
- For international agency compliance, safety, and statutory information for WAN interfaces, refer to the following documents. Use the documentation roadmap for your particular router to link to the appropriate documents for your router:
 - *Regulatory Compliance and Safety Information for the Catalyst 5000 Family Switches*
 - *Regulatory Compliance and Safety Information for the Catalyst 6000 Family Switches*
 - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
 - *Regulatory Compliance and Safety Information for Cisco 7100 Series VPN Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco uBR7200 Series Universal Broadband Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7301 Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7304 Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7401ASR Internet Router*
 - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly What's New in Cisco Product Documentation, which also lists all new and revised technical documentation at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>



CHAPTER 1

Overview

This chapter describes the multichannel DS1/PRI port adapters and contains the following sections:

- [Port Adapter Overview, page 1-1](#)
- [Multichannel DS1/PRI Overview, page 1-3](#)
- [Features, page 1-4](#)
- [LEDs, page 1-5](#)
- [Cables and Connections, page 1-8](#)
- [Port Adapter Locations on the Supported Platforms, page 1-9](#)
- [Identifying Interface Addresses, page 1-18](#)

Port Adapter Overview

The multichannel DS1/PRI port adapters (PA-MC-2T1, PA-MC-4T1, and PA-MC-8T1) are single-width port adapters that integrate channel service unit (CSU) functionality, data service unit (DSU) functionality, and DS0 channel support into the Cisco router. The PA-MC-8DSX1 integrates DS1 data service unit (DSU) functionality and DS0 channel support into the Cisco router.

The multichannel DS1/PRI port adapter provides two, four, or eight independent T1 (100-ohm) connections using RJ-48C connectors. (See [Figure 1-1](#), [Figure 1-2](#), and [Figure 1-3](#).) Each multichannel DS1/PRI port adapter can provide up to 128 separate, full-duplex, HDLC DS0, fractional, or full T1 channels.



Note

Each port adapter has a handle attached, but this handle is not shown in this publication to allow a full view of the detail on the port adapter faceplate.

Figure 1-1 .DS1/PRI Port Adapter Front-Panel View (Two-Port Version Shown)

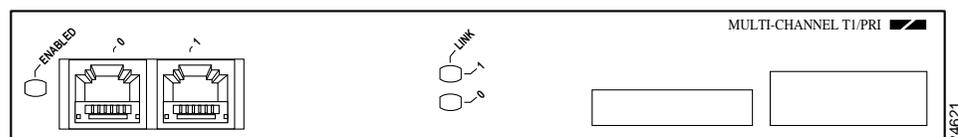


Figure 1-2 DS1/PRI Port Adapter Front-Panel View (Four-Port Version Shown)

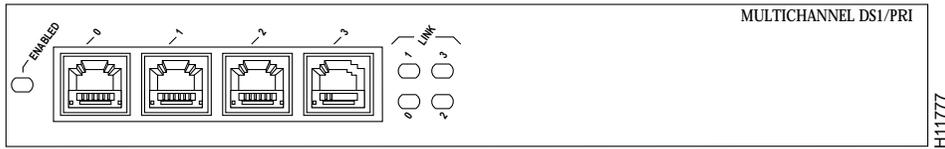
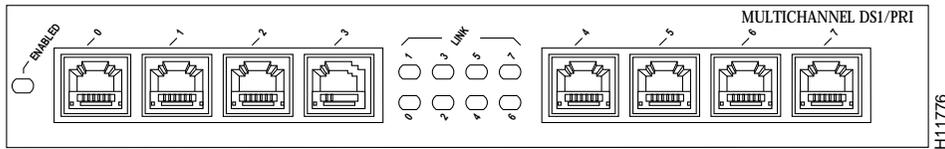


Figure 1-3 DS1/PRI Port Adapter Front-Panel View (Eight-Port Version Shown)



The following table lists the port adapters supported by each platform.

Table 1-1 Port Adapters Supported by Each Platform

Platform	Supported Port Adapters
Catalyst RSM/VIP2 in Catalyst 5000 family switches	<ul style="list-style-type: none"> • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	<ul style="list-style-type: none"> • PA-MC-4T1 • PA-MC-8T1
Cisco 7120 series router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1
Cisco 7140 series router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1
Cisco 7200 series router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1
Cisco 7201 router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1
Cisco uBR7223 router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1

Table 1-1 Port Adapters Supported by Each Platform (continued)

Platform	Supported Port Adapters
Cisco uBR7246 router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1
Cisco 7301 router	<ul style="list-style-type: none"> • PA-MC-8T1 • PA-MC-8DSX1
Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1
Cisco 7401ASR router	<ul style="list-style-type: none"> • PA-MC-8T1 • PA-MC-8DSX1
VIP in Cisco 7000 series or Cisco 7500 series routers	<ul style="list-style-type: none"> • PA-MC-2T1 • PA-MC-4T1 • PA-MC-8T1 • PA-MC-8DSX1

Multichannel DS1/PRI Overview

When you are running channelized T1, each DS1 interface can provide up to 24 T1 channel groups, which are numbered from 0 to 23. Each channel group provides up to twenty-four 64-kbps time slots (DS0 channels), which are numbered 1 to 24. Multiple time slots can be mapped to a single channel group. Each channel group is presented to the system as a serial interface that can be configured individually. Usable bandwidth for each channel group is calculated as $n \times 56$ kbps or $n \times 64$ kbps, where n is a number of DS0 time slots (1 to 24).



Note

The Catalyst 6000 family FlexWAN module does not support ISDN.

When you are running ISDN PRI, each DS1 interface provides 23 bearer (B) channels that can transmit and receive data at the rate of 64 kbps, full-duplex, and one data (D) channel that can transmit and receive data at the rate of 16 kbps, full-duplex. The B channels are used for transmitting user data. The D channel is used for call setup control and network connection teardown, and provides the communication from the router to the ISDN switch. The B and D channels are presented to the system as serial interfaces that support High-Level Data Link Control (HDLC) and Point-to-Point Protocol (PPP) encapsulation. The multichannel DS1/PRI port adapter supports dial-on-demand routing (DDR) when you are running ISDN PRI.

Each of the T1 channels on the multichannel DS1/PRI port adapter uses a portion of the T1 bandwidth (fractional T1) or the entire T1 bandwidth for data transmission. Usable bandwidth for each T1 is $n \times 64$ or $n \times 56$ kbps, where n is a number from 1 to 24. When you are not running at full T1 speeds, the unused portion of the T1 bandwidth cannot be used and is filled with idle channel data.



Note

T1 time slots on the multichannel DS1/PRI port adapter are numbered 1 to 24, instead of the zero-based scheme (0 to 23) used with other Cisco products. This numbering scheme is to ensure consistency with telco numbering schemes for T1 channels within channelized equipment.

The multichannel DS1/PRI port adapter supports facilities data link (FDL) in Extended Superframe (ESF) framing, as well as network and payload loopbacks. Bit error rate (BER) testing is supported on each of the T1 links. The BER testing is done *only* over a framed T1 signal and can be run only on one port at a time.

The multichannel DS1/PRI port adapter does *not* support the aggregation of multiple T1s (called *inverse muxing* or *bonding*) for higher bandwidth data rates. The multichannel DS1/PRI port adapter supports Cisco HDLC, Frame Relay, PPP, and Switched Multi megabit Data Service (SMDS) Data Exchange Interface (DXI) encapsulations over each T1 link. For SMDS only, DXI is sent on the T1 line, so it needs to connect to an SMDS switch that has direct DXI input.

Features

The multichannel DS1/PRI port adapter has the following features and physical characteristics:

- Transmits and receives data bidirectionally at the rate of 1.536 Mbps for each T1 port.
- The individual T1 connections on the DSX-1 version of the multichannel DS1/PRI port adapter use 100-ohm RJ-48C cables to connect to external CSUs to a Multi-channel Interface Processor (MIP) or to any other equipment that uses a DSX-1 interface.



Note

External DSX-1 channels do not provide CSU functionality and must connect to an external CSU for long-haul applications.

- Supports RFC 1406—For information on accessing Cisco MIB files, refer to the *Cisco MIB User Quick Reference*. For RFC 1406, Cisco supports all tables except the “Frac” table.
- For wide-area networking, the multichannel DS1/PRI port adapter can function as a concentrator for a remote site.



Note

The Catalyst RSM/VIP2, Catalyst 6000 family switches, Cisco 7304 PCI Port Adapter Carrier Card, and VIP in Cisco 7000 series routers and Cisco 7500 series routers support online insertion and removal (OIR), but individual port adapters do not. To replace the port adapters, you must first remove the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI Port Adapter Carrier Card, or VIP from the chassis and then replace port adapters as required. OIR is supported for port adapters in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router.

The DS1/PRI line interface unit (LIU) meets the following specifications for input jitter tolerance, pulse shape/amplitude (T1 and DSX1), line termination, and jitter transfer (see [Table 1-2](#)):

- ANSI 62411
- Bellcore TR499

Table 1-2 provides the T1 channel data rates for the multichannel DS1/PRI port adapter.

Table 1-2 T1 Channel Data Rates

DS1/PRI Channel Number	Data Rate
0 to 23	$n \times 56$ kbps up to full T1 (1.344 Mbps) or $n \times 64$ kbps up to full T1 (1.536 Mbps) ¹

1. Or any mixture of $n \times 56$ and $n \times 64$, where $2n \leq 24$

The multichannel DS1/PRI port adapter DS1/PRI ports receive and transmit at the T1 and DSX-1 level while driving and receiving from a 100-ohm shielded twisted-pair cable. This port adapter connects directly to any equipment that has T1 or DSX-1 level input/output. The DS1/PRI front end meets the following specifications:

- Line rate: 1.544 Mbps (± 32 ppm)
- Line code: AMI or B8ZS (bipolar with eight-zero substitution) on the external ports
- Impedance: 100 ohms
- Pulse shape: ANSI T1.102, pulse amplitude is between 2.4 and 3.6V peak
- Output signal: DSX-1 can drive 655 feet (199.6 meters) of 100-ohm shielded twisted-pair cable and meet DSX-1 pulse shape template at the line side

T1 versions of the multichannel DS1/PRI port adapter support all DSX-1 specifications, plus the following features:

- Selectable line build out of 0 dB, -7.5 dB, or -22.5 dB
- Selectable receiver gain between 26 dB and 36 dB
- Line protection per UL 1459/1950 and FCC part 68



Note

Up to 128 interfaces can be configured per multichannel DS1/PRI port adapter. For example, if you have an eight-port multichannel DS1/PRI port adapter with 24 channels per port (or 24×8), you have 192 interfaces—this is greater than 128, and therefore is not allowed.

LEDs

The multichannel DS1/PRI port adapter contains the ENABLED LED, standard on all port adapters, and one status LED for each port. (The LEDs are shown in Figure 1-4, Figure 1-5, and Figure 1-6.)

Figure 1-4 Two-Port Multichannel DS1/PRI Port Adapter LEDs (Horizontal Orientation Shown)

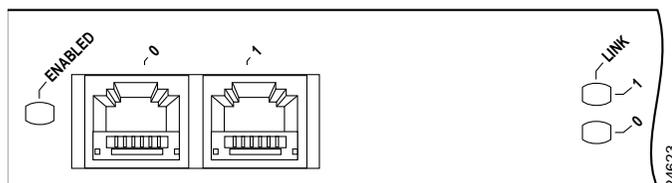


Figure 1-5 Four-Port Multichannel DS1/PRI Port Adapter LEDs (Horizontal Orientation Shown)

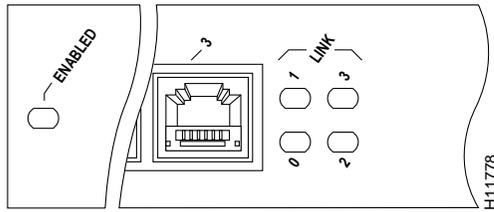
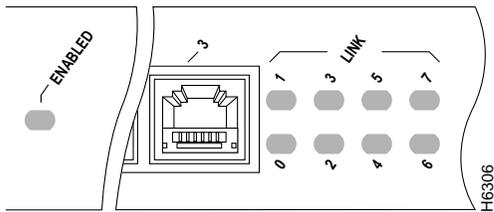


Figure 1-6 Eight-Port Multichannel DS1/PRI Port Adapter LEDs (Horizontal Orientation Shown)



After system initialization, the ENABLED LED goes on, indicating that the multichannel DS1/PRI port adapter has been enabled for operation. The console screen also displays a message as the system discovers each interface during its re initialization.

The following conditions must be met before the multichannel DS1/PRI port adapter is enabled:

- The multichannel DS1/PRI port adapter is correctly connected to the backplane and receiving power.
- A valid version of multichannel DS1/PRI port adapter microcode is loaded and running.
- The system bus recognizes the multichannel DS1/PRI port adapter.

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

Table 1-3 lists various system states and functions that are reflected by the front-panel status LEDs on the multichannel DS1/PRI port adapter during the CPU boot process and microcode download.

Table 1-3 LEDs for Port Status

LED Color	State	Description
Yellow	On	RAM test has started.
		Waiting for download.
Green	On (flashes once)	RAM test has completed.
	On, then goes off	Download has started.
	On (flashes once, then goes off)	Download has completed.



Note

After the multichannel DS1/PRI port adapter microcode is booted, the microcode takes over control of the LEDs.

During the system bootup process and microcode download, if an error occurs, the port status LEDs flash yellow a number of times, pause, and then repeat the flashes. Count the number of flashes to determine the error. [Table 1-4](#) lists the LED error indications that might appear.

Table 1-4 *LED Error States*

Number of Yellow Flashes	Description
1	Memory tests failed.
2	PLX mailbox test failed.
3	Incomplete data on download.
4	Checksum error on download.
5	Invalid command (flashing does not repeat, but processing continues).
6	Unexpected return from downloaded operational code.
7	Processor exception has occurred.

In all of the preceding error modes, the CPU continually loops and the system does not proceed to the microcode download.

After the system successfully completes the CPU boot process and microcode download, the front-panel port status LEDs on the multichannel DS1/PRI port adapter show the various system states and functions. (See [Table 1-5](#).)

Table 1-5 *LEDs for Port Status Indications after Boot Completion*

LED Color	State	Description
Green	On	Port adapter is receiving good signal.
Yellow	On	Port adapter is in loopback mode.
None	Off	Not receiving good signal. Not in loopback mode.

Cables and Connections

The DS1/PRI interface receptacles on the multichannel DS1/PRI port adapter are RJ-48C receptacles for T1 (100-ohm). You can use all interface receptacles simultaneously.



Note

After you properly connect a port to a line, it takes approximately 30 seconds for Cisco IOS software to report that the line is up.

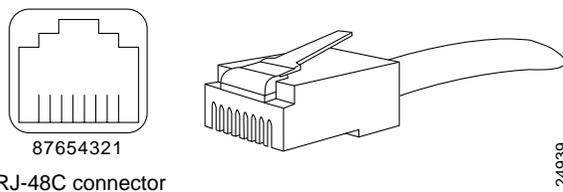
Each connection supports T1 (100-ohm) interfaces that meet T1.403 and ACCUNET TR62411 standards. The RJ-48C connection does not require an external transceiver. The DS1/PRI ports are T1 interfaces that use UTP 100-ohm shielded twisted-pair cables. [Figure 1-7](#) shows the multichannel DS1/PRI port adapter interface cable and connectors.



Note

To meet VCCI Class II EMI requirements, you must use shielded twisted-pair (STP) cables.

Figure 1-7 DS1/PRI Interface Cable and Connector



[Table 1-6](#) lists the signal pinouts and descriptions for the RJ-48C connector.

Table 1-6 100-ohm RJ-48C Connector Pinout

Pin	Signal ¹
1	RX ring
2	RX tip
3	NC
4	TX ring
5	TX tip
6	NC
7	NC
8	NC

1. TX = transmit. RX= receive.
NC = no connect.

Port Adapter Locations on the Supported Platforms

This section discusses port adapter slot locations on the supported platforms. The illustrations that follow summarize slot location conventions on each platform. This section contains the following subsections:

- [Catalyst RSM/VIP2 Slot Numbering, page 1-9](#)
- [Catalyst 6000 Family FlexWAN Module Slot Numbering, page 1-11](#)
- [Cisco 7100 Series Routers Slot Numbering, page 1-12](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering, page 1-13](#)
- [Cisco uBR7200 Series Routers Slot Numbering, page 1-14](#)
- [Cisco 7201 Router Slot Numbering, page 1-15](#)
- [Cisco 7301 Router Slot Numbering, page 1-15](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering, page 1-16](#)
- [Cisco 7401ASR Router Slot Numbering, page 1-17](#)
- [Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Slot Numbering, page 1-17](#)

Catalyst RSM/VIP2 Slot Numbering

The Catalyst RSM/VIP2 can be installed in any slot in a Catalyst 5000 family switch except the top slots, which contain the supervisor engine modules. The Catalyst RSM/VIP2 does not use interface processor slot numbering; therefore, the slots in which it is installed are not numbered. The multichannel DS1/PRI port adapter can be installed into either port adapter slot 0 or slot 1 on a Catalyst RSM/VIP2.

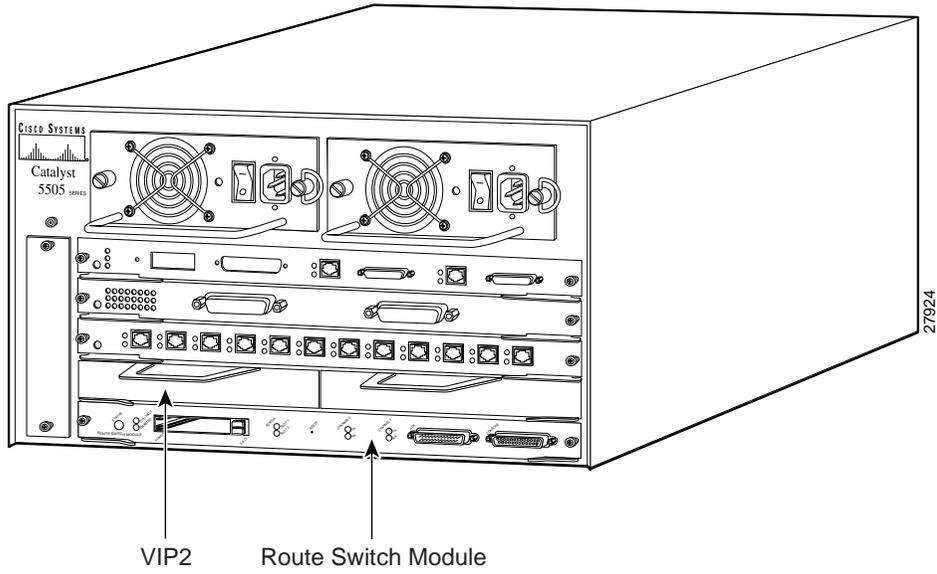
[Figure 1-8](#) shows a Catalyst RSM/VIP2 with two port adapters installed.



Note

The Catalyst 5500 switch has 13 slots. Slot 1 is reserved for the supervisor engine. If a redundant supervisor engine is used, it would go in slot 2; otherwise, slot 2 can be used for other modules. Slot 13 is a dedicated slot, reserved for the ATM switch processor (ASP) module. Refer to the *Catalyst 5000 Series Route Switch Module Installation and Configuration Note* for any additional slot restrictions for the Catalyst RSM/VIP2.

Figure 1-8 Catalyst 5000 Family Switch with Port Adapters Installed on Catalyst RSM/VIP2



Catalyst 6000 Family FlexWAN Module Slot Numbering

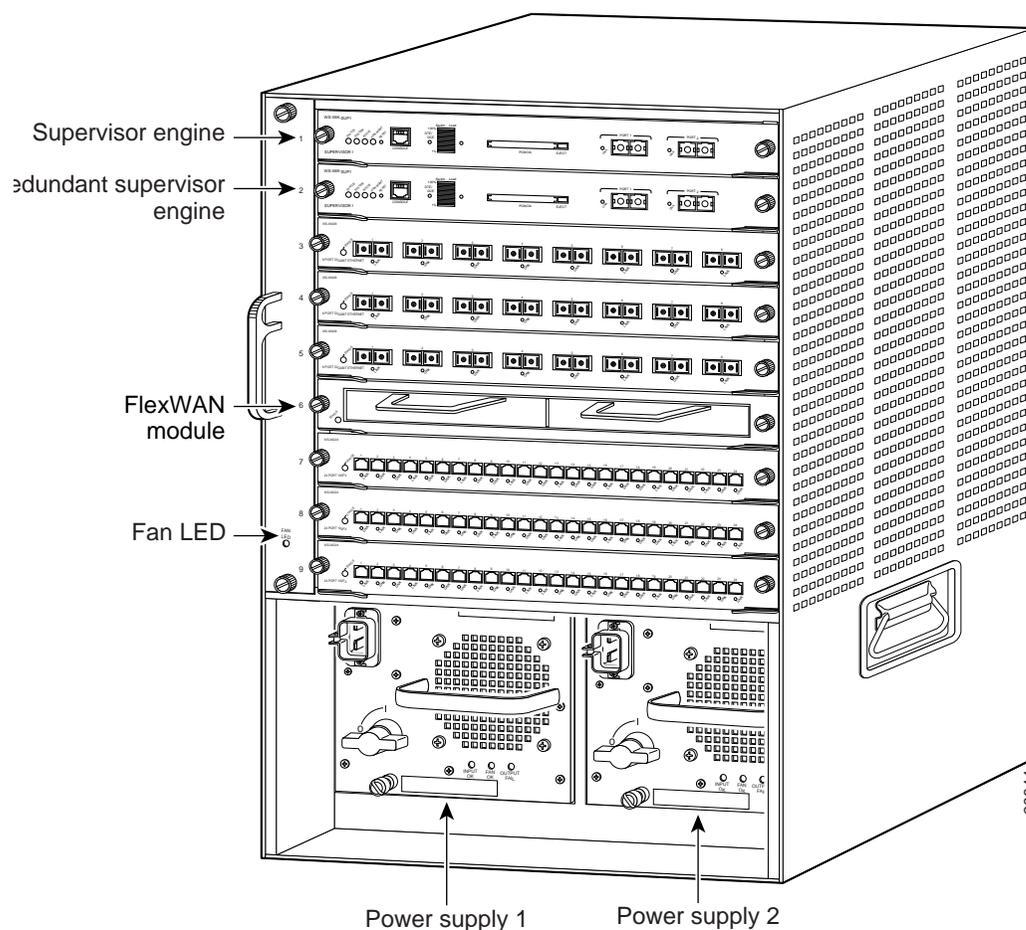
The Catalyst 6000 family FlexWAN module can be installed in any slot in a Catalyst 6000 family switch except slot 1, which is reserved for the supervisor engine. The multichannel DS1/PRI port adapter can be installed into either port adapter bay 0 or bay 1 on a FlexWAN module. [Figure 1-9](#) shows a FlexWAN module with two blank port adapters installed.



