Configuring the PA-MC-8TE1+

To continue your PA-MC-8TE1+ port adapter installation, you must configure the card type as either T1 or E1 and then configure the interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- Using the EXEC Command Interpreter, page 4-1
- Configuring the Interfaces, page 4-2
- Checking the Configuration, page 4-9

Note   For complete information on configuring the supervisor engine and all modules on the Catalyst 6500 series switches and Cisco 7600 series Internet Routers, refer to the publications listed in the "Related Documentation" section on page viii. For information on all Catalyst 6500 series switches and Cisco 7600 series Internet Router commands, refer to the publications listed in the "Related Documentation" section on page viii.

Using the EXEC Command Interpreter

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

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

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

```
Router> enable

Password:
```

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

```
Router#
```

To configure the new interfaces, proceed to the "Configuring the Interfaces" section on page 4-2.

Configuring the Interfaces

The PA-MC-8TE1+ interfaces can be configured as E1 or T1 interfaces. After you verify that the new PA-MC-8TE1+ is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

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

If you installed a new PA-MC-8TE1+ or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interfaces. If you replaced a PA-MC-8TE1+ 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 PA-MC-8TE1+, 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:

- Shutting Down an Interface, page 4-3
- Performing a Basic Interface Configuration, page 4-4
- Configuring the Controller, page 4-5
- Configuring Cyclic Redundancy Checks, page 4-7
- Configuring Multichannel ISDN PRI Interfaces, page 4-8

Shutting Down an Interface

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

Follow these steps to shut down an interface:

Step 1   Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the "Using the EXEC Command Interpreter" section on page 4-1 for instructions.)

Step 2   At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

Step 3   Shut down interfaces by entering the **interface** subcommand (followed by the interface type and the interface address), and then enter the **shutdown** command. See the "Using the show interfaces Command" section on page 4-19 for the command syntax.

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

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

Step 4   Write the new configuration to NVRAM as follows:

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

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

Step 5   Verify that new interfaces are now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface. The "Using the show interfaces Command" section on page 4-19 provides examples.

Step 6   Re-enable interfaces by doing the following:

a.   Repeat Step 3 to re-enable an interface. Substitute the **no shutdown** command for the **shutdown** command.

b.   Repeat Step 4 to write the new configuration to memory. Use the **copy running-config startup-config** command.

c.   Repeat Step 5 to verify that the interfaces are in the correct state. Use the **show interfaces** command followed by the interface type and interface address of the interface.

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

Performing a Basic Interface Configuration

Following are instructions for a basic configuration, which include specifying card and service type, 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.

Note   Because the PA-MC-8TE1+ port adapter can be configured for E1 or T1 connectivity, you **must** specify the card type as E1 or T1, as described in the following procedure. There is no default card type. The port adapter is not functional until the card type is set. Information about the port adapter is not indicated in the output of any **show** commands unless the card type has been set to E1 or T1.

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 whether the card is to be used as T1 or E1 by using the **card type** command in configuration mode.

- The example below sets the card in slot 1 to T1:

```
Router(config)# card type t1 1
```

- The example below sets the card in slot 1 to E1:

```
Router(config)# card type e1 1
```

Note   To change the card type of the PA-MC-8TE1+ after the **card type** command has been entered, you must remove the card from the router, save the running configuration to NVRAM, and reboot the router. When the router has finished rebooting, reinsert the card and repeat Step 2

Or you can save the running configuration to the TFTP server and edit the card type in the saved file. Then use the **copy tftp:**//*tftp address*/*file name* **system:**//**startup-config** command to copy the configuration back to the router, and then reload.

Step 3   Specify the first interface to configure by entering the **interface** command, followed by the type of interface and the interface address you plan to configure. The "Using the show interfaces Command" section on page 4-19 provides examples.

Step 4   Assign an IP address and subnet mask to the interface (if IP routing is enabled on the system) by using the **ip address** subcommand, as in the following example:

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

Step 5   Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

Step 6   Re-enable the interfaces using the **no shutdown** command. (See the "Shutting Down an Interface" section on page 4-3.)

Step 7   Configure all additional port adapter interfaces as required.

Step 8   After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.