Note

Slot 1 is reserved for the supervisor engine. If a redundant supervisor engine is used, it would go in slot 2; otherwise, slot 2 can be used for other modules.

Figure 1-9 Catalyst 6000 Family Switch with Blank Port Adapters Installed on FlexWAN Module



Cisco 7100 Series Routers Slot Numbering

The multichannel DS1/PRI 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 1-10](#) shows the slot numbering on a Cisco 7120 series router. [Figure 1-11](#) shows the slot numbering on a Cisco 7140 series router.

Figure 1-10 Port Adapter Slots in the Cisco 7120 Series Router

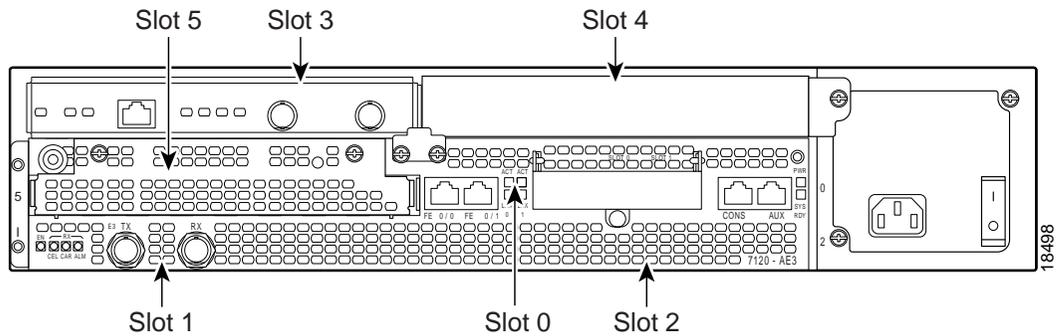
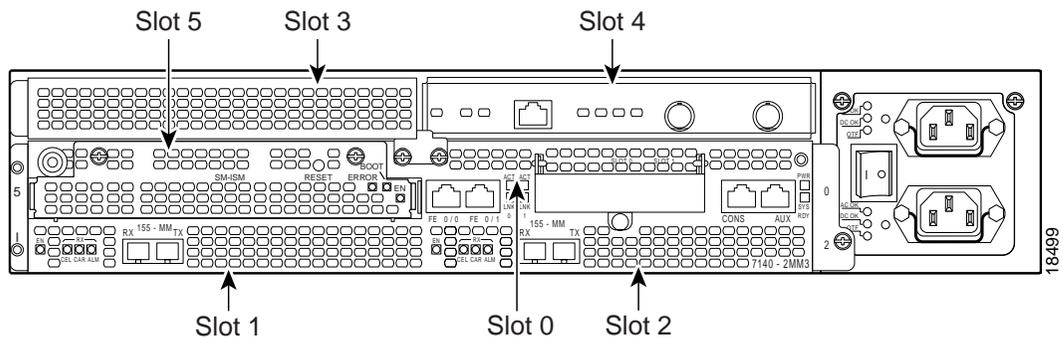


Figure 1-11 Port Adapter Slots in the Cisco 7140 Series Router



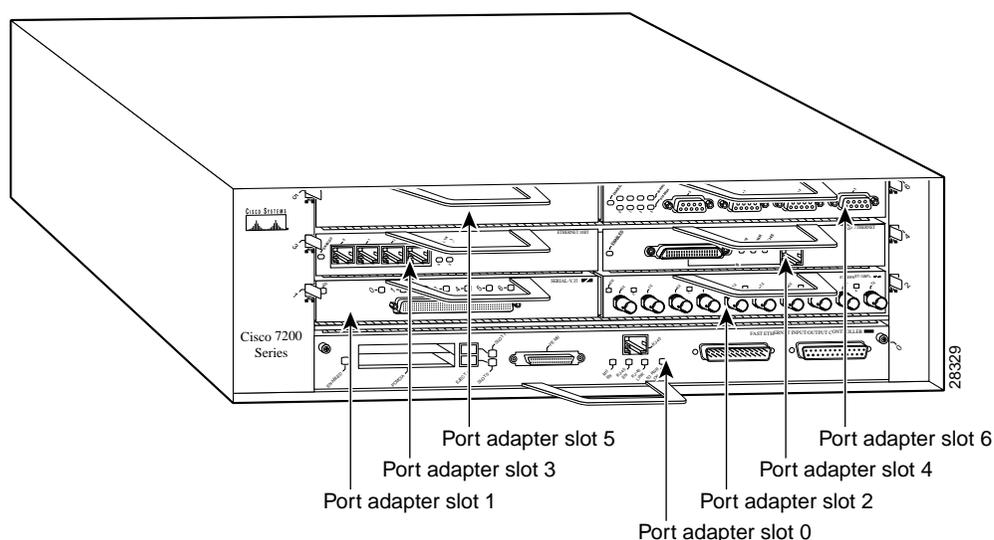
Cisco 7200 Series Routers and Cisco 7200 VXR Routers Slot Numbering

Cisco 7202 routers have two port adapter slots. The slots are numbered from left to right. You can place a port adapter in either of the slots (slot 1 or slot 2). The Cisco 7202 router is not shown.

Cisco 7204 routers and Cisco 7204VXR routers have four slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 4. You can place a port adapter in any of the slots (slot 1 through slot 4). Slot 0 is always reserved for the I/O controller. The Cisco 7204 router and Cisco 7204VXR are not shown.

Cisco 7206 routers and Cisco 7206VXR routers (including the Cisco 7206 and Cisco 7206VXR routers as router shelves in a Cisco AS5800 Universal Access Server) have six slots for port adapters, and one slot for an input/output (I/O) controller. The slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through slot 6. You can place a port adapter in any of the six slots (slot 1 through slot 6). Slot 0 is always reserved for the I/O controller. [Figure 1-12](#) shows the slot numbering on a Cisco 7206 router. The Cisco 7206VXR router is not shown.

Figure 1-12 Port Adapter Slots in the Cisco 7206 Router

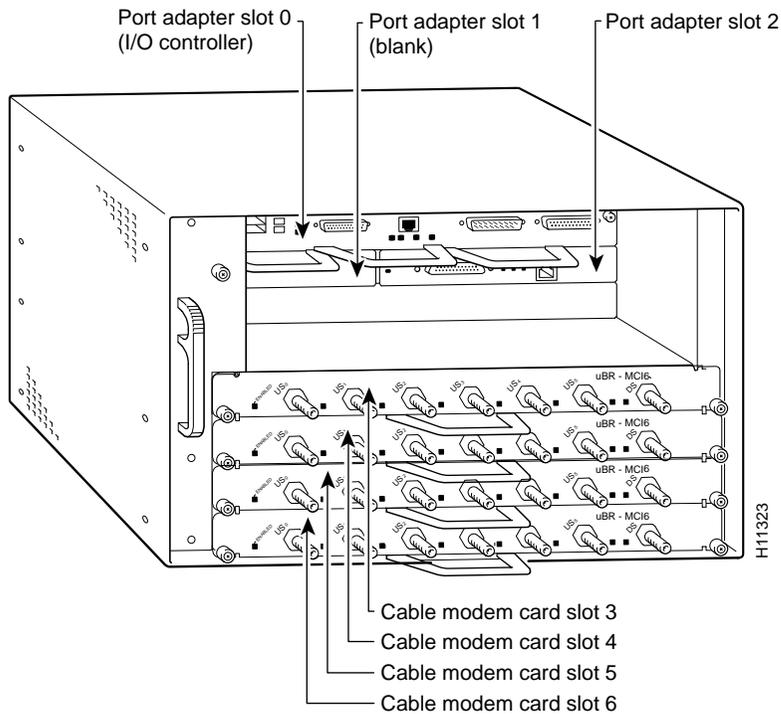


Cisco uBR7200 Series Routers Slot Numbering

The Cisco uBR7223 router has one port adapter slot (slot 1). Slot 0 is always reserved for the I/O controller—if present. The Cisco uBR7223 router is not shown.

The Cisco uBR7246 router and Cisco uBR7246VXR router have two port adapter slots (slot1 and slot 2). Slot 0 is always reserved for the I/O controller—if present. [Figure 1-13](#) shows the slot numbering of port adapters on a Cisco uBR7246 router or Cisco uBR7246VXR router.

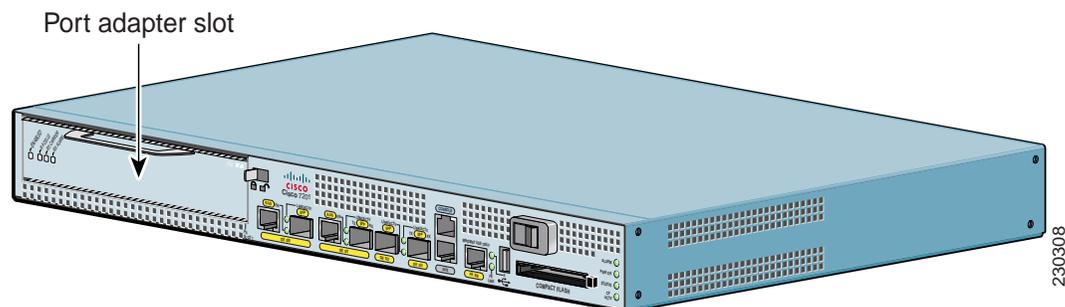
Figure 1-13 Port Adapter Slots in the Cisco uBR7246 Router



Cisco 7201 Router Slot Numbering

Figure 1-14 shows the front view of a Cisco 7201 router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7201 router.

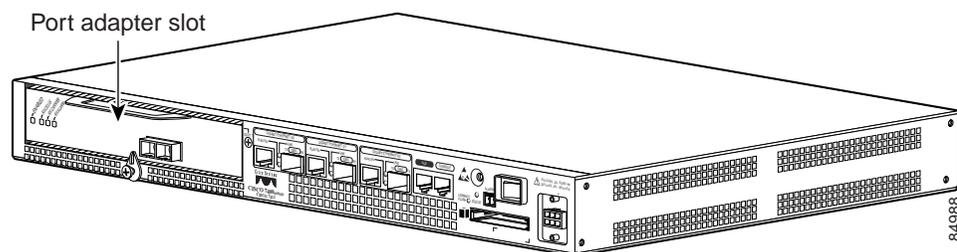
Figure 1-14 Port Adapter Slot in the Cisco 7201 Router



Cisco 7301 Router Slot Numbering

Figure 1-15 shows the front view of a Cisco 7301 router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7301 router.

Figure 1-15 Port Adapter Slot in the Cisco 7301 Router



Cisco 7304 PCI Port Adapter Carrier Card Slot Numbering

The Cisco 7304 PCI Port Adapter Carrier Card installs in Cisco 7304 router module slots 2 through 5. [Figure 1-16](#) shows a Cisco 7304 PCI Port Adapter Carrier Card with a port adapter installed. The Cisco 7304 PCI Port Adapter Carrier Card accepts one single-width port adapter.

[Figure 1-17](#) shows the module slot numbering on a Cisco 7304 router. The port adapter slot number is the same as the module slot number. Slot 0 and slot 1 are reserved for the NPE module or NSE module.

Figure 1-16 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Installed

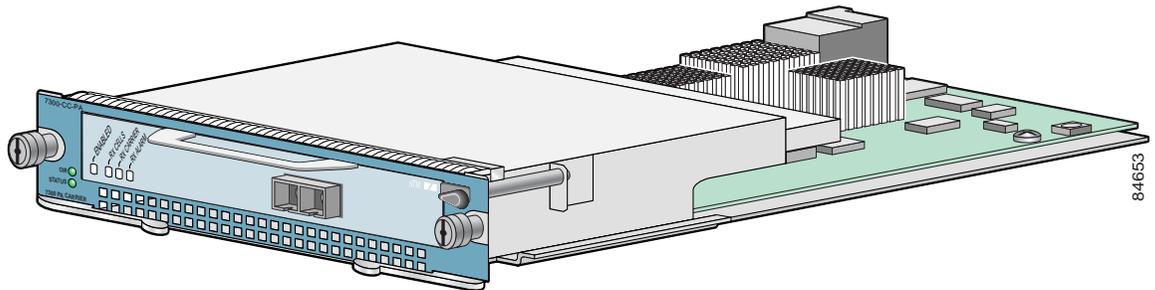
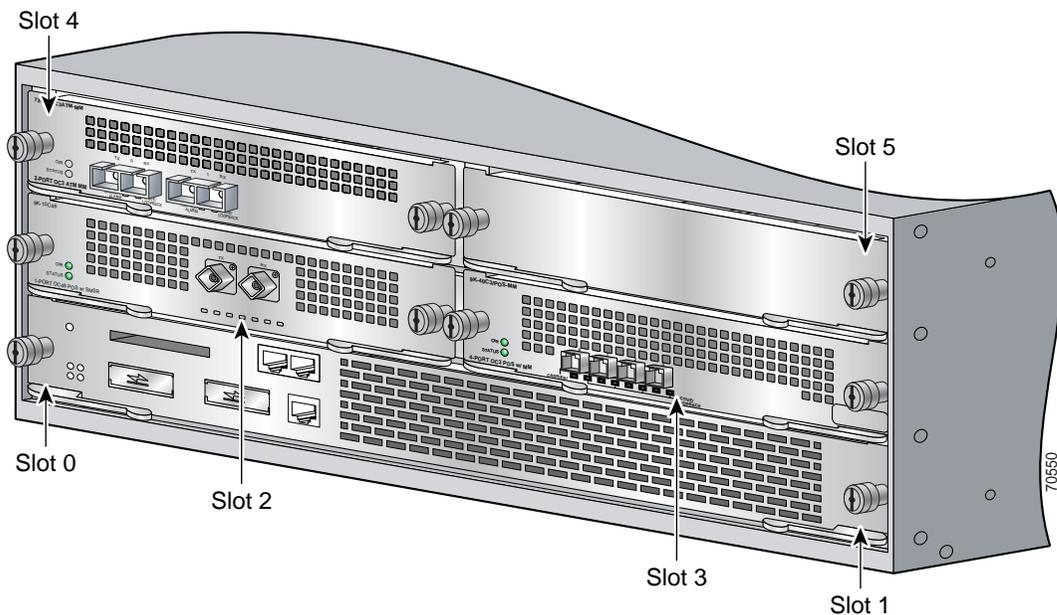


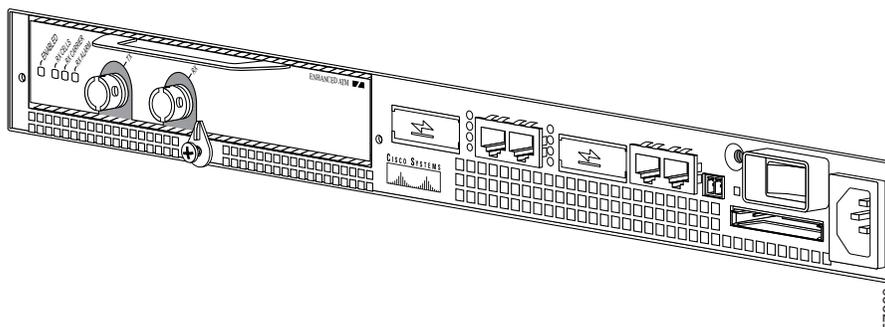
Figure 1-17 Module Slots on the Cisco 7304 Router



Cisco 7401ASR Router Slot Numbering

Figure 1-18 shows the front view of a Cisco 7401ASR router with a port adapter installed. There is only one port adapter slot (slot 1) in a Cisco 7401ASR router.

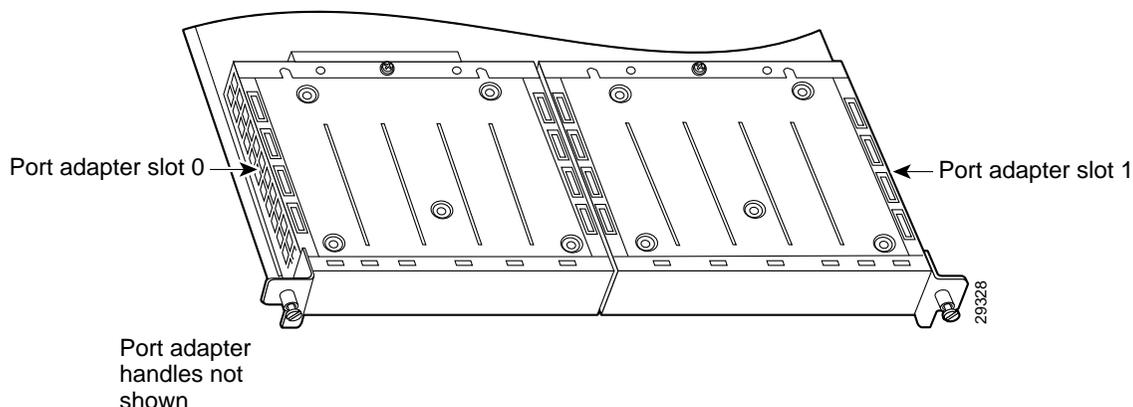
Figure 1-18 Port Adapter Slot in the Cisco 7401ASR Router



Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Slot Numbering

Port adapters are supported on the VIPs (versatile interface processors) used in Cisco 7000 series and Cisco 7500 series routers. In the Cisco 7010 router and Cisco 7505 router, the VIP motherboard is installed horizontally in the VIP slot. In the Cisco 7507 router and Cisco 7513 router, the VIP motherboard is installed vertically in the VIP slot. A port adapter can be installed in either bay (port adapter slot 0 or 1) on the VIP. The bays are numbered from left to right on the VIP. Figure 1-19 shows the slot numbering of a VIP.

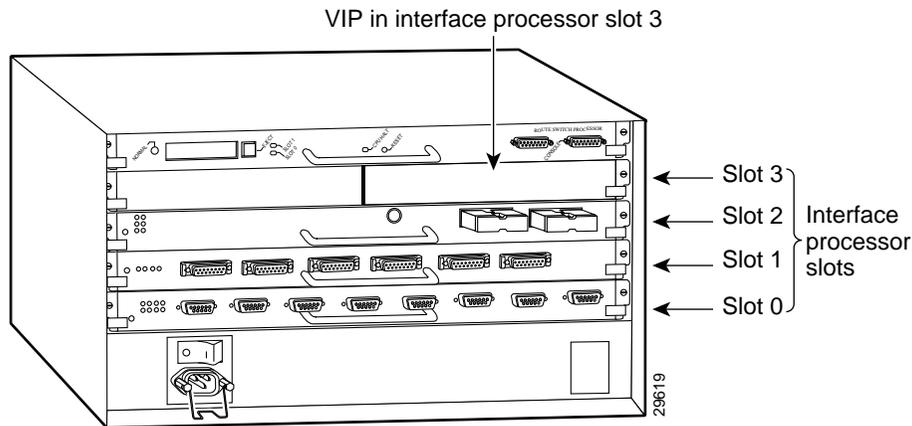
Figure 1-19 VIP Slot Locations



Cisco 7010 routers have three slots for port adapters, and two slots for Route Switch Processors (RSPs). The slots are numbered from bottom to top. You can place a port adapter in any of the VIP interface slots (slot 0 through 2). Slots 3 and 4 are always reserved for RSPs. The Cisco 7010 router is not shown.

Cisco 7505 routers have four slots for port adapters, and one slot for an RSP. The slots are numbered from bottom to top. You can place a port adapter in any of the VIP interface slots (slot 0 through 3). One slot is always reserved for the RSP. [Figure 1-20](#) shows the slot numbering on a Cisco 7505 router.

Figure 1-20 VIP Slots in the Cisco 7505 Router



Cisco 7507 routers have five slots for port adapters, and two slots for RSPs. The slots are numbered from left to right. You can place a port adapter in any of the VIP interface slots (slot 0, 1, 4, 5, or 6). Slots 2 and 3 are always reserved for RSPs. The Cisco 7507 router is not shown.

Cisco 7513 routers have eleven slots for port adapters, and two slots for RSPs. The slots are numbered from left to right. You can place a port adapter in any of the VIP interface slots (slots 0 through 5, or slots 9 through 12). Slots 6 and 7 are always reserved for RSPs. The Cisco 7513 router is not shown.

Identifying Interface Addresses

This section describes how to identify interface addresses for the multichannel DS1/PRI port adapter in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on a multichannel DS1/PRI port adapter installed in a router maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the interface address changes to reflect the new port adapter slot number.

Interfaces on a multichannel DS1/PRI port adapter installed in a VIP or FlexWAN module maintain the same address regardless of whether other interface processors or modules are installed or removed. However, when you move a VIP or FlexWAN module to a different slot, the interface processor or module slot number changes to reflect the new interface processor or module slot.



Note

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

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

- [Catalyst RSM/VIP2 Interface Addresses, page 1-22](#)
- [Catalyst 6000 Family FlexWAN Module Interface Addresses, page 1-23](#)
- [Cisco 7100 Series Routers Interface Addresses, page 1-23](#)
- [Cisco 7200 Series and Cisco 7200 VXR Routers Interface Addresses, page 1-24](#)
- [Cisco uBR7200 Series Routers Interface Addresses, page 1-24](#)
- [Cisco 7201 Router Interface Addresses, page 1-24](#)
- [Cisco 7301 Router Interface Addresses, page 1-24](#)
- [Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses, page 1-25](#)
- [Cisco 7401ASR Router Interface Addresses, page 1-25](#)
- [Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Interface Addresses, page 1-25](#)

Table 1-7 summarizes the interface address formats for the supported platforms.

Table 1-7 Identifying Interface Addresses

Platform	Interface Address Format	Numbers	Syntax
Catalyst RSM/VIP2 in Catalyst 5000 family switches	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot— 0 or 1 Interface port ¹ : <ul style="list-style-type: none"> • PA-MC-4T1: 0 through 3 • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	0/1:0
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	Module-slot-number/port-adapter-bay-number/ interface-port-number:channel-group-number	Module slot — ² through 13 (depends on the number of slots in the switch) Port adapter bay— 0 or 1 Interface port: ³ <ul style="list-style-type: none"> • PA-MC-4T1: 0 through 3 • PA-MC-8T1: 0 through 7 Channel group—0 through 23	3/0/0:0

Table 1-7 Identifying Interface Addresses (continued)

Platform	Interface Address Format	Numbers	Syntax
Cisco 7120 series router	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 3 Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1: 0 through 7 Channel group—0 through 23	3/0:0
Cisco 7140 series router	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 4 Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1: 0 through 7 Channel group—0 through 23	4/0:0
Cisco 7200 series routers and Cisco 7200 VXR routers	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—0 through 6 (depends on the number of slots in the router) ⁴ Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	1/0:0
Cisco 7201 router ⁵	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 1 Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 Channel group—0 through 23	1/0:0

Table 1-7 Identifying Interface Addresses (continued)

Platform	Interface Address Format	Numbers	Syntax
Cisco uBR7223 router	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 1 ⁴ Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	1/0:0
Cisco uBR7246 router	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—1 or 2 ⁴ Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	1/2:0
Cisco 7301 router ⁶	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 1 Interface port: <ul style="list-style-type: none"> • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	1/0:0
Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router	Module-slot-number/interface-port-number: channel-group-number	Module slot—2 through 5 Interface port: <ul style="list-style-type: none"> • PA-MC-2T1: 0 or 1 • PA-MC-4T1: 0 through 3 • PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	3/0:0

Table 1-7 Identifying Interface Addresses (continued)

Platform	Interface Address Format	Numbers	Syntax
Cisco 7401ASR router ⁷	Port-adapter-slot-number/interface-port-number: channel-group-number	Port adapter slot—always 1 Interface port: <ul style="list-style-type: none"> PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	1/0:0
VIP in Cisco 7000 series routers or Cisco 7500 series routers	Interface-processor-slot-number/port-adapter-slot-number/interface-port-number:channel-group-number	Interface processor slot—0 through 12 (depends on the number of slots in the router) Port adapter slot— 0 or 1 Interface port: <ul style="list-style-type: none"> PA-MC-2T1: 0 or 1 PA-MC-4T1: 0 through 3 PA-MC-8T1 and PA-MC-8DSX1: 0 through 7 Channel group—0 through 23	3/1/0:0

1. The Catalyst RSM/VIP2 does not support the PA-MC-2T1 multichannel DS1/PRI port adapter.
2. Slot 1 is reserved for the supervisor engine. If a redundant supervisor engine is used, it must go in slot 2; otherwise, slot 2 can be used for other modules.
3. The Catalyst 6000 family FlexWAN module supports the PA-MC-4TI and PA-MC-8T1 multichannel DS1/PRI port adapters only.
4. Port adapter slot 0 is reserved for the Fast Ethernet port on the I/O controller (if present).
5. The Cisco 7201 router supports the PA-MC-2T1 and the PA-MC-4T1 port adapters.
6. The Cisco 7301 router supports the PA-MC-8T1 and the PA-MC-8DSX1 port adapters.
7. The Cisco 7401ASR router supports the PA-MC-8T1 and the PA-MC-8DSX1 port adapters.

Catalyst RSM/VIP2 Interface Addresses

In Catalyst 5000 family switches, the Catalyst RSM/VIP2 can be installed in any slot except the top slots, which contain the supervisor engine modules. The Catalyst RSM/VIP2 in a Catalyst 5000 family switch does not use interface processor slot numbering; therefore, the slots in which it is installed are not numbered. A port adapter can be installed into either port adapter slot 0 or slot 1 on a Catalyst RSM/VIP2. See [Figure 1-8](#).

The interface address is composed of a three-part number in the format *port-adapter-slot number/interface-port number:channel-group-number*. See [Table 1-7](#). For example, if a four-port PA-MC-4T1 is installed in port adapter slot 1 of a Catalyst RSM/VIP2 in a Catalyst 5000 family switch, the interface addresses would be 1/0:0, 1/1:0, 1/2:0, 1/3:0 (port adapter slot 1, interface ports 0 through 3, and channel group 0). If an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in the same slot, the interface addresses would be 1/0:0, 1/1:0, 1/2:0, 1/3:0, 1/4:0, 1/5:0, 1/6:0, and 1/7:0 (port adapter slot 1 interface ports 0 through 7, and channel group 0).

Catalyst 6000 Family FlexWAN Module Interface Addresses

The Catalyst 6000 family FlexWAN module can be installed in module slots 2 through 9 (depending on the number of slots in the router). Slot 1 is reserved for the supervisor engine. A port adapter can be installed into either port adapter bay 0 or bay 1 on a FlexWAN module. See [Figure 1-9](#).

The interface address is composed of a four-part number in the format *module-number/port-adapter-bay-number/interface-port-number:channel-group-number*. See [Table 1-7](#).

The first number identifies the module slot of the chassis in which the FlexWAN module is installed (slot 2 through slot 3, 6, or 9 depending on the number of slots in the chassis). These module slots are generally numbered from top to bottom, starting with 1.

The second number identifies the bay of the FlexWAN module in which the port adapter is installed (0 or 1). The bays are numbered from left to right on the FlexWAN module.

The third number identifies the physical port number on the port adapter. The PA-MC-4T1 is a four-port port adapter, therefore the port number can be 0 through 3. The PA-MC-8T1 is an eight-port port adapter, therefore the port can be 0 through 7.

The fourth number identifies the logical channel group and is a number from 0 through 23.

For example, if a four-port PA-MC-4T1 is installed in the FlexWAN module in module slot 3, port adapter bay 0, the interface addresses would be 3/0:0, 3/1:0, 3/2:0, 3/3:0 (module slot 3, port adapter bay 0, interface ports 0 through 3, and channel group 0). If an eight-port PA-MC-8T1 is installed in the FlexWAN module in module slot 3, port adapter bay 0, the interface addresses would be 3/0/0:0 through 3/0/7:0 (module slot 3, port adapter bay 0, interface ports 0 through 7, and channel group 0).



Note

The FlexWAN module physical port address begins with slot 0, which differs from the conventional Catalyst 6000 family port address, which begins with slot 1.

Cisco 7100 Series Routers Interface Addresses

In Cisco 7120 series router, port adapters are installed in port adapter slot 3. See [Figure 1-10](#). In the Cisco 7140 series router, port adapters are installed in port adapter slot 4. See [Figure 1-11](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#). For example, if a dual-port PA-MC-2T1 is installed on a Cisco 7120 router, the interface addresses would be 3/0:0 and 3/1:0. If a dual-port PA-MC-2T1 is installed on a Cisco 7140 router, the interface addresses would be 4/0:0 and 4/1:0.

Cisco 7200 Series and Cisco 7200 VXR Routers Interface Addresses

In Cisco 7200 series routers and Cisco 7200 VXR routers, port adapter slots are numbered from the lower left to the upper right, beginning with slot 1 and continuing through 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 adapters can be installed in any available port adapter slot from 1 through 6 (depending on the number of slots in the router). (Slot 0 is reserved for the I/O controller.) See [Figure 1-12](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number: channel-group-number*. See [Table 1-7](#). For example, if a dual-port PA-MC-2T1 is installed in slot 1 on a Cisco 7200 series router, the interface addresses would be 1/0:0 and 1/1:0. If a four-port PA-MC-4T1 is installed in slot 1 on a Cisco 7200 series router, the interface address would be 1/0:0, 1/1:0, 1/2:0, and 1/3:0 (port adapter slot 1 interface ports 0 through 3, and channel group 0). If an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in slot 1 on a Cisco 7200 series router, the interface address would be 1/0:0, 1/1:0, 1/2:0, 1/3:0, 1/4:0, 1/5:0, 1/6:0, and 1/7:0 (port adapter slot 1 interface ports 0 through 7, and channel group 0).

Cisco uBR7200 Series Routers Interface Addresses

In the Cisco uBR7223 router, only one slot accepts port adapters and it is numbered slot 1.

In the Cisco uBR7246 router and Cisco uBR7246VXR router, port adapters can be installed in two port adapter slots (slot 1 and slot 2). Slot 0 is always reserved for the I/O controller—if present. See [Figure 1-13](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number: channel-group-number*. See [Table 1-7](#). For example, if a dual-port PA-MC-2T1 is installed in slot 1 of a Cisco uBR7223 router, the interface addresses would be 1/0:0 and 1/1:0 (port adapter slot 1 interface ports 0 and 1, and channel group 0). If the dual-port PA-MC-2T1 were installed in slot 2 of a Cisco uBR7246 router, the interface addresses would be 2/0:0 and 2/1:0 (port adapter slot 2 interface ports 0 and 1, and channel group 0).

Cisco 7201 Router Interface Addresses

In the Cisco 7201 router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-14](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#). For example, if a four-port PA-MC-4T1 is installed in a Cisco 7201 router, the interface address would be 1/0:0, 1/1:0, 1/2:0, and 1/3:0 (port adapter slot 1 interface ports 0 through 3, and channel group 0).

Cisco 7301 Router Interface Addresses

In the Cisco 7301 router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-15](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#). For example, if an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in a Cisco 7301 router, the interface address would be 1/0:0, 1/1:0, 1/2:0, 1/3:0, 1/4:0, 1/5:0, 1/6:0, and 1/7:0 (port adapter slot 1 interface ports 0 through 7, and channel group 0).

Cisco 7304 PCI Port Adapter Carrier Card Interface Addresses

In the Cisco 7304 router, port adapters are installed in a Cisco 7304 PCI port adapter carrier card, which installs in Cisco 7304 router module slots 2 through 5. The port adapter slot number is the same as the module slot number. See [Figure 1-16](#) and [Figure 1-17](#).

The interface address is composed of a three-part number in the format *module-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#). For example, if a dual-port PA-MC-2T1 is installed in the Cisco 7304 PCI port adapter carrier card in Cisco 7304 router module slot 3, the interface addresses would be 3/0:0 and 3/1:0 (port adapter slot 3 interface ports 0 and 1, and channel group 0). If a four-port PA-MC-4T1 is installed in the Cisco 7304 PCI port adapter carrier card in Cisco 7304 router module slot 3, the interface addresses would be 3/0:0, 3/1:0, 3/2:0, and 3/3:0 (port adapter slot 3 interface ports 0 through 3, and channel group 0). If an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in the Cisco 7304 PCI port adapter carrier card in Cisco 7304 router module slot 3, the interface addresses would be 3/0:0, 3/1:0, 3/2:0, 3/3:0, 3/4:0, 3/5:0, 3/6:0, and 3/7:0 (port adapter slot 3 interface ports 0 through 7, and channel group 0).

Cisco 7401ASR Router Interface Addresses

In the Cisco 7401ASR router, only one slot accepts port adapters and it is numbered as slot 1. See [Figure 1-18](#).

The interface address is composed of a three-part number in the format *port-adapter-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#). For example, if an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in a Cisco 7401ASR router, the interface address would be 1/0:0, 1/1:0, 1/2:0, 1/3:0, 1/4:0, 1/5:0, 1/6:0, and 1/7:0 (port adapter slot 1 interface ports 0 through 7, and channel group 0).

Cisco 7000 Series Routers and Cisco 7500 Series Routers VIP Interface Addresses

In Cisco 7000 series routers and Cisco 7500 series routers, port adapters are installed on a versatile interface processor (VIP), which installs in interface processor slots 0 through 12 (depending on the number of slots in the router). The port adapter can be installed in either bay (port adapter slot 0 or 1) on the VIP. See [Figure 1-19](#), and [Figure 1-20](#).

The interface address for the VIP is composed of a four-part number in the format *interface-processor-slot-number/port-adapter-slot-number/interface-port-number:channel-group-number*. See [Table 1-7](#).

The first number identifies the slot in which the VIP is installed (slot 0 through 12, depending on the number of slots in the router).

The second number identifies the bay (port adapter slot) on the VIP in which the port adapter is installed (0 or 1). The bays are numbered from left to right on the VIP.

The third number identifies the physical port number (interface port number) on the port adapter. The port numbers always begin at 0 and are numbered from left to right. The number of additional ports depends on the number of ports on the port adapter. The PA-MC-2T1 is a dual-port port adapter, therefore the port can be 0 or 1. The PA-MC-4T1 is a four-port port adapter, therefore the port can be 0, through 3. The PA-MC-8T1 and PA-MC-8DSX1 are eight-port port adapters, therefore their port can be 0 through 7.

The fourth number identifies the logical channel group and is a number from 0 through 23.

For example, if a dual-port PA-MC-2T1 is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0:0 and 3/1/1:0 (interface processor slot 3, port adapter slot 1, interface ports 0 and 1, and channel group 0). If a four-port PA-MC-4T1 is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0:0, 3/1/1:0, 3/1/2:0, and 3/1/3:0 (interface processor slot 3, port adapter slot 1, interface ports 0 through 3, and channel group 0). If an eight-port PA-MC-8T1 or PA-MC-8DSX1 is installed in a VIP in interface processor slot 3, port adapter slot 1, the interface addresses would be 3/1/0:0, 3/1/1:0, 3/1/2:0, 3/1/3:0, 3/1/4:0, 3/1/5:0, 3/1/6:0, and 3/1/7:0 (interface processor slot 3, port adapter slot 1, interface ports 0 through 7, and channel group 0).

**Note**

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



CHAPTER 2

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing multichannel DS1/PRI port adapters. The chapter contains the following sections:

- [Required Tools and Equipment, page 2-1](#)
- [Software and Hardware Requirements, page 2-2](#)
- [Checking Hardware and Software Compatibility, page 2-4](#)
- [Safety Guidelines, page 2-4](#)
- [FCC Class A Compliance, page 2-11](#)

Required Tools and Equipment

You need the following tools and parts to install a multichannel DS1/PRI port adapter. If you need additional equipment, contact a service representative for ordering information.

- PA-MC-2T1, PA-MC-4T1, PA-MC-8T1, or PA-MC-8DSX1
- Catalyst RSM/VIP2 (for installation in the Catalyst 5000 family switches). For information about the specific VIP2 models that support the multichannel DS1/PRI, see the [“Software and Hardware Requirements” section on page 2-2](#).
- Catalyst 6000 family FlexWAN module (for installation in the Catalyst 6000 family switches)
- Cisco 7304 PCI Port Adapter Carrier Card (for installation in a Cisco 7304 router)
- Versatile Interface Processor (VIP) (for installation in Cisco 7000 series or Cisco 7500 series chassis only)
- Category 3 or 5 UTP RJ-48C interface cables to connect the multichannel DS1/PRI port adapter and CSU
- T1 CSU to connect the multichannel DS1/PRI port adapter (PA-8DSX1 version only) with the wide-area network
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver (for VIP installation only)
- Number 2 Phillips screwdriver
- Your own electrostatic discharge (ESD)-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares
- Antistatic mat
- Antistatic container

Software and Hardware Requirements

Table 2-1 lists the minimum Cisco IOS software release required to use the multichannel DS1/PRI port adapter in supported router or switch platforms.

Table 2-1 DS1/PRI Port Adapter Software Requirements

Platform	Recommended Minimum Cisco IOS Release
Catalyst 5000 family switches with Catalyst RSM/VIP2¹ <ul style="list-style-type: none"> • With Catalyst RSM/VIP2-40(=) 	Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0T
Catalyst 6000 family switches with Catalyst 6000 family FlexWAN module <ul style="list-style-type: none"> • PA-MC-4T1² <ul style="list-style-type: none"> – Cisco IOS for the Catalyst 6000 Family Switches product on both the Supervisor Engine 2 and the MSFC³ • PA-MC-8T1 <ul style="list-style-type: none"> – Cisco IOS for the Catalyst 6000 Family Switches product on both the supervisor engine and the MSFC – Catalyst software on the supervisor engine and Cisco IOS on the MSFC 	Cisco IOS Release 12.1(8a)E3 or later Cisco IOS Release 12.1(5a)E1 or later (Supervisor Engine 1) Cisco IOS Release 12.1(8a)E3 or later (Supervisor Engine 2) <ul style="list-style-type: none"> • Cisco IOS Release 12.1(1)EX or later on the MSFC • Catalyst 6000 family supervisor engine software version 5.4(1) or later on the supervisor engine
Cisco 7100 series routers <ul style="list-style-type: none"> • Cisco 7120 series and Cisco 7140 series 	Cisco IOS Release 12.1(5)E or later

Table 2-1 DS1/PRI Port Adapter Software Requirements (continued)

Platform	Recommended Minimum Cisco IOS Release
Cisco 7200 series and Cisco 7200 VXR routers^{4, 5, 6} <ul style="list-style-type: none"> Cisco 7204VXR and Cisco 7206VXR 	Cisco IOS Release 12.0(3)T or a later release of Cisco IOS Release 12.0T Cisco IOS Release 12.0(1)XE or a later release of Cisco IOS Release 12.0XE Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
<ul style="list-style-type: none"> Cisco 7204 and Cisco 7206 	Cisco IOS Release 11.1(20)CC or a later release of Cisco IOS Release 11.1CC Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
<ul style="list-style-type: none"> Cisco 7202 	Cisco IOS Release 11.1(9)CA1 or a later release of Cisco IOS Release 11.1CA Cisco IOS Release 11.3(4)AA or a later release of Cisco IOS Release 11.3AA Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
Cisco uBR7200 series routers <ul style="list-style-type: none"> Cisco uBR7246 and Cisco uBR7223 	Cisco IOS Release 12.0(5)T or a later release of Cisco IOS Release 12.0T
Cisco 7201 router	Cisco IOS Release 12.4(4)XD7 or a later release of Cisco IOS Release 12.4XD Cisco IOS Release 12.2(31)SB5 or a later release of Cisco IOS Release 12.2SB
Cisco 7301 router	Cisco IOS Release 12.2(11)YZ or a later release of Cisco IOS Release 12.2YZ
Cisco 7304 router <ul style="list-style-type: none"> With Cisco 7304 PCI Port Adapter Carrier Card 	Cisco IOS Release 12.2(14)SZ or a later release of Cisco IOS Release 12.2SZ
Cisco 7401ASR router	Cisco IOS Release 12.2(1)DX or a later release of Cisco IOS Release 12.2DX Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2B
VIP in the Cisco 7000 series and Cisco 7500 series	Cisco IOS Release 11.1(22)CC or a later release of Cisco IOS Release 11.1CC Cisco IOS Release 11.1(22)CC or a later release of Cisco IOS Release 11.1CC Cisco IOS Release 12.0(10)S or a later release of Cisco IOS Release 12.0S Cisco IOS Release 12.0(10)S or a later release of Cisco IOS Release 12.0S

- The Catalyst RSM/VIP2-40(=), which has 2 MB of SRAM and 32 MB of DRAM, supports two installed multichannel DS1/PRI port adapters that are running ISDN PRI with distributed services or channelized T1 with distributed switching or distributed services. It also supports two installed multichannel DS1/PRI port adapters that are running ISDN PRI or channelized T1 with distributed services.
- The PA-MC-4T1 is supported only with the Cisco IOS for the Catalyst 6000 Family Switches product on both the Supervisor Engine 2 and the MSFC
- MSFC = Multilayer Switch Feature Card
- Cisco 7200 series routers require a minimum of 32 MB of DRAM to support up to five installed multichannel DS1/PRI port adapters that are running ISDN PRI or channelized T1.
- The multichannel DS1/PRI port adapters can be used in the VIP2 and VIP4 in all Cisco 7500 series routers and Cisco 7000 series routers that use the RSP7000 and RSP7000CI, and in Cisco 7200 series routers and Cisco uBR7200 series routers.
- The multichannel DS1/PRI port adapter requires that the host Cisco 7000 series, Cisco 7200 series, or Cisco 7500 series router be running Cisco IOS Release 11.1(20)CC or a later release of Cisco IOS Release 11.1 CC.

Checking Hardware and Software Compatibility

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



Note

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

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

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

Safety Guidelines

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

Safety Warnings

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



Warning

IMPORTANT SAFETY INSTRUCTIONS

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 translated safety warnings that accompanied this device.

Note: **SAVE THESE INSTRUCTIONS**

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

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 de standaard praktijken om ongelukken te voorkomen. Voor een vertaling van de waarschuwingen die in deze publicatie verschijnen, dient u de vertaalde veiligheidswaarschuwingen te raadplegen die bij dit apparaat worden geleverd.

Opmerking **BEWAAR DEZE INSTRUCTIES.**

Opmerking Deze documentatie dient gebruikt te worden in combinatie met de installatiehandleiding voor het specifieke product die bij het product wordt geleverd. Raadpleeg de installatiehandleiding, configuratiehandleiding of andere verdere ingesloten documentatie voor meer informatie.

Varoitus

TÄRKEITÄ TURVALLISUUTEEN LIITTYVIÄ OHJEITA

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 asiakirjassa esitettyjen varoitusten käännökset löydät laitteen mukana toimitetuista ohjeista.

Huomautus **SÄILYTÄ NÄMÄ OHJEET**

Huomautus Tämä asiakirja on tarkoitettu käytettäväksi yhdessä tuotteen mukana tulleen asennusoppaan kanssa. Katso lisätietoja asennusoppaasta, kokoonpano-oppaasta ja muista mukana toimitetuista asiakirjoista.

Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ

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 les consignes de sécurité traduites qui accompagnent cet appareil.

Remarque CONSERVEZ CES INFORMATIONS

Remarque Cette documentation doit être utilisée avec le guide spécifique d'installation du produit qui accompagne ce dernier. Veuillez vous reporter au Guide d'installation, au Guide de configuration, ou à toute autre documentation jointe pour de plus amples renseignements.

Warnung WICHTIGE SICHERHEITSANWEISUNGEN

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 sind im Lieferumfang des Geräts enthalten.

Hinweis BEWAHREN SIE DIESE SICHERHEITSANWEISUNGEN AUF

Hinweis Dieses Handbuch ist zum Gebrauch in Verbindung mit dem Installationshandbuch für Ihr Gerät bestimmt, das dem Gerät beiliegt. Entnehmen Sie bitte alle weiteren Informationen dem Handbuch (Installations- oder Konfigurationshandbuch o. Ä.) für Ihr spezifisches Gerät.

Figyelem! FONTOS BIZTONSÁGI ELŐÍRÁSOK

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található.

Megjegyzés ŐRIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Megjegyzés Ezt a dokumentációt a készülékhez mellékelt üzembe helyezési útmutatóval együtt kell használni. További tudnivalók a mellékelt Üzembe helyezési útmutatóban (Installation Guide), Konfigurációs útmutatóban (Configuration Guide) vagy más dokumentumban található.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Per le traduzioni delle avvertenze riportate in questo documento, vedere le avvertenze di sicurezza che accompagnano questo dispositivo.

Nota CONSERVARE QUESTE ISTRUZIONI

Nota La presente documentazione va usata congiuntamente alla guida di installazione specifica spedita con il prodotto. Per maggiori informazioni, consultare la Guida all'installazione, la Guida alla configurazione o altra documentazione acclusa.

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette varselssymbolet betyr fare. Du befinner deg i en situasjon som kan forårsake personskade. Før du utfører arbeid med utstyret, bør du være oppmerksom på farene som er forbundet med elektriske kretssystemer, og du bør være kjent med vanlig praksis for å unngå ulykker. For å se oversettelser av advarslene i denne publikasjonen, se de oversatte sikkerhetsvarslene som følger med denne enheten.

Merk TA VARE PÅ DISSE INSTRUKSJONENE

Merk Denne dokumentasjonen skal brukes i forbindelse med den spesifikke installasjonsveiledningen som fulgte med produktet. Vennligst se installasjonsveiledningen, konfigureringsveiledningen eller annen vedlagt tilleggsdokumentasjon for detaljer.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. O utilizador encontra-se numa situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha em atenção os perigos envolvidos no manuseamento de circuitos eléctricos e familiarize-se com as práticas habituais de prevenção de acidentes. Para ver traduções dos avisos incluídos nesta publicação, consulte os avisos de segurança traduzidos que acompanham este dispositivo.

Nota GUARDE ESTAS INSTRUÇÕES

Nota Esta documentação destina-se a ser utilizada em conjunto com o manual de instalação incluído com o produto específico. Consulte o manual de instalação, o manual de configuração ou outra documentação adicional inclusa, para obter mais informações.

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Vea las traducciones de las advertencias que acompañan a este dispositivo.

Nota GUARDE ESTAS INSTRUCCIONES

Nota Esta documentación está pensada para ser utilizada con la guía de instalación del producto que lo acompaña. Si necesita más detalles, consulte la Guía de instalación, la Guía de configuración o cualquier documentación adicional adjunta.

Varning! VIKTIGA SÄKERHETSANVISNINGAR

Denna varningssignal 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 vanliga förfaranden för att förebygga olyckor. Se översättningarna av de varningsmeddelanden som finns i denna publikation, och se de översatta säkerhetsvarningarna som medföljer denna anordning.

OBS! SPARA DESSA ANVISNINGAR

OBS! Denna dokumentation ska användas i samband med den specifika produktinstallationshandbok som medföljde produkten. Se installationshandboken, konfigurationshandboken eller annan bifogad ytterligare dokumentation för närmare detaljer.

Предупреждение **ВАЖНЫЕ СВЕДЕНИЯ ПО БЕЗОПАСНОСТИ**

Этот символ предупреждает о наличии опасности. При неправильных действиях возможно получение травм. Перед началом работы с любым оборудованием необходимо ознакомиться с ситуациями, в которых возможно поражение электротоком, и со стандартными действиями для предотвращения несчастных случаев. Переведенный текст предупреждений содержится в соответствующем документе, поставляемом вместе с устройством.

Примечание **СОХРАНЯЙТЕ ЭТУ ИНСТРУКЦИЮ**

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这个警告符号指有危险。您所处的环境可能使身体受伤。操作设备前必须意识到电流的危险性，务必熟悉操作标准，以防发生事故。如果需要了解本说明中出现的警告符号的译文，请参阅本装置所附之安全警告译文。

注意 保存这些说明

注意 本文件应与本产品附带的特定安装说明一并阅读。如欲了解详情，请参阅《安装说明》、《配置说明》或所附的其他文件。

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止対策に留意してください。このマニュアルに記載されている警告の各国語版は、装置に付属の「Translated Safety Warnings」を参照してください。

注 これらの注意事項を保管しておいてください。

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警告 有关安全的重要说明

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Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis; do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.

- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe; carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Telephone Wiring Guidelines

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

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

Preventing Electrostatic Discharge Damage

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

Following are guidelines for preventing ESD damage:

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



Caution

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

FCC Class 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 multichannel DS1/PRI 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.



Note

The multichannel DS1/PRI port adapter meets FCC Part 68 requirements. The registration number is 5B1USA-33103-DD-N.



CHAPTER 3

Removing and Installing Port Adapters

This chapter describes how to remove the Cisco multichannel DS1/PRI port adapter from supported platforms and also how to install a new or replacement port adapter. This chapter contains the following sections:

- [Handling Port Adapters, page 3-1](#)
- [Online Insertion and Removal, page 3-2](#)
- [Warnings and Cautions, page 3-3](#)
- [Port Adapter Removal and Installation, page 3-4](#)
- [Connecting an RJ-48C Shielded Cable, page 3-17](#)

Handling Port Adapters

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



Note

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



Caution

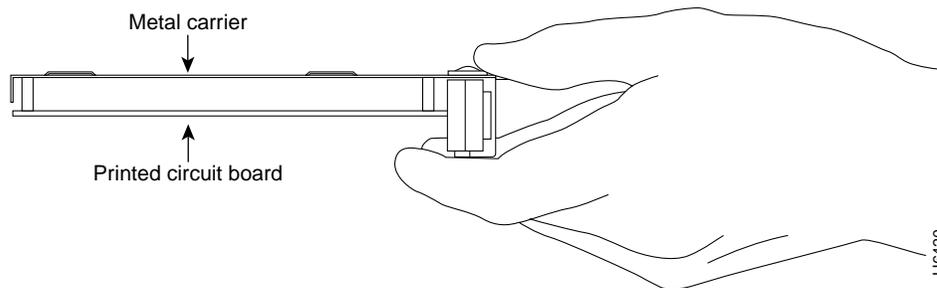
When powering off the router, wait a minimum of 30 seconds before powering it on again.



Caution

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

Figure 3-1 Handling a Port Adapter



Online Insertion and Removal

Several platforms support online insertion and removal (OIR) of port adapters; therefore, you do not have to power down routers when removing and replacing a multichannel DS1/PRI in the Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router.

Although the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card, and VIP support online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card or VIP from the router and then install or replace port adapters as required. If a blank port adapter is installed on the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card or VIP on which you want to install a new port adapter, you must first remove the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card or VIP from the router and then remove the blank port adapter.



Caution

To prevent system problems, do not remove port adapters from the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card or VIP, or attempt to install other port adapters when the system is operating. To install or replace port adapters, first remove the Catalyst RSM/VIP2, Catalyst 6000 family FlexWAN module, Cisco 7304 PCI port adapter carrier card or VIP from the router.

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



Note

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

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

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a port adapter in a supported platform, refer to the [“Port Adapter Removal and Installation”](#) section on page 3-4.

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

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

When you remove or insert a port adapter, the pins send signals to notify the system of changes. The router then performs the following procedure:

1. Rapidly scans the system for configuration changes.
2. Initializes newly inserted port adapters or administratively shuts down any vacant interfaces.
3. Brings all previously configured interfaces on the port adapter back to their previously installed state. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar port adapter type is reinserted into a slot, its ports are configured and brought online up to the port count of the originally installed port adapter of that type.



Note

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

Warnings and Cautions

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



Caution

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



Note

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



Caution

To prevent jamming the carrier between the upper and the lower edges of the port adapter slot, and to ensure that the edge connector at the rear of the port adapter mates with the connection at the rear of the port adapter slot, make certain that the carrier is positioned correctly, as shown in the cutaway illustrations in the [“Port Adapter Removal and Installation”](#) section on page 3-4.



Caution

When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the card. Some platforms have an ESD connector for attaching the wrist strap.

**Warning**

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

Port Adapter Removal and Installation

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

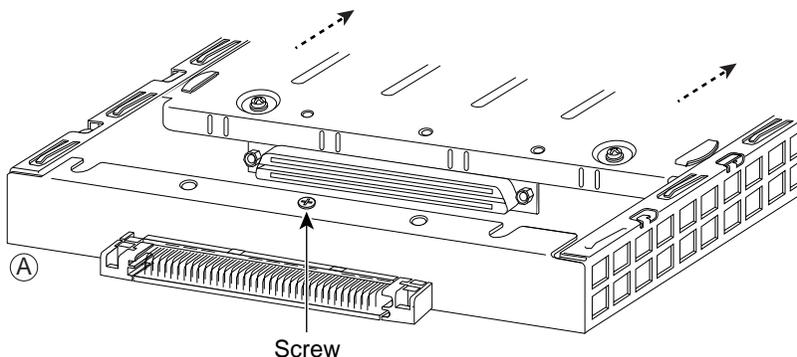
- [Catalyst RSM/VIP2—Removing and Installing a Port Adapter, page 3-5](#)
- [Catalyst 6000 Family FlexWAN Module—Removing and Installing a Port Adapter, page 3-6](#)
- [Cisco 7100 Series Routers—Removing and Installing a Port Adapter, page 3-7](#)
- [Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Removing and Installing a Port Adapter, page 3-8](#)
- [Cisco uBR7200 Series Routers—Removing a Port Adapter, page 3-9](#)
- [Cisco uBR7200 Series Routers—Installing a Port Adapter, page 3-10](#)
- [Cisco 7201 Router—Removing and Installing a Port Adapter, page 3-11](#)
- [Cisco 7301 Router—Removing and Installing a Port Adapter, page 3-12](#)
- [Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter, page 3-13](#)
- [Cisco 7401ASR Router—Removing and Installing a Port Adapter, page 3-15](#)
- [VIP—Removing and Installing a Port Adapter, page 3-16](#)

Catalyst RSM/VIP2—Removing and Installing a Port Adapter

Note: You must first remove the Catalyst RSM/VIP2 from the chassis before removing a port adapter from the Catalyst RSM/VIP2.

Step 1

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

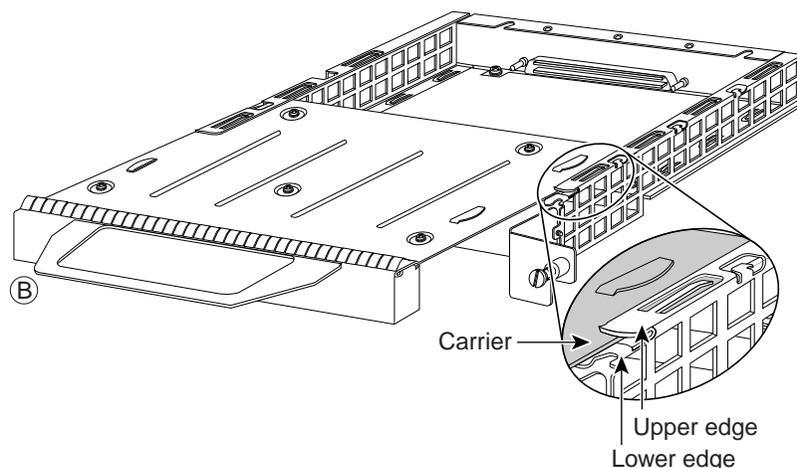


Step 2

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

Step 3

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



Step 4

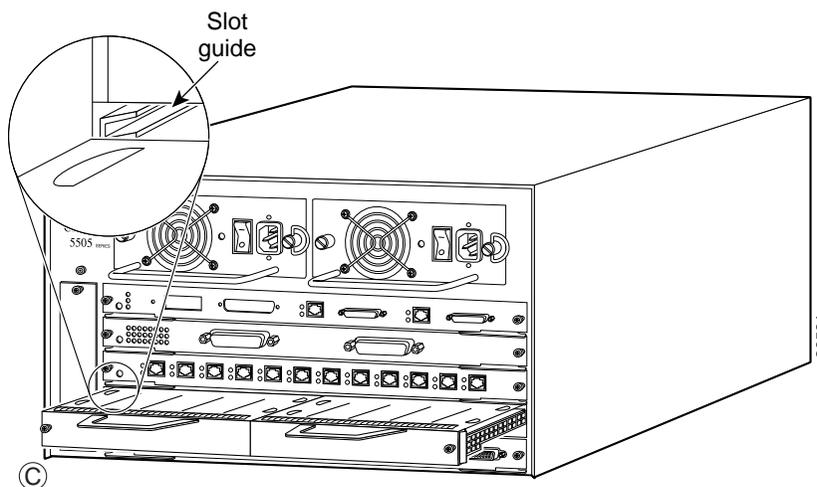
Install the screw in the rear of the port adapter slot. Do not overtighten the screw. (See A.)

Step 5

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

Step 6

Reinstall the Catalyst RSM/VIP2 motherboard in the chassis and tighten the captive installation screw on each side of the Catalyst RSM/VIP2 faceplate. (See C.)

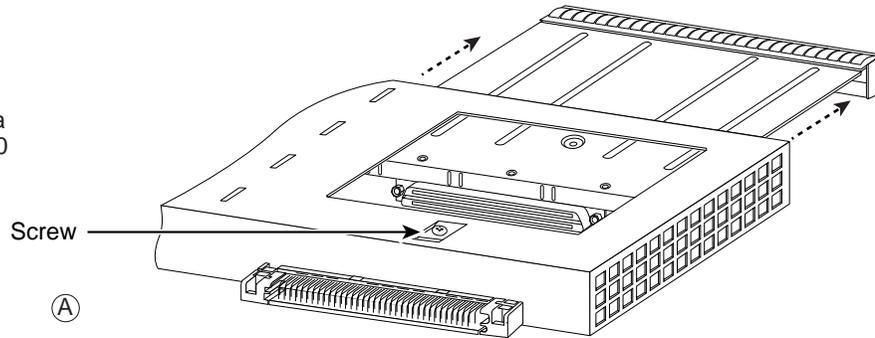


Catalyst 6000 Family FlexWAN Module—Removing and Installing a Port Adapter

Note: You must first remove the Catalyst 6000 FlexWAN module from the chassis before removing a port adapter from the Catalyst 6000 FlexWAN module.

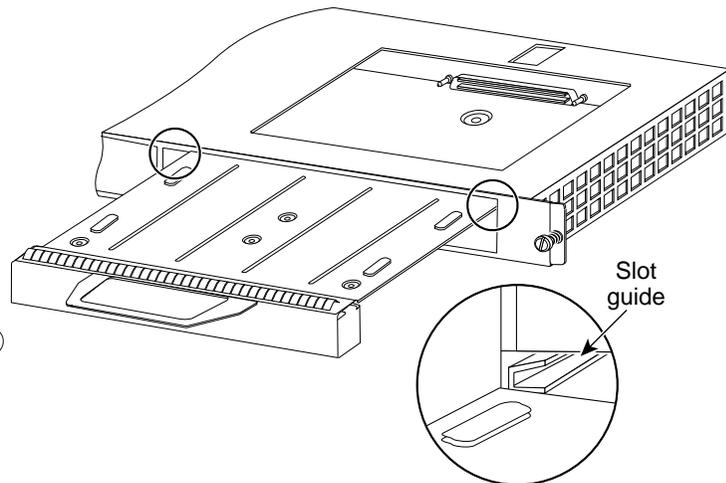
Step 1

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



Step 2

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



Step 3

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

Step 4

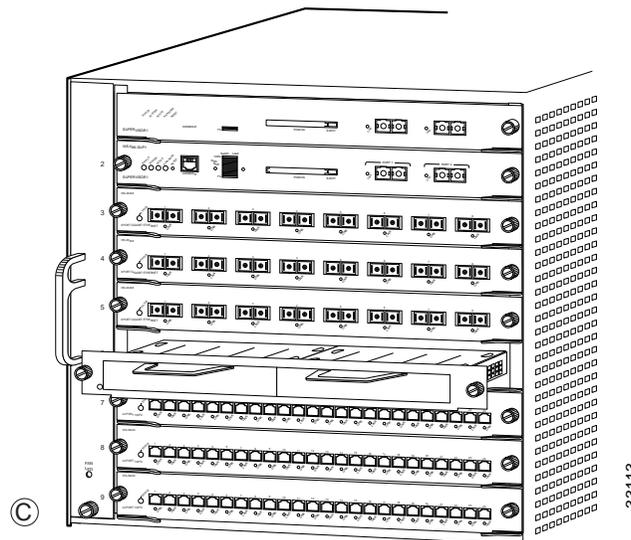
Carefully slide the new port adapter into the port adapter bay until the connector on the port adapter is completely seated in the connector at the rear of the port adapter slot. (See B.)

Step 5

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

Step 6

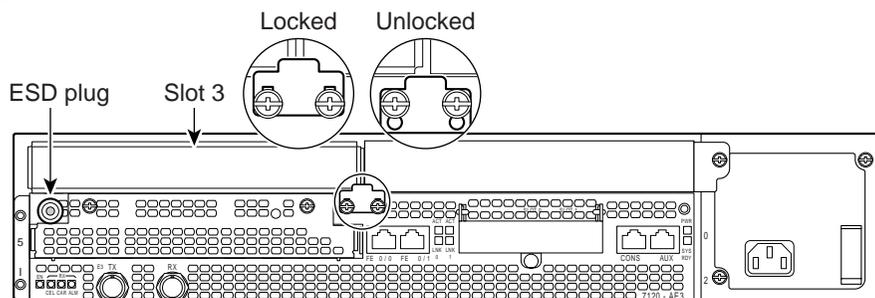
Reinstall the Catalyst 6000 FlexWAN module in the chassis, and tighten the captive installation screw on each side of the Catalyst 6000 FlexWAN module faceplate. (See C.)



Cisco 7100 Series Routers—Removing and Installing a Port Adapter

Step 1

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



Step 2

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

Step 3

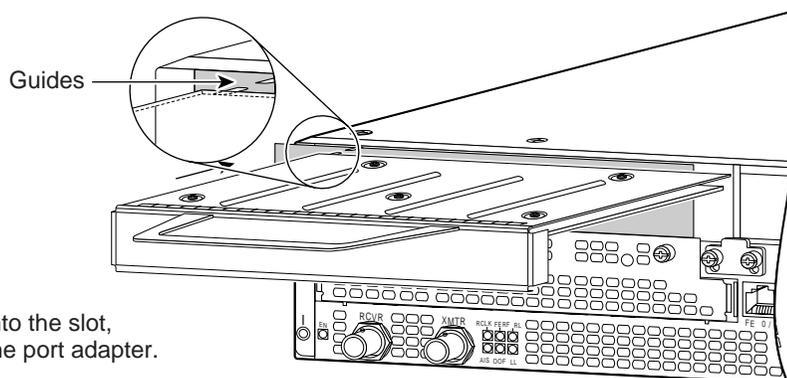
With the port adapter halfway out of the slot, disconnect all cables from the port adapter.

Step 4

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

Step 5

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



Step 6

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

Step 7

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

Step 8

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

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

Step 1

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

Step 2

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

Step 3

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

Step 4

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

Step 5

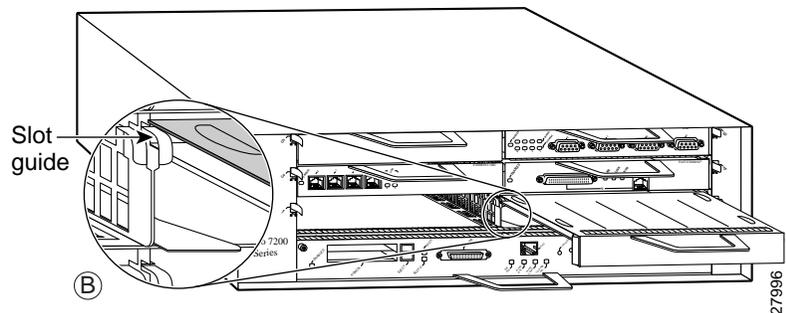
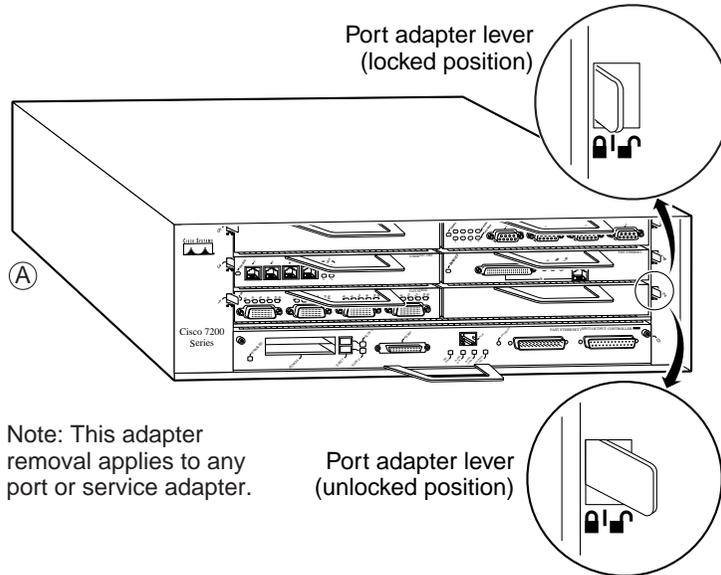
Carefully slide the new port adapter halfway into the port adapter slot. (See B.)

Step 6

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

Step 7

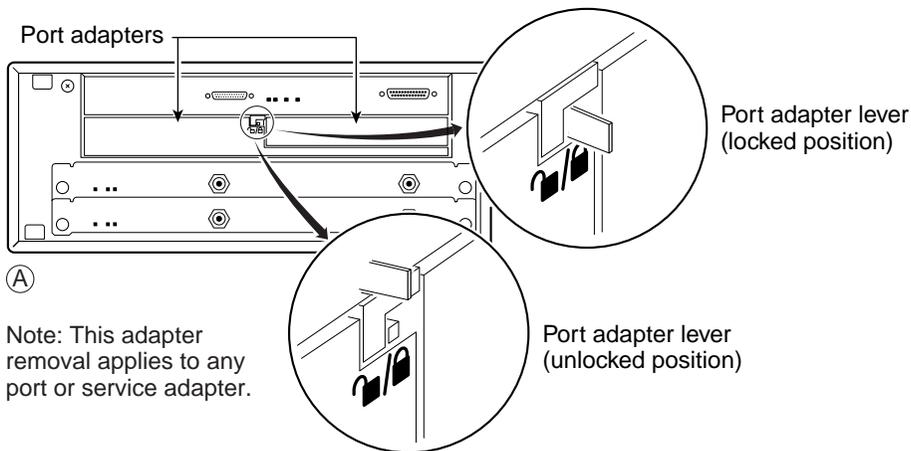
After the port adapter is properly seated, lock the port adapter lever. (See A.)



Cisco uBR7200 Series Routers—Removing a Port Adapter

Step 1

To remove the port adapter, unlock the port adapter retaining mechanism. The port adapter lever remains in the unlocked position.

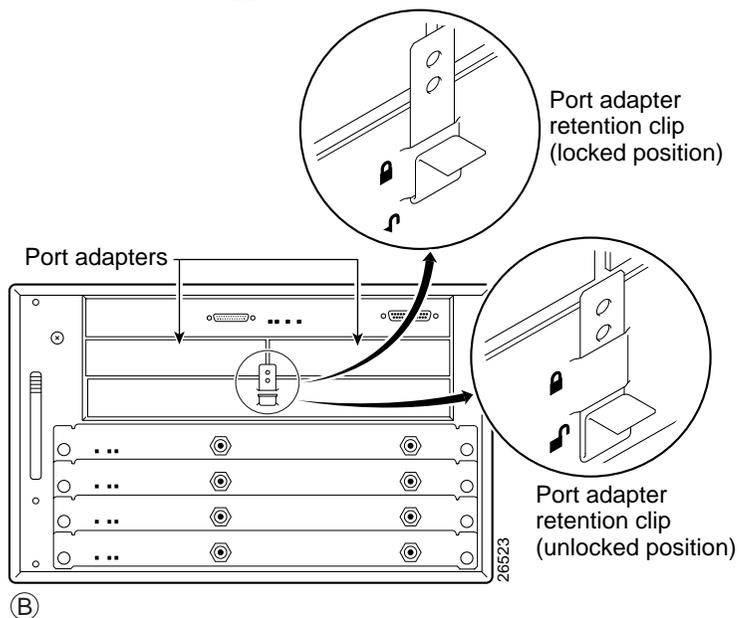


Place the port adapter lever (Cisco uBR7223, see A), or the port adapter retention clip (Cisco uBR7246 and Cisco uBR7246 VXR, see B) in the unlocked position. Either mechanism remains in the unlocked position.

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

Step 2

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



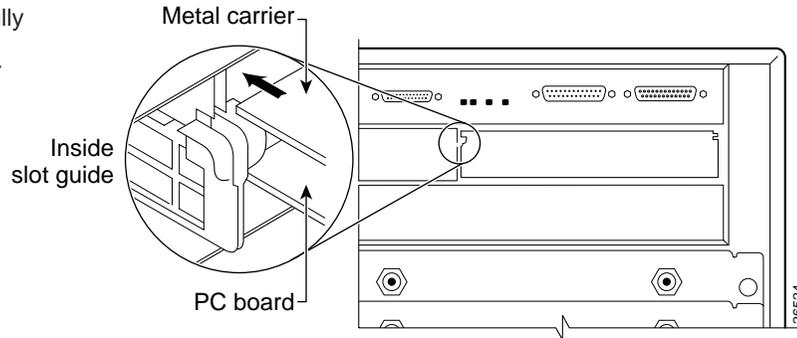
Step 3

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

Cisco uBR7200 Series Routers—Installing a Port Adapter

Step 1

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



Step 2

Carefully slide the new port adapter halfway into the port adapter slot.

Step 3

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

Step 4

After the port adapter is properly seated, lock the port adapter lever or retention clip, depending on your system. (See illustration on preceding page.)

Cisco 7201 Router—Removing and Installing a Port Adapter

Step 1

Use an ESD wrist strap to ground yourself to the router.

Step 2

To remove the port adapter, place the port adapter lever in the unlocked position. The port adapter lever remains in the unlocked position.

Step 3

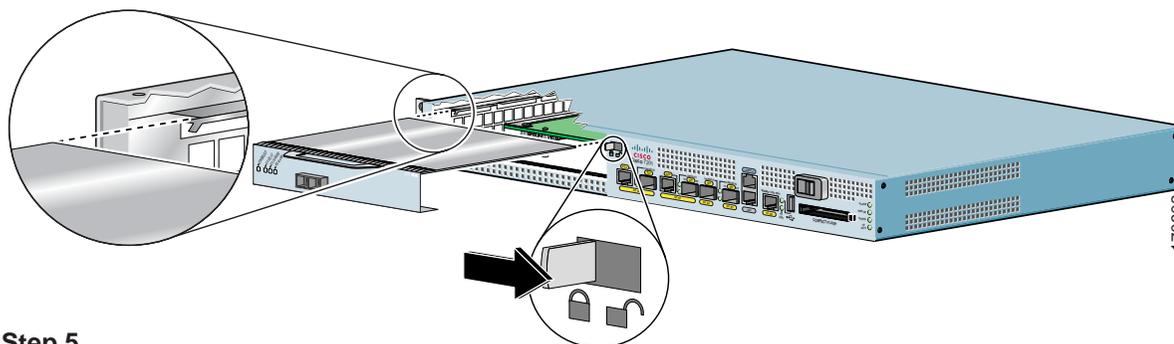
Grasp the handle of the port adapter and pull the port adapter about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 4

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

Caution

The port adapter must slide into the slot guides close to the chassis lid. Do not allow the port adapter components to come in contact with the system board or the port adapter could be damaged.



Step 5

To insert the port adapter, carefully align the port adapter carrier in the slot guides. Slide the new port adapter halfway into the chassis.

Step 6

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

Step 7

After the port adapter is properly seated, lock the port adapter lever.

Cisco 7301 Router—Removing and Installing a Port Adapter

Step 1

Use an ESD wrist strap to ground yourself to the router.

Step 2

To remove a port adapter, use a Phillips screwdriver to turn the screw holding the port adapter latch. The screw should be loose enough to allow the latch to rotate to an unlocked position. (See A.) The latch can rotate 360°.

Step 3

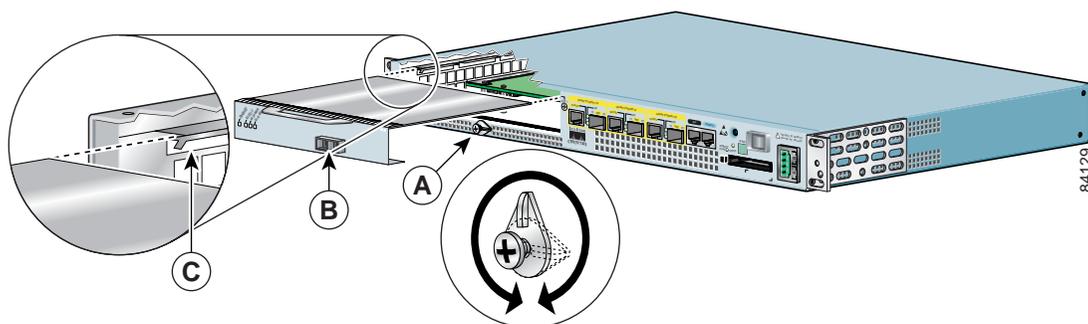
Grasp the handle and pull the port adapter from the router, about halfway out of its slot. (See B.) If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 4

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

Caution

The port adapter must slide into the slot guides close to the chassis lid. (See C.) Do not allow the port adapter components to come in contact with the system board or the port adapter could be damaged.



Step 5

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

Step 6

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

Step 7

After the port adapter is properly seated, turn and secure the port adapter latch in the upright, locked position. (See A.) Tighten the screw to ensure the port adapter remains firmly in place.

Cisco 7304 PCI Port Adapter Carrier Card—Removing and Installing a Port Adapter

You can install one single-width port adapter in a Cisco 7304 PCI Port Adapter Carrier Card. This section provides step-by-step instructions for removing and installing a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card.



Warning

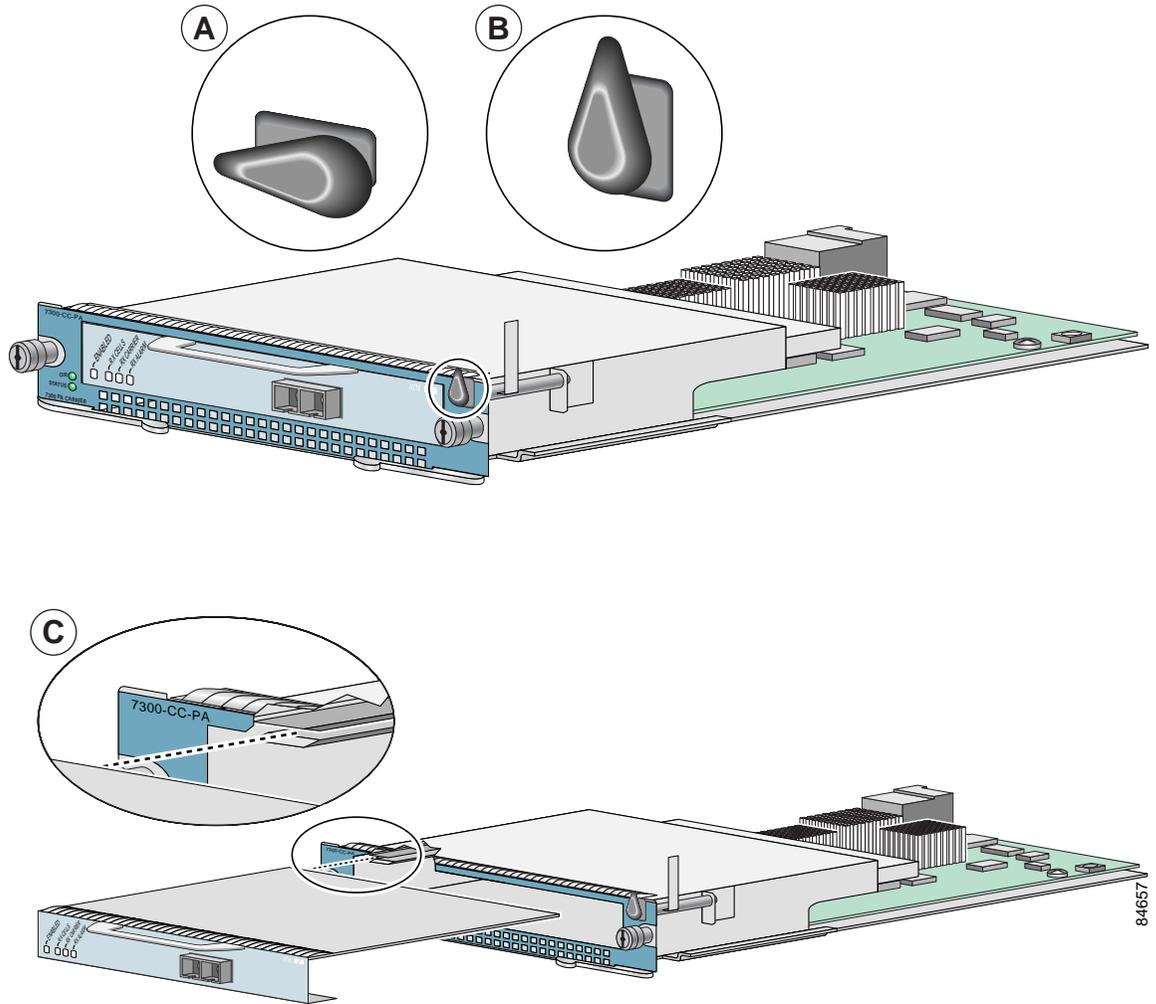
When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the Cisco 7304 PCI Port Adapter Carrier Card. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.

To remove and install a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card, refer to [Figure 3-2](#) and do the following:

- Step 1** If the Cisco 7304 PCI Port Adapter Carrier Card is still in the router, you must remove the Cisco 7304 PCI Port Adapter Carrier Card before removing a port adapter.
- Step 2** To remove the port adapter from the Cisco 7304 PCI Port Adapter Carrier Card, turn the port adapter lock from its locked and horizontal position shown in A of [Figure 3-2](#) to its unlocked and vertical position shown in B of [Figure 3-2](#).
- Step 3** Grasp the handle of the port adapter and pull the port adapter from the Cisco 7304 PCI Port Adapter Carrier Card. (You have already disconnected the cables from the port adapter when removing the Cisco 7304 PCI Port Adapter Carrier Card).
- Step 4** To insert the port adapter in the Cisco 7304 PCI Port Adapter Carrier Card, locate the guide rails inside the Cisco 7304 PCI Port Adapter Carrier Card that hold the port adapter in place. They are at the top left and top right of the port adapter slot and are recessed about an inch, as shown in C of [Figure 3-2](#).
- Step 5** Carefully slide the port adapter in the Cisco 7304 PCI Port Adapter Carrier Card until the port adapter makes contact with the port adapter interface connector. When fully seated, the port adapter front panel should be flush with the face of the Cisco 7304 PCI Port Adapter Carrier Card.
- Step 6** After the port adapter is properly seated, turn the port adapter lock to its locked and horizontal position, as shown in A of [Figure 3-2](#).

Figure 3-2 illustrates how to remove and install a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card.

Figure 3-2 Cisco 7304 PCI Port Adapter Carrier Card—Port Adapter Removal and Installation

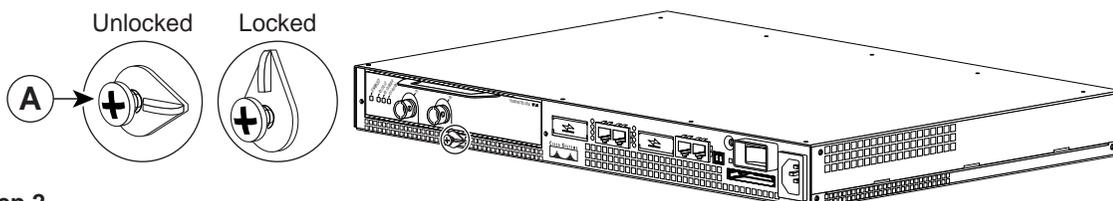


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Cisco 7401ASR Router—Removing and Installing a Port Adapter

Step 1

To remove the port adapter, use a number 2 Phillips screwdriver to loosen the screw on the port adapter latch. Rotate the port adapter latch until it clears the faceplate of the port adapter. (See A.) The latch can rotate 360°.



Step 2

Pull the port adapter from the router, about halfway out of its slot. (If you remove a blank port adapter, keep the blank port adapter for use in the router if you should ever remove the port adapter. The port adapter slot must always be filled.)

Step 3

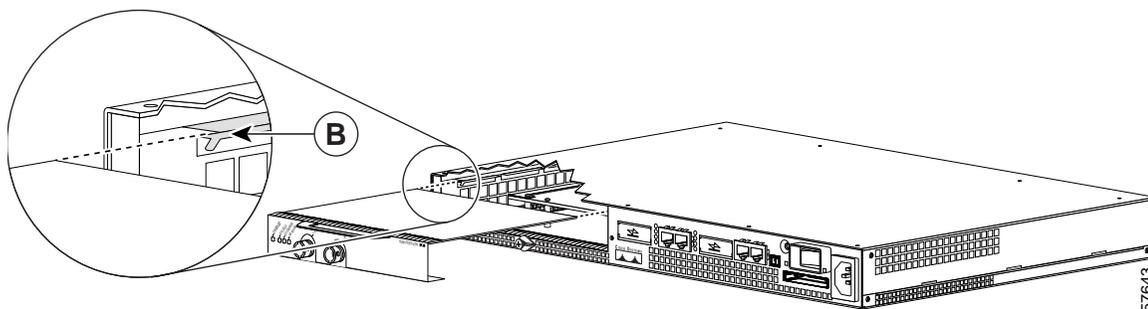
With the port adapter halfway out of the slot, disconnect all cables from the port adapter. After disconnecting the cables, pull the port adapter completely out of the chassis slot.

Step 4

To insert the port adapter, locate the port adapter slot guides inside the Cisco 7401ASR router. They are near the top, and are recessed about 1/2 inch. (See B.)

Caution

The port adapter must slide into the slot guides under the chassis lid. Do not allow the port adapter components to come in contact with the system board, or the port adapter could be damaged.



Step 5

Insert the port adapter in the slot guides halfway, and then reconnect the port adapter cables.

Step 6

After the cables are connected, carefully slide the port adapter all the way into the slot until the port adapter is seated in the router midplane. When installed, the port adapter input/output panel should be flush with the face of the router.

Step 7

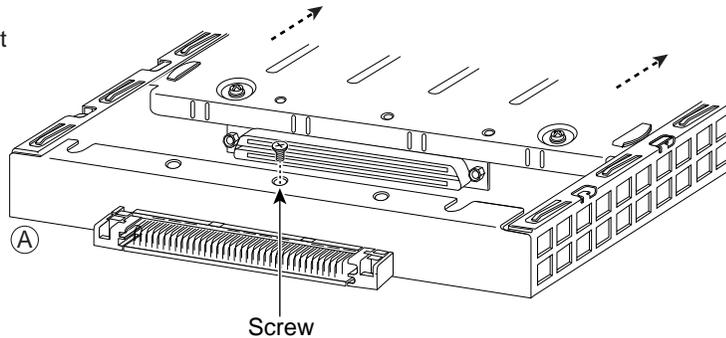
After the port adapter is properly seated, rotate the port adapter latch to the upright locked position and use a number 2 Phillips screwdriver to tighten the latch screw. If needed, loosen the latch screw to rotate the latch over the port adapter. Finish the installation by tightening the latch screw.

VIP—Removing and Installing a Port Adapter

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

Step 1

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

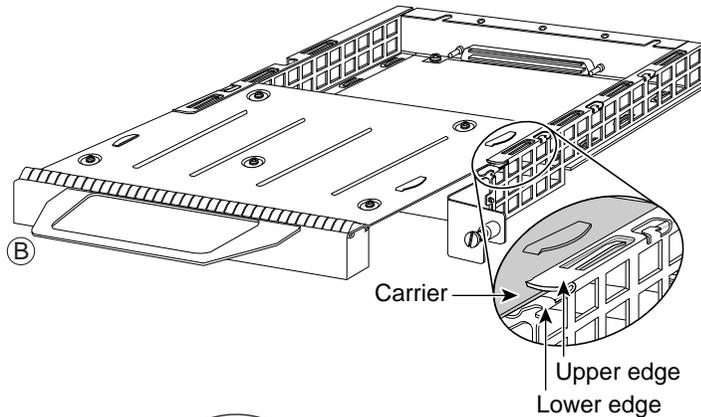


Step 2

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

Step 3

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

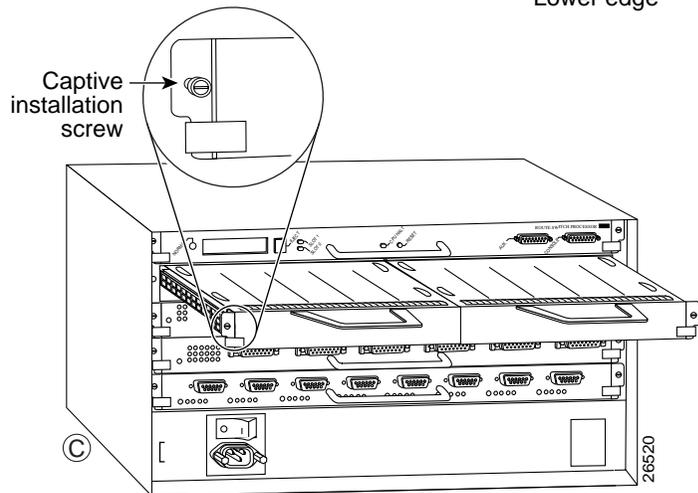


Step 4

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

Step 5

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



Step 6

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

Connecting an RJ-48C Shielded Cable

On a single multichannel DS1/PRI port adapter, you can use up to two (PA-MC-2T1), four (PA-MC-4T1,) or eight (PA-MC-8T1 or PA-MC-8DSX1) RJ-48C connections. RJ-48C shielded cables are not available from Cisco Systems; they are available from outside commercial cable vendors.

To connect RJ-48C shielded cables to the multichannel DS1/PRI port adapter, follow this procedure:

-
- Step 1** Attach the Category 3 or 5 UTP shielded cable directly to one of the RJ-48C ports on the multichannel DS1/PRI port adapter.
 - Step 2** Attach the network end of your RJ-48C shielded cable to your external equipment.
 - Step 3** Repeat Steps 1 and 2 for each of the remaining interfaces you want to install.



Note When you make a good connection of an RJ-48C shielded cable to a port on the multichannel DS1/PRI port adapter, it takes approximately 30 seconds for the system software to report that the line is up.

This completes the port adapter cable installation. Proceed to [Chapter 4, “Configuring the Multichannel DS1/PRI Interfaces,”](#) to configure the port adapter and complete the installation.



CHAPTER 4

Configuring the Multichannel DS1/PRI Interfaces

To continue your Cisco multichannel DS1/PRI port adapter installation, you must configure the DS1/PRI interfaces. The instructions that follow apply to all supported platforms. Minor differences among the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- [Using the EXEC Command Interpreter, page 4-1](#)
- [Configuring the Interfaces, page 4-2](#)
- [Checking the Configuration, page 4-18](#)

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 to 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.
- Step 3** When you enter the correct password, the system displays the privileged-level system prompt (#):
- ```
Router#
```
-

Proceed to the following section to configure the new interfaces.

Configuring the Interfaces

After you verify that the new multichannel DS1/PRI port adapter is installed correctly (the ENABLED LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

- Protocols and encapsulations you plan to use on the new interfaces.
- Protocol-specific information, such as IP addresses, if you plan to configure the interfaces for IP routing.
- A decision on whether the new interface will use bridging.
- ISDN switch type, for the configuring of ISDN PRI. (Table 4-1 lists ISDN service provider switch types.)



Note The Catalyst 6000 family FlexWAN module does not support ISDN.

- T1 information, for example, clock source, line code, and framing type.
- Channel group and PRI group information and time slot mapping.

Table 4-1 ISDN Service Provider Switch Types

Keywords by Area	Switch Type
Australia	
basic-ts013	Australian TS013 switches
Europe	
basic-1tr6	German 1TR6 ISDN switches
basic-nwnet3	Norwegian NET3 ISDN switches (phase 1)
basic-net3	NET3 ISDN switches (UK, Denmark, and other nations); covers the Euro-ISDN E-DSS1 signaling system)
basic-net5	NET5 switches (UK and Europe)
primary-net5	European ISDN PRI switches (UK and Europe)
vn2	French VN2 ISDN switches
vn3	French VN3 ISDN switches
Japan	
ntt	Japanese NTT ISDN switches
primary-ntt	Japanese ISDN PRI switches
North America	
basic-5ess	Lucent basic rate switches
basic-dms100	NT DMS-100 basic rate switches
basic-ni1	National (North American) ISDN-1 switches
primary-4ess	Lucent 4ESS switch type for the U.S. (ISDN PRI only)
primary-5ess	Lucent 5ESS switch type for the U.S. (ISDN PRI only)
primary-dms100	NT DMS-100 switch type for the U.S. (ISDN PRI only)
New Zealand	
basic-nznet3	New Zealand NET3 switches

If you installed a new multichannel DS1/PRI or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interfaces. If you replaced a multichannel DS1/PRI that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configurations.

For a summary of the configuration options available and instructions for configuring interfaces on a multichannel DS1/PRI, refer to the appropriate configuration publications listed in the [“Related Documentation”](#) section on page viii.

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

This section contains the following subsections:

- [Performing a Basic Interface Configuration, page 4-3](#)
- [Configuring the Controller, page 4-6](#)
- [Configuring the Interface, page 4-9](#)
- [Configuring Cyclic Redundancy Checks, page 4-10](#)
- [Customizing the Multichannel DS1/PRI Port Adapter, page 4-11](#)

Performing a Basic Interface Configuration

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

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

```
Router# disable
```

```
Router>
```

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

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

- Step 2** Specify the first interface to configure by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure.

Table 4-2 provides examples of the **interface serial** subcommand for the supported platforms.

Table 4-2 Examples of the interface serial Subcommand for the Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 0. Router(config)# interface serial 0/0:0 Router(config-if)#
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	interface serial , followed by <i>module-slot/bay/port:channel group</i> (module-slot-number/port-adapter-bay-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter bay 0 of a FlexWAN module in module slot 3. Router(config)# interface serial 3/0/0:0 Router(config-if)#
Cisco 7120 series router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 3. Router(config)# interface serial 3/0:0 Router(config-if)#
Cisco 7140 series router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 4. Router(config)# interface serial 4/0 Router(config-if)#
Cisco 7200 series routers and Cisco 7200 VXR routers	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 6. Router(config)# interface serial 6/0:0 Router(config-if)#
Cisco 7201 router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0:0 Router(config-if)#
Cisco uBR7223 router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0:0 Router(config-if)#
Cisco uBR7246 router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 2. Router(config)# interface serial 2/0:0 Router(config-if)#

Table 4-2 Examples of the interface serial Subcommand for the Supported Platforms (continued)

Platform	Command	Example
Cisco 7301 router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0:0 Router(config-if)#
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	interface serial , followed by <i>slot/port:channel group</i> (module-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router. Router(config)# interface serial 3/0:0 Router(config-if)
Cisco 7401ASR router	interface serial , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# interface serial 1/0:0 Router(config-if)#
VIP in Cisco 7000 series routers and Cisco 7500 series routers	interface serial , followed by <i>slot/port adapter/port:channel group</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1 of a VIP in interface processor slot 1. Router(config)# interface serial 1/1/0:0 Router(config-if)#

- Step 3** Assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand, as in the following example:

```
Router(config-if)# ip address 1.1.15.1 255.255.255.0
Router(config-if)#
```

- Step 4** Add any other interface subcommands required to enable routing protocols and adjust the interface characteristics.
- Step 5** After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode.
- Step 6** Write the new configuration to NVRAM as follows:

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

This completes the procedure for creating a basic configuration.

Configuring the Controller

The following steps make up a basic controller configuration for the multichannel DS1/PRI port adapter on each platform:

- Step 1** Enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:
- ```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```
- Step 2** Choose a T1 controller by entering the **controller t1** subcommand, followed by the interface address of the interface you plan to configure.

[Table 4-3](#) provides examples of the **controller t1** subcommand for the supported platforms.

**Table 4-3** Examples of the controller t1 Subcommand for the Supported Platforms

| Platform                                                             | Command                                                                                                                                                              | Example                                                                                                                                                                                        |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catalyst RSM/VIP2 in Catalyst 5000 family switches                   | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                              | The example is for interface 0 of a port adapter in port adapter slot 0.<br><br>Router(config)# <b>controller t1 0/0:0</b><br>Router(config-controller)#                                       |
| Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches | <b>controller t1</b> , followed by <i>module-slot/bay/port:channel group</i> (module-slot-number/port-adapter-bay-number/interface-port-number:channel-group-number) | The example is for interface 0 of a port adapter in port adapter bay 0 of a FlexWAN module in module slot 3.<br><br>Router(config)# <b>controller t1 3/0/0:0</b><br>Router(config-controller)# |
| Cisco 7120 series routers                                            | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                              | The example is for interface 0 of a port adapter in port adapter slot 3.<br><br>Router(config)# <b>controller t1 3/0:0</b><br>Router(config-controller)#                                       |
| Cisco 7140 series routers                                            | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                              | The example is for interface 0 of a port adapter in port adapter slot 4.<br><br>Router(config)# <b>controller t1 4/0:0</b><br>Router(config-controller)#                                       |
| Cisco 7200 series routers and Cisco 7200 VXR routers                 | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                              | The example is for interface 0 of a port adapter in port adapter slot 6.<br><br>Router(config)# <b>controller t1 6/0:0</b><br>Router(config-controller)#                                       |
| Cisco 7201 router                                                    | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                              | The example is for interface 0 of a port adapter in port adapter slot 1.<br><br>Router(config)# <b>controller t1 1/0:0</b><br>Router(config-controller)#                                       |

**Table 4-3** Examples of the controller t1 Subcommand for the Supported Platforms (continued)

| Platform                                                        | Command                                                                                                                                                                              | Example                                                                                                                                                                                                                 |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco uBR7223 router                                            | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                                              | The example is for interface 0 of a port adapter in port adapter slot 1.<br><br>Router(config)# <b>controller t1 1/0:0</b><br>Router(config-controller)#                                                                |
| Cisco uBR7246 router                                            | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                                              | The example is for interface 0 of a port adapter in port adapter slot 2.<br><br>Router(config)# <b>controller t1 2/0:0</b><br>Router(config-controller)#                                                                |
| Cisco 7301 router                                               | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                                              | The example is for interface 0 of a port adapter in port adapter slot 1.<br><br>Router(config)# <b>controller t1 1/0:0</b><br>Router(config-controller)#                                                                |
| Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router | <b>controller t1</b> , followed by <i>module-slot/port:channel group</i> (module-slot-number/interface-port-number:channel-group-number)                                             | The example is for interface 0 on a port adapter in a Cisco 7304 PCI Port Adapter Carrier Card in module slot 3 of a Cisco 7304 router.<br><br>Router(config)# <b>controller t1 3/0:0</b><br>Router(config-controller)# |
| Cisco 7401ASR router                                            | <b>controller t1</b> , followed by <i>slot/port:channel group</i> (port-adapter-slot-number/interface-port-number:channel-group-number)                                              | The example is for interface 0 of a port adapter in port adapter slot 1.<br><br>Router(config)# <b>controller t1 1/0:0</b><br>Router(config-controller)#                                                                |
| VIP in Cisco 7000 series and Cisco 7500 series routers          | <b>controller t1</b> , followed by <i>slot/port adapter/port:channel group</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number:channel-group-number) | The example is for interface 0 of a port adapter in port adapter slot 1 of a VIP in interface processor slot 1.<br><br>Router(config)# <b>controller t1 1/1/0:0</b><br>Router(config-controller)#                       |

- Step 3** In controller configuration mode, enter the **framing [sf | esf]** configuration subcommand to set the framing format, as in the following example:

```
Router(config-controller)# framing esf
```

Use the **no** form of this command to restore the default, SF.

- Step 4** Enter the **clock source [internal | line]** configuration subcommand to set the clock source, as in the following example:

```
Router(config-controller)# clock source internal
```

Use the **no** form of this command to restore the default, line.

- Step 5** Enter the **channel-group** *number timeslots value [speed {56 | 64}]* configuration subcommand to set the channel group, as in the following example:

```
Router(config-controller)# channel-group 0 timeslots 1-24 speed 56
```



**Note** When the multichannel DS1/PRI port adapter is being used with AMI encoding, it must be configured as 64K or invert data mode.



**Note** The channel-group number can be from 0 to 23 and the time slot value can be from 1 to 24. The maximum number of channel groups per each 8-port multichannel DS1/PRI port adapter is 128.

- Step 6** Enter the **pri-group** *timeslots value* configuration subcommand to set the PRI group, as in the following example:

```
Router(config-controller)# pri-group timeslots 1-24
```



**Note** The channel-group number can be from 0 to 23 and the time slot value can be from 1 to 24.

- Step 7** Enter the **description** controller configuration subcommand (containing a line of up to 80 characters describing this controller) to set the description, as in the following example:

```
Router(config-controller)# description Arizona 3 Router; location: building 2
```

- Step 8** Enter the **cablelength** *{long [gain26 | gain36] [0db | -7.5db | -15db | -22.5db]}* configuration subcommand to set the cable length, as in the following example:

```
Router(config-controller)# cablelength long gain26 -15db
```

Enter the **no** form of this command to restore the default, gain36, 0dB.

For the PA-MC-8DSX1 port adapter, set the cable length by entering the **cablelength** *{short [133 | 266 | 399 | 533 | 655]}* command, as in the following example:

```
Router(config-controller)# cablelength short 266
```

Use the **no** form of this command to return to the default, 133. The range of values for the short-haul cable lengths is from 0 to 655 feet.

- Step 9** Enter the **fdl** *{att | ansi}* configuration subcommand to set the Facilities Data Link (FDL), as in the following example:

```
Router(config-controller)# fdl ansi
```

Use the **no** form of this command to disable FDL.



**Note** The **fdl** configuration subcommand is not allowed in SF mode.

- Step 10** Enter the **shutdown** configuration subcommand to shut down the controller, as in the following example:

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

To exit controller configuration mode and return to global configuration mode, enter the **exit** command.  
To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

## Configuring the Interface

The following steps make up a basic interface configuration for the multichannel DS1/PRI port adapter:

- 
- Step 1** At the privileged-level prompt, enter configuration mode and specify that the console terminal will be 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 by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure. [Table 4-2 on page 4-4](#) provides examples.
- Step 3** Set the encapsulation used by the interface by entering the **encapsulation {frame-relay | hdlc | ppp | smds | x25}** configuration subcommand, as in the following example:
- ```
Router(config-if)# encapsulation ppp
```
- Step 4** In interface configuration mode, set the description by entering the **description** configuration subcommand (containing a line of up to 80 characters describing this interface), as in the following example:
- ```
Router(config-if)# description PPP channel 5
```
- Step 5** Configure additional interfaces as required.
- Step 6** When you have included all of the configuration subcommands to complete the configuration, press **Ctrl-Z** to exit configuration mode.
- Step 7** Write the new configuration to NVRAM as follows:
- ```
Router# copy running-config startup-config
[OK]
Router#
```
- 

To check the interface configuration using **show** commands, proceed to the [“Checking the Configuration” section on page 4-18](#).

## Configuring Cyclic Redundancy Checks

Cyclic redundancy check (CRC) is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. All interfaces use a 16-bit CRC (CRC-CITT) by default but also support a 32-bit CRC. The sender of a data frame calculates the frame check sequence (FCS). Before it sends a frame, the sender appends the FCS value to the message. The receiver recalculates the FCS and compares its calculation to the FCS from the sender. If there is a difference between the two calculations, the receiver assumes that a transmission error occurred and sends a request to the sender to re send the frame.

Table 4-4 summarizes CRC commands.

**Table 4-4** CRC Commands

| Purpose                       | Command            | Example                                                                                                                                                                                          |
|-------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable 32-bit CRC.            | <b>crc size</b>    | The example enables 32-bit CRC on a serial interface:<br><br><pre>Router(config)# <b>interface serial 3/0:0</b> Router(config-if)# <b>crc 32</b></pre>                                           |
| Return to default 16-bit CRC. | <b>no crc size</b> | The example disables 32-bit CRC on a serial interface and returns to the default 16-bit CRC:<br><br><pre>Router(config)# <b>interface serial 3/0:0</b> Router(config-if)# <b>no crc 32</b></pre> |

Enable 32-bit CRC using the **crc 32** command. Before you can enable 32-bit CRC, you must use the **interface serial** command (followed by the interface address of the interface) to select the interface on which you want to enable 32-bit CRC. This command functions in the same way on all supported platforms.

In the example that follows, 32-bit CRC is specified. This example applies to all systems in which the multichannel DS1/PRI port adapter is supported.

```
Router(config-if)# crc 32
```

Use the **no crc 32** command to disable 32-bit CRC and return the interface to the default 16-bit CRC (CRC-CITT) setting.

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

Then write the new configuration to NVRAM using the **copy running-config startup-config** command.

For command descriptions, refer to the *Configuration Fundamentals Configuration Guide* on Cisco.com.

To check the interface configuration using **show** commands, proceed to the [“Checking the Configuration”](#) section on page 4-18.

## Customizing the Multichannel DS1/PRI Port Adapter

You can customize the DS1/PRI port adapter. The features you can customize have default values that will probably suit your environment and not need to be changed. 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 DS1/PRI port adapter:

- [Configuring Multichannel T1 Interfaces, page 4-11](#)
- [Configuring Multichannel T1 ISDN PRI Interfaces, page 4-13](#)
- [Specifying T1 Framing, page 4-17](#)
- [Setting the Cable Length, page 4-18](#)

## Configuring Multichannel T1 Interfaces

Following are instructions for a basic multichannel T1 configuration (enabling a controller and specifying IP routing). You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available, refer to the publications listed in the [“Related Documentation” section on page viii](#).

The channel groups must be mapped before the multichannel DS1/PRI controller can be configured. The following are controller commands used to map the channel group (the default variable is listed first):

- **controller t1** *port-adapter-slot-number/interface-port-number* (for Catalyst RSM/VIP2)
- **controller t1** *module-slot-number/port-adapter-bay-number/interface-port-number* (for Catalyst 6000 family FlexWAN module)
- **controller t1** *port-adapter-slot-number/interface-port-number* (for Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router)
- **controller t1** *module-slot-number/interface-port-number* (for Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router)
- **controller t1** *interface-processor-slot-number/port-adapter-slot-number/interface-port-number* (for VIP)
- **clock source** [*line* | *internal*]
- **framing** [*sf* | *esf*]
- **linecode** [*ami* | *b8zs*]
- **invert data**
- **loopback** [*diagnostic* | *local* | *remote*]
- **shutdown**
- **channel-group** *number timeslots list [speed {56 | 64}]*

The argument *number* is the channel group 0 to 23.

The argument *list* is a number between 1 and 24. You can enter time slots individually and separate them by commas or enter them as a range separated by a hyphen (for example, 1-3, 8, 9-18). Time slot 0 is an illegal configuration.

Use *speed* specify the DS0 speed of the channel group; 64 kbps is the default.

In the following procedure, press the **Return** key after each configuration step:

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

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

- Step 2** Choose a T1 controller by entering the **controller t1** subcommand, followed by the interface address of the interface you plan to configure. [Table 4-3](#) provides examples of the **controller t1** subcommands for the supported platforms.

- Step 3** At the prompt, specify the clock source for the controller. The **clock source** command determines which end of the circuit provides the clocking signal.

```
Router(config-controller)# clock source line
```



**Note** You can set the clock source to use internal clocking for testing purposes. One end of a T1 circuit must provide the clock source.

- Step 4** Specify the **framing** type:

```
Router(config-controller)# framing esf
```

- Step 5** Specify the **linecode** format:

```
Router(config-controller)# linecode b8zs
Router(config-controller)#
```

- Step 6** Enter the **channel-group** modification command to specify the channel group and time slots to be mapped.



**Note** The maximum number of channel groups per each 8-port multichannel DS1/PRI port adapter is 128.

The following example shows channel group 0 and time slots 1, 3 through 5, and 7 selected for mapping on a VIP:

```
Router(config-controller)# channel-group 0 timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1/1:0,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1/1:0,
changed state to up
Router(config-controller)#
```

- Step 7** Specify the interface to modify by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure. [Table 4-2](#) provides examples of the **interface serial** subcommand for the supported platforms.

- Step 8** Assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand as in the following example:

```
Router(config-int)# ip address 1.1.15.1 255.255.255.0
Router(config-int)#
```

- Step 9** Add any other configuration subcommands required to enable routing protocols and adjust the interface characteristics.
- Step 10** Use the **no shutdown** command to reenab the interfaces.
- Step 11** After including all of the configuration subcommands, to complete the configuration, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) to exit configuration mode.
- Step 12** Write the new configuration to memory:
- ```
Router# write memory
```
- The system displays an OK message when the configuration is stored.
- Step 13** Exit the privileged level and return to the user level by entering **disable** at the prompt:
- ```
Router# disable

Router>
```

---

This completes the procedure for creating a basic channelized T1 configuration. Proceed to the [“Checking the Configuration” section on page 4-18](#) to check the interface configuration using **show** commands. For additional information about configuring channelized T1 interfaces, refer to the publications *Wide-Area Networking Configuration Guide* and *Wide-Area Networking Command Reference* on Cisco.com.

## Configuring Multichannel T1 ISDN PRI Interfaces



### Note

---

The Catalyst 6000 family FlexWAN module does not support ISDN.

---

Following are instructions for a basic multichannel T1 ISDN PRI configuration (enabling a controller and specifying IP routing). You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available, refer to the publications listed in the [“Related Documentation” section on page viii](#).

The PRI group must be mapped before the multichannel DS1/PRI controller can be configured (there is only one PRI group for each controller). The following are controller commands used to map the PRI group:

- **isdn switch-type** *switch-type*
- **controller t1** *port-adapter-slot-number/interface-port-number* (for Catalyst RSM/VIP2)
- **controller t1** *port-adapter-slot-number/interface-port-number* (for Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, Cisco uBR7200 series routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router)
- **controller t1** *module-slot-number/interface-port-number* (for Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router)
- **controller t1** *interface-processor-slot-number/port-adapter-slot-number/interface-port-number* (for VIP)
- **clock source line**
- **framing esf**

- **linecode b8zs**
- **invert data**
- **loopback** [**diagnostic** | **local** | **remote**]
- **shutdown**
- **pri-group** [**timeslots** *list*][*speed* {**56** | **64**}]

The argument *list* is a number between 1 and 24. (Time slots 1 to 23 represent the B channels, and time slot 24 represents the D channel. You can enter time slots individually and separate them by commas or enter them as a range separated by a hyphen (for example, 1-3, 8, 9-18). The default DS0 speed of the PRI group is 64 kbps.



**Note**

If you do not specify the time slots, the controller is configured for 23 B channels (time slots 1 to 23) and one D channel (time slot 24).

The Catalyst RSM/VIP2 identifies the PRI group as a serial interface by port adapter slot (0 or 1), port number (0 or 1), and time slot 23. For example, the address of the multichannel DS1/PRI port adapter installed in port adapter slot 1, port 1, and time slot 23, would be recognized by the system as serial 1/1:23.

The Catalyst RSM/VIP2 does not support the PA-MC-2T1 multichannel DS1/PRI port adapter.



**Note**

The Catalyst 6000 family FlexWAN module does not support ISDN.

Cisco 7100 series routers, Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers identify the PRI group as a serial interface by port adapter slot number, port number (0 or 1), and time slot 23. For example, the address of the multichannel DS1/PRI port adapter installed in port adapter slot 1, port 1, and time slot 23, would be recognized by the system as serial 1/1:23.

The Cisco 7201 router, Cisco 7301 router, and Cisco 7401ASR router identify the PRI group as a serial interface by port adapter slot number, port number (0 or 1), and time slot 23. For example, the address of the multichannel DS1/PRI port adapter installed in port adapter slot 1, port 1, and time slot 23, would be recognized by the system as serial 1/1:23.

The Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router identifies the PRI group as a serial interface by port adapter slot number (2 through 5), port number (0 or 1), and time slot 23. For example, the address of the multichannel DS1/PRI port adapter installed in port adapter slot 3, port 1, and time slot 23, would be recognized by the system as serial 3/1:23.

Cisco 7000 series routers and Cisco 7500 series routers identify the PRI group as a serial interface by chassis slot number, port adapter slot (0 or 1), port number (0 or 1), and time slot 23. For example, the address of the multichannel DS1/PRI port adapter installed in chassis slot 4, port adapter slot 1, port 1, and time slot 23, would be recognized by the system as serial 4/1/1:23.

In the following procedure for a basic multichannel T1 ISDN PRI configuration, press **Return** after each configuration step:

**Step 1**

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

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

- Step 2** Identify the ISDN switch type. In the following example, the switch primary-5ess (a switch for the United States) is identified as the switch type:

```
Router(config)# isdn switch-type primary-5ess
```




---

**Note** The ISDN switch type that you identify is for all ISDN ports installed in the router.

---

- Step 3** Choose a T1 controller by entering the **controller t1** subcommand, followed by the interface address of the interface you plan to configure. [Table 4-3](#) provides examples of the **controller t1** subcommand for supported platforms.

- Step 4** At the prompt, specify the clock source for the controller. The **clock source line** command determines which end of the circuit provides the clocking signal.

```
Router(config-controller)# clock source line
```




---

**Note** You can set the clock source to use internal clocking for testing purposes. One end of a T1 circuit must provide the clock source.

---

- Step 5** Specify the **framing** type:

```
Router(config-controller)# framing esf
```

- Step 6** Specify the **linecode** format:

```
Router(config-controller)# linecode b8zs
Router(config-controller)#
```

- Step 7** Use the **pri-group** modification command to specify the time slots to map. The following examples show PRI-group time slots 1, 3 through 5, and 7 (the B channels) mapped to time slot 24 (the D channel), which is recognized by the system as time slot 23.

For the Catalyst RSM/VIP2:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1:23,
changed state to up
Router(config-controller)#
```

For Cisco 7100 series routers:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to up
Router(config-controller)#
```

For Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1:23,
changed state to down
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1:23,
changed state to up
Router(config-controller)#
```

For the Cisco 7201 router:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to up
Router(config-controller)#
```

For the Cisco 7301 router:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to up
Router(config-controller)#
```

For the Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to up
Router(config-controller)#
```

For the Cisco 7401ASR router:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial4/1:23,
changed state to up
Router(config-controller)#
```

For the VIP:

```
Router(config-controller)# pri-group timeslots 1,3-5,7
Router(config-controller)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1/1:23,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/1/1:23,
changed state to up
Router(config-controller)#
```




---

**Note** In the preceding examples, the line-protocol status for time slot 24 (listed in the output as time slot 23) represents the entire PRI group.

---

- Step 8** Specify the interface to modify by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure. For multichannel T1 ISDN PRI, the PRI group is configured using time slot 24, which is recognized by the system as time slot 23 (for example, the VIP2 would be 3/1/1:23).

- Step 9** If IP routing is enabled on the system, assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand as in the following example:
- ```
Router(config-int)# ip address 1.1.15.1 255.255.255.0
Router(config-int)#
```
- Step 10** Add any other configuration subcommands required to enable routing protocols and adjust the interface characteristics.
- Step 11** Use the **no shutdown** command to re enable the interfaces.
- Step 12** After including all of the configuration subcommands, to complete the configuration, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) to exit configuration mode.
- Step 13** Write the new configuration to memory:
- ```
Router# write memory
```
- The system displays an OK message when the configuration is stored.
- Step 14** Exit the privileged level and return to the user level by entering **disable** at the prompt:
- ```
Router# disable

Router>
```

This completes the procedure for creating a basic multichannel T1 ISDN PRI configuration. Proceed to the [“Checking the Configuration” section on page 4-18](#) to check the interface configuration information using **show** commands. For dialer interface configuration and additional multichannel T1 ISDN PRI interface configuration information, refer to the publications *Wide-Area Networking Configuration Guide* and *Wide-Area Networking Command Reference* on Cisco.com.

Specifying T1 Framing

In controller configuration mode, specify T1 framing by entering the **framing [sf | esf]** configuration subcommand, as in the following example:

```
Router(config-controller)# framing sf
```

Use the **no** form of this command to return to the default, ESF framing.



Note If you specify SF framing, you must have 56-kbps speed or inverted data to avoid errors.

Setting the Cable Length

For the PA-MC-2T1, PA-MC-4T1, and PA-MC-8T1, in controller configuration mode, set the cable length by entering the **cablelength** [long {gain26 | gain 36} {0db | -7.5db | -15db | -22.5db} short {133 | 266 | 399 | 533 | 655}] command, as in the following example:

```
Router(config-controller)# cablelength long gain26 -15db
```

Use the **no** form of this command to return to the default, gain36, 0dB.



Note

Each T1 port can operate in long-haul or short-haul mode. In long-haul mode, the user must specify the gain and the line build-out. The default values are gain26 with 0dB line build-out. In short-haul mode, the user must specify the cable length in feet. The range is from 0 to 655 feet. The actual mapping is shown in [Table 4-5](#).

For the PA-MC-8DSX1, in controller configuration mode, set the cable length by entering the **cablelength** {short [133 | 266 | 399 | 533 | 655]} command, as in the following example:

```
Router(config-controller)# cablelength short 266
```

Use the **no** form of this command to return to the default, 133. The range of values for the short-haul cable lengths is from 0 to 655 feet.

[Table 4-5](#) provides the cable length range values for the **cablelength short** command.

Table 4-5 Mapping of Cable Length Values to Range

Range (feet)	Value
0 to 133	133
133 to 266	266
266 to 399	399
399 to 533	533
533 to 655	655

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, use the **ping** command to check connectivity, use the **loopback** command to verify the physical interface, and use the BERT to check bit errors. This section includes the following subsections:

- [Using show Commands to Verify the New Interface Status, page 4-19](#)
- [Using the ping Command to Verify Network Connectivity, page 4-37](#)
- [Using loopback Commands, page 4-38](#)
- [Checking Bit Errors Using a BERT, page 4-41](#)

Using show Commands to Verify the New Interface Status

Table 4-6 provides a list of **show** commands and their functions. This section will help you to verify that new interfaces are configured and operating correctly and that the multichannel DS1/PRI port adapter appears correctly in them. Sample displays of the output of selected **show** commands appear in the sections that follow. For complete command descriptions and examples, refer to the publications listed in the “[Related Documentation](#)” section on page viii.


Note

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

Table 4-6 Using show Commands

Command	Function	Example
show version or show hardware	Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images	Router# show version
show controllers	Displays all the current interface processors and their interfaces	Router# show controllers
show controllers t1	Displays the status of each installed T1 interface	Router# show controllers t1
show diag slot Note The <i>slot</i> argument is not required with Catalyst 5000 family switches.	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	Router# show diag 2
show interfaces type 0 or 1/ interface-port-number	Displays status information about a specific type of interface (for example, serial) on a Catalyst RSM/VIP2	Router# show interfaces serial 1/0
show interfaces type module-slot- number/port-adapter-bay-number/ interface-port-number	Displays status information about a specific type of interface (for example, serial) on a Catalyst 6000 family FlexWAN module	Router# show interfaces serial 3/0/0
show interfaces type 3/interface-port- number	Displays status information about a specific type of interface (for example, serial) in a Cisco 7120 series router	Router# show interfaces serial 3/0
show interfaces type 4/interface-port- number	Displays status information about a specific type of interface (for example, serial) in a Cisco 7140 series router	Router# show interfaces serial 4/0

Table 4-6 Using show Commands (continued)

Command	Function	Example
show interfaces <i>type port-adapter-slot-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco 7200 series router, Cisco 7200 VXR router, Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router	Router# show interfaces serial 1/0
show interfaces <i>type 1/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7223 router	Router# show interfaces serial 1/1
show interfaces <i>type 1 or 2/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7246 router	Router# show interfaces serial 2/0
show interfaces <i>type module-slot-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) on a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	Router# show interfaces serial 3/0
show interfaces <i>type interface-processor-slot-number/port-adapter-slot-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) on a VIP in a Cisco 7000 series router or Cisco 7500 series router	Router# show interfaces serial 3/1/0
show isdn status	Displays all the ISDN interfaces installed in the router and the ISDN switch type for the interfaces	Router# show isdn status
show protocols	Displays protocols configured for the entire system and for specific interfaces	Router# show protocols
show running-config	Displays the running configuration file	Router# show running-config
show startup-config	Displays the configuration stored in NVRAM	Router# show startup-config

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

- [Using the show version Commands, page 4-21](#)
- [Using the show diag Command, page 4-26](#)
- [Using the show interfaces Command, page 4-31](#)

Choose the subsection appropriate for your system. Proceed to the [“Using the ping Command to Verify Network Connectivity”](#) section on page 4-37 when you have finished using the **show** commands.

Using the show version Commands

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



Note

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

The following sections provide platform-specific output examples using the **show version** command:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command, page 4-21](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show version Command, page 4-22](#)
- [Cisco 7100 Series Routers—Example Output of the show version Command, page 4-22](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command, page 4-23](#)
- [Cisco 7201 Router—Example Output of the show version Command, page 4-24](#)
- [Cisco 7301 Router—Example Output of the show version Command, page 4-24](#)
- [Cisco 7401ASR Router—Example Output of the show version Command, page 4-25](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command, page 4-26](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 5000 family switch with a multichannel DS1/PRI port adapter installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-PV-M), Version 11.1(20)CC
Synced to mainline version: 11.1(13.5)CA
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 24-Nov-97 23:59 by jroumas
Image text-base: 0x60010900, data-base: 0x60708000
ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM
SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fcl)
potent7505-1 uptime is 5 hours, 30 minutes
System restarted by reload
System image file is "potent/rsp-pv-mz.DTP7", booted via tftp from
171.69.209.28
cisco RSP1 (R4700) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
```

```
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
2 VIP2 controllers (8 Ethernet)(8 T1).
8 Ethernet/IEEE 802.3 interfaces.
3 Serial network interfaces.
8 multichannel T1/PRI ports.
125K bytes of non-volatile configuration memory.
16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

Catalyst 6000 Family FlexWAN Module—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 6000 family FlexWAN module with a PA-MC-8T1 installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-PV-M), Version 11.1(20)CC
Synced to mainline version: 11.1(13.5)CA
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 24-Nov-97 23:59 by jroumas
Image text-base: 0x60010900, data-base: 0x60708000
ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM
SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
potent7505-1 uptime is 5 hours, 30 minutes
System restarted by reload
System image file is "potent/rsp-pv-mz.DTP7", booted via tftp from
171.69.209.28
cisco RSP1 (R4700) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
2 VIP2 controllers (8 Ethernet)(8 T1).
8 Ethernet/IEEE 802.3 interfaces.
3 Serial network interfaces.
8 multichannel T1/PRI ports.
125K bytes of non-volatile configuration memory.
16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

Cisco 7100 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7120 series router with a PA-MC2T1 installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) EGR Software (c7100-IS-M), Version 12.0(4)XE,
TAC:Home:SW:IOS:Specials for info
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Thu 10-Jun-99 15:32 by linda
Image text-base:0x60008900, data-base:0x60D8E000
```

```

ROM:System Bootstrap, Version 12.0(19990720:023243)
[gautham-conn_4xe-PRE_ALPHE
BOOTFLASH:EGR Software (c7100-IS-M), Version 12.0(4)XE,

Router uptime is 24 minutes
System restarted by power-on
System image file is "disk0:c7100-is-mz.120-4.XE"

cisco 7120-bad (EGR) processor with 61440K/69632K bytes of memory.
R527x CPU at 225Mhz, Implementation 40, Rev 10.0, 2048KB L2 Cache
Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
2 FastEthernet/IEEE 802.3 interface(s)
125K bytes of non-volatile configuration memory.

40960K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2000

```

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7200 series router with a multichannel DS1/PRI port adapter installed:

```

Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (7200-PV-M), Version 11.1(20)CC
Synched to mainline version: 11.1(13.5)CA
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 24-Nov-97 23:59 by jroumas
Image text-base: 0x60010900, data-base: 0x60708000
ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM
SOFTWARE
ROM: GS Software (C7200-BOOT-M), Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fcl)
router uptime is 5 hours, 30 minutes
System restarted by reload
System image file is "c7200-mz.DTP7", booted via tftp from
171.69.209.28
cisco 7206 (NPE150) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
8 Ethernet/IEEE 802.3 interfaces.
3 Serial network interfaces.
8 Channelized T1/PRI ports.
125K bytes of non-volatile configuration memory.
16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0

```

Cisco 7201 Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7201 router:

```
Router# show version

Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alphan uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

Cisco 7301 Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco router with a multichannel DS1/PRI port adapter installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7301 Software (C7300-JS-M), Experimental Version 12.2(20020904:004736) [biff 107]
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Mon 09-Sep-02 18:02 by biff
Image text-base:0x600088F8, data-base:0x61A94000

ROM: System Bootstrap, Version 12.2(20020730:200705) [biff-TAZ2_QA_RELEASE_16B 101],
DEVELOPMENT SOFTWARE
BOOTLDR:7301 Software (C7301-BOOT-M), Experimental Version 12.2(20020813:014224)
[biff-TAZ2_QA_RELEASE_17B 101]

7301p2b uptime is 0 minutes
System returned to ROM by reload at 00:01:51 UTC Sat Jan 1 2000
System image file is "tftp://10.1.8.11/tazii/images/c7301-js-mz"

cisco 7301 (NPE-G1) processor (revision A) with 491520K/32768K bytes of memory.
Processor board ID 0
```

```

BCM1250 CPU at 700Mhz, Implementation 1, Rev 0.2, 512KB L2 Cache
1 slot midplane, Version 2.0

Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
3 Gigabit Ethernet/IEEE 802.3 interface(s)
509K bytes of non-volatile configuration memory.

62976K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
32768K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x102

```

Cisco 7401ASR Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7401ASR router with a multichannel DS1/PRI port adapter installed:

```

Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (7401ASR-PV-M), Version 11.1(20)CC
Synced to mainline version: 11.1(13.5)CA
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 24-Nov-97 23:59 by jroumas
Image text-base: 0x60010900, data-base: 0x60708000
ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM
SOFTWARE
ROM: GS Software (C7401ASR-BOOT-M), Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
router uptime is 5 hours, 30 minutes
System restarted by reload
System image file is "c7401ASR-mz.DTP7", booted via tftp from
171.69.209.28
cisco 7206 (NPE150) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
8 Ethernet/IEEE 802.3 interfaces.
3 Serial network interfaces.
8 Channelized T1/PRI ports.
125K bytes of non-volatile configuration memory.
16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0

```

VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7500 series router with a multichannel DS1/PRI port adapter installed:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-PV-M), Version 11.1(20)CC
Synced to mainline version: 11.1(13.5)CA
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 24-Nov-97 23:59 by jroumas
Image text-base: 0x60010900, data-base: 0x60708000
ROM: System Bootstrap, Version 5.3.2(3.2) [kmac 3.2], MAINTENANCE INTERIM
SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(8)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
potent7505-1 uptime is 5 hours, 30 minutes
System restarted by reload
System image file is "potent/rsp-pv-mz.DTP7", booted via tftp from
171.69.209.28
cisco RSP1 (R4700) processor with 65536K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Chassis Interface.
2 VIP2 controllers (8 Ethernet)(8 T1).
8 Ethernet/IEEE 802.3 interfaces.
3 Serial network interfaces.
8 multichannel T1/PRI ports.
125K bytes of non-volatile configuration memory.
16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

Using the show diag Command

Display the types of port adapters installed in your system (and specific information about each) using the **show diag slot** command, where *slot* is the *port adapter slot* in a Cisco 7100 series router, Cisco 7200 series router, Cisco 7200 VXR router, Cisco uBR7200 series router, Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router, the *module slot* in a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router, and the *interface processor slot* in Cisco 7000 series router or Cisco 7500 series router with a VIP. In the FlexWAN module, the **show diag** command is used without the *slot* designation.



Note The *slot* argument is optional for Catalyst 5000 family switches.



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

The following sections provide platform-specific output examples using the **show diag** command:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show diag Command, page 4-27](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show diag Command, page 4-27](#)
- [Cisco 7100 Series Routers—Example Output of the show diag Command, page 4-28](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command, page 4-28](#)
- [Cisco 7201 Router—Example Output of the show diag Command, page 4-29](#)
- [Cisco 7301 Router—Example Output of the show diag Command, page 4-29](#)
- [Cisco 7401ASR Router—Example Output of the show diag Command, page 4-30](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command, page 4-30](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a DS1/PRI port adapter installed in a Catalyst RSM/VIP2:

```
Router# show diag 2
Slot 2:
    Physical slot 2, ~physical slot 0xD, logical slot 2, CBus 0
    Microcode Status 0x4
    Master Enable, LED, WCS Loaded
        Pending I/O Status: None
    EEPROM format version 1
    VIP2 controller, HW rev 2.4, board revision D0
    Serial number: 04371939 Part number: 73-1684-03
    Test history: 0x00 RMA number: 00-00-00
    Flags: cisco 7500
EEPROM contents (hex):
    0x20: 01 15 02 04 00 42 B5 T1 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
[Additional display text omitted]
```

Catalyst 6000 Family FlexWAN Module—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a PA-MC-8T1 installed in a Catalyst 6000 family FlexWAN module:

```
Router# show diag

[Additional display text omitted]

Slot 6: Logical_index 12
    Board is analyzed ipc ready FlexWAN controller

    Slot database information:
    Flags: 0x2004Insertion time: unknown

    CWAN Controller Memory Size: Unknown

    PA Bay 0 Information:
        Multi-channel (T1) PA, 8 ports
        EEPROM format version 0
        HW rev 0.00, Board revision UNKNOWN
```

```
Serial number: 00000000 Part number: 00-0000-00
[Additional display text omitted]
```

Cisco 7100 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a Fast Ethernet port adapter in port adapter slot 3 of a Cisco 7120 series router:

```
Router# show diag 3
Slot 3:
10/100 Fast-ethernet with RJ45 Integrated port adapter, 2 ports
Integrated port adapter is analyzed
EEPROM contents at hardware discovery:
Hardware revision 255.255 Board revision UNKNOWN
EEPROM format version 1
EEPROM contents (hex):
0x20:01 D3 FF FF
0x30:FF FF FF
```



Note To use the **show diag** command with the Cisco 7140 series router, replace the slot argument **3** with **4**.

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a multichannel DS1/PRI port adapter in port adapter slot 1 of a Cisco 7200 series router:

```
Router# show diag 1
Slot 1:
Physical slot 1, ~physical slot 0xE, logical slot 1, 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: 04540965 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 45 4A 25 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: 0x147C (05:33:22 ago)

Controller Memory Size: 32 MBytes DRAM, 2048 KBytes SRAM
PA Bay 0 Information:
Ethernet PA, 4 ports
EEPROM format version 1
HW rev 1.C, Board revision A0
Serial number: 04953593 Part number: 73-1556-07
PA Bay 1 Information:
Multi-channel (T1) PA, 8 ports
EEPROM format version 0
HW rev FF.FF, Board revision UNKNOWN
Serial number: 4294967295 Part number: 255-65535-255
```

Cisco 7201 Router—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7201 router:

```
Router# show diag 1
Slot 1:
Dual OC3 POS Port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 00:02:19 ago
EEPROM contents at hardware discovery:
Hardware Revision : 1.0
PCB Serial Number : JAE07520DYL
Part Number : 73-8220-02
Board Revision : A0
RMA Test History : 00
RMA Number : 0-0-0-0
RMA History : 00
Deviation Number : 0
Product (FRU) Number : PA-POS-20C3
Top Assy. Part Number : 800-21857-02
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 03 E3 41 01 00 C1 8B 4A 41 45 30 37 35
0x10: 32 30 44 59 4C 82 49 20 1C 02 42 41 30 03 00 81
0x20: 00 00 00 00 04 00 88 00 00 00 00 CB 94 50 41 2D
0x30: 50 4F 53 2D 32 4F 43 33 20 20 20 20 20 20 20 20
0x40: 20 C0 46 03 20 00 55 61 02 FF FF FF FF FF FF FF
0x50: FF FF
0x60: FF FF
0x70: FF FF
```

Cisco 7301 Router—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a multichannel DS1/PRI port adapter in port adapter slot 1 of a Cisco 7301 router:

```
Router# show diag 1
Slot 1:
POS Single Width, Multi Mode Port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 01:38:29 ago
EEPROM contents at hardware discovery:
Hardware revision 2.2          Board revision A0
Serial number      28672741    Part number      73-3192-06
FRU Part Number:PA-POS-OC3MM=

Test history      0x0          RMA number      00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 96 02 02 01 B5 82 E5 49 0C 78 06 00 00 00 00
0x30:50 00 00 00 02 08 19 00 00 00 FF FF FF FF FF FF
```



Note

Input/output data for the console port, auxiliary port, Gigabit Ethernet ports, and CompactFlash Disk are listed in the output of the **show c7300** command, rather than in the output of the **show diag** command.

Cisco 7401ASR Router—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a multichannel DS1/PRI port adapter in port adapter slot 1 of a Cisco 7401ASR router:

```
Router# show diag 1
Slot 1:
Physical slot 1, ~physical slot 0xE, logical slot 1, 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: 04540965 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 45 4A 25 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: 0x147C (05:33:22 ago)

Controller Memory Size: 32 MBytes DRAM, 2048 KBytes SRAM
PA Bay 0 Information:
Ethernet PA, 4 ports
EEPROM format version 1
HW rev 1.C, Board revision A0
Serial number: 04953593 Part number: 73-1556-07
PA Bay 1 Information:
Multi-channel (T1) PA, 8 ports
EEPROM format version 0
HW rev FF.FF, Board revision UNKNOWN
Serial number: 4294967295 Part number: 255-65535-255
```

VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command that shows a DS1/PRI port adapter in port adapter slot 0 on a VIP in interface processor slot 2:

```
Router# show diag 2
Slot 2:
Physical slot 2, ~physical slot 0xD, logical slot 2, 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: 04371939 Part number: 73-1684-03
Test history: 0x00 RMA number: 00-00-00
Flags: cisco 7500

EEPROM contents (hex):
  0x20: 01 15 02 04 00 42 B5 T1 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: 0x14A4 (00:23:00 ago)

Controller Memory Size: 32 MBytes DRAM, 2048 KBytes SRAM
```

```

PA Bay 0 Information:
  DS1/PRI PA, 1 port
  EEPROM format version 1
  HW rev 1.00, Board revision AO
  Serial number: 3549502 Part number: 73-2620-02

```

Using the show interfaces Command

Display status information (including the physical slot and interface address) for the interfaces you specify using the **show interfaces** command.

For complete descriptions of interface subcommands and the configuration options available for the individual platforms, refer to the publications listed in the “[Related Documentation](#)” section on [page viii](#).



Note

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

The following sections provide platform-specific output examples using the **show interfaces** command:

- [Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command, page 4-31](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show interfaces Command, page 4-32](#)
- [Cisco 7100 Series Routers—Example Output of the show interfaces Command, page 4-33](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command, page 4-33](#)
- [Cisco 7201 Router—Example Output of the show interfaces Command, page 4-34](#)
- [Cisco 7301 Router—Example Output of the show interfaces Command, page 4-35](#)
- [Cisco 7401ASR Router—Example Output of the show interfaces Command, page 4-36](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show interfaces Command, page 4-36](#)

Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command that shows all of the information specific to the first multichannel DS1/PRI port (port 0) on a Catalyst RSM/VIP2 in port adapter slot 1, channel group 2:

```

Router# show interfaces serial 1/0:2
Serial1/0:2 is down, line protocol is down
  Hardware is Multichannel T1
  Internet address is 1.1.1.10/30
  MTU 1500 bytes, BW 1344 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 04:18:08, output 04:18:08, 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
  523 packets input, 39030 bytes, 0 no buffer
  Received 513 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  523 packets output, 40076 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  2 carrier transitions alarm present
Timeslot(s) Used: 1-24, Transmitter delay is 0 flags, transmit queue length 24

```

Following is an example of the **show interfaces serial** command that shows all of the information specific to the same port on a Catalyst RSM/VIP2 (port 0 in port adapter slot 1) when the port is configured for ISDN PRI:

```

Router# show interfaces serial 1/0:23
Serial1/0:23 is up, line protocol is up(spoofing)
  Hardware is Multichannel T1
  MTU 1500 bytes, BW 64Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions alarm present
  Timeslot(s) Used:24, Transmitter delay is 0 flags, transmit queue length 0

```



Note

In the preceding examples, the term “spoofing” indicates that the interface is configured for ISDN PRI. Spoofing is indicated only on time slot 24 (the D channel), which is recognized by the system as time slot 23.

Catalyst 6000 Family FlexWAN Module—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command that shows all of the information specific to the first PA-MC-8T1 port (port 0) in port adapter slot 6, channel group 1:

```

Router# show interfaces serial 6/0/0:1
Serial6/0/0:1 is down, line protocol is down
  Hardware is Multichannel T1
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, CRC 16, Data non-inverted
  Keepalive not set
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns

```

```

0 output errors, 0 collisions, 2 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions alarm present
Timeslot(s) Used:1-24, subrate: 64Kb/s, transmit delay is 0 flags
Transmit queue length 999

```

Cisco 7100 Series Routers—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command from a Cisco 7120 series router. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 3 of a Cisco 7120 series router; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```

Router# show interfaces serial 3/0
Serial3/0 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]

```

```

Router# show interfaces serial 3/1
Serial3/1 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.1
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text omitted from this example]

```

```

Router# show interfaces serial 3/2
Serial3/2 is up, line protocol is up
  Hardware is M8T-RS232
  Internet address is 10.0.0.2
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
[Additional display text for remaining interfaces omitted]

```



Note

To use the **show interfaces serial** command with the Cisco 7140 series router, replace the interface address arguments **3/0**, **3/1**, **3/2**, **3/3**, **3/4**, **3/5**, **3/6**, and **3/7** with **4/0**, **4/1**, **4/2**, **4/3**, **4/4**, **4/5**, **4/6**, and **4/7**, respectively.

Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command that shows all of the information specific to the first multichannel DS1/PRI port (port 0) in port adapter slot 6, channel group 1 on a Cisco 7200 series router:

```

Router# show interfaces serial 6/0:1
Serial6/0:1 is up, line protocol is up (looped)
  Hardware is Multichannel T1
  Internet address is 1.6.0.1/30
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:07, output 00:00:07, 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
  87 packets input, 6521 bytes, 0 no buffer
  Received 87 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  87 packets output, 6521 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions
no alarm present
Timeslot(s) Used:1-24, subrate: 64Kb/s, transmit delay is 0 flags

```



Note

In the above example, the term “spoofing” indicates that the interface is configured for ISDN PRI. Spoofing is indicated only on time slot 24 (the D channel), which is recognized by the system as time slot 23.

Cisco 7201 Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command from a Cisco 7201 router:

```

Router# show interfaces
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia
0019.56c5.2adb)
  Internet address is 209.165.200.225
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 180240000 bits/sec, 430965 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    2222975 packets input, 133378500 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out

```

Cisco 7301 Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command for a Cisco 7301 router. Most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces
GigabitEthernet0/0 is up, line protocol is up
  Hardware is BCM1250 Internal MAC, address is 0005.dd2c.7c1b (bia 0005.dd2c.7c1b)
  Internet address is 10.1.3.153/16
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Half-duplex, 100Mb/s, media type is RJ45
  output flow-control is off, input flow-control is off
  ARP type:ARPA, ARP Timeout 04:00:00
  Last input 00:00:01, output 00:00:07, output hang never
  Last clearing of "show interface" counters 19:00:50
  Input queue:0/75/63658/0 (size/max/drops/flushes); Total output drops:0
```

(display text omitted)

```
GigabitEthernet0/1 is up, line protocol is up
  Hardware is BCM1250 Internal MAC, address is 0005.dd2c.7c1a (bia 0005.dd2c.7c1a)
  Internet address is 192.18.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 5/255, rxload 6/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, link type is autonegotiation, media type is SX
  output flow-control is off, input flow-control is off
  ARP type:ARPA, ARP Timeout 04:00:00
  Last input 18:56:46, output 00:00:09, output hang never
  Last clearing of "show interface" counters 19:00:52
  Input queue:0/75/16176489/0 (size/max/drops/flushes); Total output drops:0
```

(display text omitted)

```
GigabitEthernet0/2 is up, line protocol is up
  Hardware is BCM1250 Internal MAC, address is 0005.dd2c.7c19 (bia 0005.dd2c.7c19)
  Internet address is 1.1.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 5/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, link type is autonegotiation, media type is SX
  output flow-control is off, input flow-control is off
  ARP type:ARPA, ARP Timeout 04:00:00
  Last input 00:04:42, output 00:00:01, output hang never
  Last clearing of "show interface" counters 19:00:54
  Input queue:0/75/22087/0 (size/max/drops/flushes); Total output drops:0
```

(display text omitted)

Cisco 7401ASR Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command that shows all of the information specific to the first multichannel DS1/PRI port (port 0) in port adapter slot 1, channel group 1 on a Cisco 7401ASR router:

```
Router# show interfaces serial 1/0:1
Serial1/0:1 is up, line protocol is up (looped)
  Hardware is Multichannel T1
  Internet address is 1.6.0.1/30
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:07, output 00:00:07, 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
    87 packets input, 6521 bytes, 0 no buffer
    Received 87 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    87 packets output, 6521 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    1 carrier transitions
  no alarm present
  Timeslot(s) Used:1-24, subrate: 64Kb/s, transmit delay is 0 flags
```

VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command that shows all of the information specific to the first multichannel DS1/PRI port (port 0) on a VIP-equipped Cisco 7500 series router in chassis slot 3, port adapter slot 1, channel group 2:

```
Router# show interfaces serial 3/1/0:2
Serial3/1/0:2 is down, line protocol is down
  Hardware is Multichannel T1
  Internet address is 1.1.1.10/30
  MTU 1500 bytes, BW 1344 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 04:18:08, output 04:18:08, 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
    523 packets input, 39030 bytes, 0 no buffer
    Received 513 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    523 packets output, 40076 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    2 carrier transitions alarm present
  Timeslot(s) Used: 1-24, Transmitter delay is 0 flags, transmit queue length 24
```

Following is an example of the **show interfaces serial** command that shows all of the information specific to the same port on a VIP-equipped Cisco 7500 series router (port 0 in chassis slot 3, port adapter slot 1) when the port is configured for ISDN PRI:

```
Router# show interfaces serial 3/1/0:23
Serial3/1/0:23 is up, line protocol is up(spoofing)
  Hardware is Multichannel T1
  MTU 1500 bytes, BW 64Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions alarm present
  Timeslot(s) Used:24, Transmitter delay is 0 flags, transmit queue length 0
```


Note

In the above examples, the term “spoofing” indicates that the interface is configured for ISDN PRI. Spoofing is indicated only on time slot 24 (the D channel), which is recognized by the system as time slot 23.

Using the ping Command to Verify Network Connectivity

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

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

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

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

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

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

Using loopback Commands

If you have difficulty with the multichannel DS1/PRI port adapter configuration or installation, you can troubleshoot the multichannel DS1/PRI port adapter using the **loopback** command. Specify loopback for a T1 controller and T1 channel using the **loopback** command. There are three main loopback modes: diagnostic, local (line and payload), and remote (iboc and esf).

Specify the loopback format using the **loopback [diagnostic | local | remote]** command.



Note

To shut down the T1 controller, use the **shutdown** command at the controller prompt.

Diagnostic loopback loops the outgoing transmit signal back to the receive signal and sends an alarm indication signal (AIS) to the network. The syntax of the **loopback diagnostic** command is as follows:

loopback [diagnostic]

Following are examples of setting the first T1 into diagnostic loopback for various supported platforms:

For the Catalyst RSM/VIP2:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback diagnostic
```

For the Catalyst 6000 family FlexWAN module:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0/0
Router(config-controller)# loopback diagnostic
```

For the Cisco 7100 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 4/0
Router(config-controller)# loopback diagnostic
```

For the Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/0
Router(config-controller)# loopback diagnostic
```

For the Cisco 7201 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback diagnostic
```

For the Cisco 7301 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback diagnostic
```

For Cisco 7304 PCI Port Adapter Carrier Card in Cisco 7304 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0
Router(config-controller)# loopback diagnostic
```

For the Cisco 7401ASR router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback diagnostic
```

For the VIP:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/1/0
Router(config-controller)# loopback diagnostic
```

Local loopback loops the incoming signal back to the line. The syntax of the **loopback local** command is as follows:

```
loopback [local {payload | line}]
```

Following are examples of setting the first T1 into local loopback for various supported platforms:

For the Catalyst RSM/VIP2:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback local payload
```

For the Catalyst 6000 family FlexWAN module:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0/0
Router(config-controller)# loopback local payload
```

For the Cisco 7100 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 4/0
Router(config-controller)# loopback local payload
```

For the Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/0
Router(config-controller)# loopback local payload
```

For the Cisco 7201 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback local payload
```

For the Cisco 7301 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback local payload
```

For Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0
Router(config-controller)# loopback local payload
```

For the Cisco 7401ASR router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback local payload
```

For the VIP:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/1/0
Router(config-controller)# loopback local payload
```

The syntax of the **loopback remote** command follows:

```
loopback [remote {esf line | iboc | esf payload}]
```

Remote line inband loopback causes the far end to loop its receive signal back to transmit.

Following are examples of setting the first T1 into remote line inband loopback for various supported platforms:

For the Catalyst RSM/VIP2:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback remote esf line
```

For the Catalyst 6000 family FlexWAN module:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0/0
Router(config-controller)# loopback remote esf line
```

For the Cisco 7100 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 4/0
Router(config-controller)# loopback remote esf line
```

For the Cisco 7200 series routers, Cisco 7200 VXR routers, and Cisco uBR7200 series routers:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/0
Router(config-controller)# loopback remote esf line
```

For the Cisco 7201 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback remote esf line
```

For the Cisco 7301 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback remote esf line
```

For Cisco 7304 PCI Port Adapter Carrier Card in the Cisco 7304 router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 3/0
Router(config-controller)# loopback remote esf line
```

For the Cisco 7401ASR router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 1/0
Router(config-controller)# loopback remote esf line
```

For the VIP:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller t1 2/1/0
Router(config-controller)# loopback remote esf line
```

Checking Bit Errors Using a BERT

To check bit errors using a bit error rate test (BERT), use the following command:

```
[no] t1 bert pattern {2^11 | 2^15 | 2^20 O.153 | 2^20 QRSS | 2^23 | 0s | 1s | alt-0-1} interval  
minutes
```

where

2¹⁵ is an exponential number that represents a pseudorandom repeating pattern that is 32,767 bits long

2²⁰ is a pseudorandom repeating pattern that is 1,048,575 bits long

2²³ is a pseudorandom repeating pattern that is 8,388,607 bits long

0s is a pattern of all zeroes (00000000...)

1s is a pattern of all 1s (111111...)

minutes are 1 to 14400, which designates the time the BERT will run.

To stop the BERT, use the optional **no** form of the command.

Following is an example of this command, where the pseudorandom pattern 2²⁰ is sent and repeats on the T1 port for 60 minutes:

```
Router# t1 bert pattern 2^20 interval 60
```

The BERT command is not saved in NVRAM. The test patterns from the multichannel DS1/PRI port adapter are framed test patterns; therefore, they are inserted into the payload of a framed T1 signal.

To display the BERT results, use the following EXEC commands: **show controllers t1 number** or **show controllers t1 number brief**.

The following subsections show some examples of displaying BERT results output.

- [Examples of Displaying BERT Output During a Test, page 4-42](#)
- [Examples of Displaying BERT Output After a Completed Test, page 4-44](#)
- [Examples of Displaying BERT Output When the Test is Stopped Prematurely, page 4-46](#)

Examples of Displaying BERT Output During a Test

Following are examples of how to display BERT output results during a test from various routers:

For the Catalyst RSM/VIP2:

```
Router# show controllers t1 0/0 brief
T1 0/0 is up.
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : sync
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 43155
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 43155
Applique type is Channelized T1
No alarms detected.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (24 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7100 series routers:

```
Router# show controllers t1 4/0
T1 4/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : sync
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 6165
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 6165
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (0 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7200 series routers, Cisco 7200VXR routers, or Cisco uBR7200 series routers:

```
Router# show controllers t1 2/0
T1 2/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync        : sync
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 6165
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 6165
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (0 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7401ASR router:

```
Router# show controllers t1 1/0
T1 1/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync        : sync
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 6165
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 6165
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (0 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the VIP on a Cisco 7000 series router or Cisco 7500 series router:

```
Router# show controllers t1 0/0/0 brief
T1 0/0/0 is up.
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync        : sync
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 43155
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 43155
Applique type is Channelized T1
No alarms detected.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (24 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
```

```

0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#

```



Note

When the T1 is under BERT (in the running state), its line state is down and the “Total Bit Errors” value is not valid if the “Status” field is “Not Sync.”

Examples of Displaying BERT Output After a Completed Test

Following are examples of how to display BERT output results after the test is complete from various routers:

For the Catalyst RSM/VIP2:

```

Router# show controllers t1 0/0
T1 0/0 is up.
DSX1 BERT pattern      : zeros
DSX1 BERT sync         : done
DSX1 BERT sync count   : 1
DSX1 BERT interval     : 2
DSX1 BERT time remain  : 0
DSX1 BERT total errs   : 0
DSX1 BERT total k bits: 178785
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 178785
Applique type is Channelized T1
No alarms detected.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (177 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#

```

For the Cisco 7100 series routers:

```

Router# show controllers t1 4/0
%CLEAR-5-COUNTERS: Clear counter on all interfaces by console
show cont t1 2/0
T1 4/0 is up. (Diagnostic Loopback)
DSX1 BERT pattern      : zeros
DSX1 BERT sync         : done
DSX1 BERT sync count   : 1
DSX1 BERT interval     : 2
DSX1 BERT time remain  : 0
DSX1 BERT total errs   : 0
DSX1 BERT total k bits: 178785
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 178785
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (0 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#

```

For the Cisco 7200 series routers, Cisco 7200 VXR routers, or Cisco uBR7200 series routers:

```
Router# show controllers t1 2/0
%CLEAR-5-COUNTERS: Clear counter on all interfaces by console show cont t1 2/0
T1 2/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : done
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 0
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 178785
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 178785
  Applique type is Channelized T1
  Receiver has no alarms.
  Cablelength is long gain36 0db
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (0 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7401ASR Router:

```
Router# show controllers t1 1/0
%CLEAR-5-COUNTERS: Clear counter on all interfaces by console show cont t1 2/0
T1 1/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : done
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 0
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 178785
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 178785
  Applique type is Channelized T1
  Receiver has no alarms.
  Cablelength is long gain36 0db
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (0 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the VIP on a Cisco 7000 series router or Cisco 7500 series router:

```
Router# show controllers t1 0/0/0
T1 0/0/0 is up.
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : done
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 0
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 178785
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 178785
  Applique type is Channelized T1
  No alarms detected.
  Cablelength is long gain36 0db
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
```

```
Data in current interval (177 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```



Note The “Status” field is irrelevant when the BERT is done. If the “Sync Detected” counter is 0, the Bit Errors fields have no meaning.

Examples of Displaying BERT Output When the Test is Stopped Prematurely

Following are examples of how to display BERT output results when the test is stopped prematurely from various routers:

For the Catalyst RSM/VIP2:

```
Router# show controllers t1 0/0
T1 0/0 is up.
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : done
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 6166
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 6166
Applique type is Channelized T1
No alarms detected.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (267 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7100 series routers:

```
Router# show controllers t1 4/0
T1 4/0 is up. (Diagnostic Loopback)
  DSX1 BERT pattern      : zeros
  DSX1 BERT sync         : done
  DSX1 BERT sync count   : 1
  DSX1 BERT interval     : 2
  DSX1 BERT time remain  : 2
  DSX1 BERT total errs   : 0
  DSX1 BERT total k bits: 6166
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 6166
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (58 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For Cisco 7200 series routers, Cisco 7200 VXR routers, or Cisco uBR7200 series routers:

```
Router# show controllers t1 2/0
T1 2/0 is up. (Diagnostic Loopback)
DSX1 BERT pattern      : zeros
DSX1 BERT sync         : done
DSX1 BERT sync count   : 1
DSX1 BERT interval     : 2
DSX1 BERT time remain  : 2
DSX1 BERT total errs   : 0
DSX1 BERT total k bits: 6166
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 6166
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (58 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the Cisco 7401ASR router:

```
Router# show controllers t1 1/0
T1 1/0 is up. (Diagnostic Loopback)
DSX1 BERT pattern      : zeros
DSX1 BERT sync         : done
DSX1 BERT sync count   : 1
DSX1 BERT interval     : 2
DSX1 BERT time remain  : 2
DSX1 BERT total errs   : 0
DSX1 BERT total k bits: 6166
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 6166
Applique type is Channelized T1
Receiver has no alarms.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (58 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#
```

For the VIP on a Cisco 7000 series router or Cisco 7500 series router:

```
Router# show controllers t1 0/0/0
T1 0/0/0 is up.
DSX1 BERT pattern      : zeros
DSX1 BERT sync         : done
DSX1 BERT sync count   : 1
DSX1 BERT interval     : 2
DSX1 BERT time remain  : 2
DSX1 BERT total errs   : 0
DSX1 BERT total k bits: 6166
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 6166
Applique type is Channelized T1
No alarms detected.
Cablelength is long gain36 0db
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (267 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
```

```

0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Router#

```



Note

In the preceding three examples, the “Bit Errors(Sync BERT Started)” counter indicates the number of bit errors during BERT, and the “Bit Errors(Sync last Sync)” counter shows the number of bit errors since the last pattern sync was detected.