Step 9   Write the new configuration to NVRAM as follows:

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

This completes the procedure for creating a basic configuration.

Configuring the Controller

Following are instructions for a basic controller configuration for the PA-MC-8TE1+:

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 controller by entering the **controller t1** or **controller e1** subcommand, followed by the interface address of the interface you plan to configure.

Step 3   In controller configuration mode, enter the **framing [sf | esf]** configuration subcommand to set the framing format for T1, as in the following example:

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

Enter the **framing crc4** configuration subcommand to set the framing format for E1, as in the following example:

```
Router(config-controller)# framing crc4
```

Step 4   Enter the **linecode b8zs** subcommand to select the line coding for T1:

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

Enter the **linecode hdb3** subcommand to select the line coding for E1:

```
Router(config-controller)# linecode hdb3
```

Step 5 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, which is **line**.

Step 6 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 12 speed 64
```

> ✎
>
> **Note** The channel-group number can be from 0 to 23 and the time slot value can be from 1 to 24 for T1. The channel-group number can be from 0 to 30 and the time slot value can be from 1 to 31 for E1. The maximum number of channel groups per each 8-port PA-MC-8TE1+ is 256.

Step 7 Enter the **pri-group timeslots** *range* configuration subcommand to set the PRI group, as in the following example:

```
Router(config-controller)# pri-group timeslots 12
```

> ✎
>
> **Note** The channel-group number can be from 0 to 23 and the time slot value can be from 1 to 24 for T1. The channel-group number can be from 0 to 30 and the time slot value can be from 1 to 31 for E1.

Step 8 Enter the **description line** (up to 80 characters describing this controller*)* configuration subcommand to set the description, as in the following example:

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

Step 9 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, which is **gain36**, **0dB**.

Step 10 For T1 enter the **fdl {att | ansi}** configuration subcommand to set the Facility 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 Super Frame mode.

Step 11 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 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 resend the frame.

Table 4-1 summarizes CRC commands.

Table 4-1   CRC Commands

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

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.

In the example that follows, 32-bit CRC is specified:

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

The preceding command example applies to all systems in which the port adapter is supported. Use the **no crc 32** command to disable CRC-32 and return the interface to the default CRC-16 (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 4-9.

Configuring Multichannel ISDN PRI Interfaces

Following are instructions for a basic multichannel ISDN PRI configuration, which includes 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 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*
- **clock source** *line*
- **linecode b8zs**
- **framing esf**
- **loopback** [**diagnostic** | **local** | **remote**]
- **shutdown**
- **pri-group** [**timeslots** *range* {**56** | **64**}]

    where the *range* value is a number between 1 and 24 for T1 or 1 and 31 for E1. Time slots 1 to 23 represent the B channels, and time slot 24 represents the D channel for T1. Time slots 1 to 15 and 17 to 31 represent the B channels and time slot 16 represents the D channel for E1. 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).

> **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) for T1. The controller is configured for 30 B channels and one D channel (time slot 16) for E1.

In the following procedure for a basic multichannel 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 primary-5ess switch (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 controller (T1 or E1), set the clock source, specify the framing and line code, and PRI group time slots as described in the "Configuring the Controller" section on page 4-5 and the "Performing a Basic Interface Configuration" section on page 4-4.

Step 4   Write the new configuration to memory:

```
Router# write memory
```

The system displays an OK message when the configuration is stored.

Step 5   Exit the privileged level and return to the user level by entering **disable** at the prompt:

```
Router# disable

Router>
```

This completes the procedure for configuring multichannel ISDN PRI interfaces. Proceed to the "Checking the Configuration" section on page 4-9 to check the interface configuration using **show** commands.

Checking the Configuration

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

- Using show Commands to Verify the New Interface Status, page 4-9
- Using the ping Command to Verify Network Connectivity, page 4-22
- Using loopback Commands, page 4-22

Using show Commands to Verify the New Interface Status

This section demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the PA-MC-8TE1+ port adapter appears in them correctly. Sample displays of the output of selected **show** commands for some of the supported platforms 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.

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.

✏️ **Note**   If information about the PA-MC-8TE1+ port adapter is not indicated in **show** command output, it is probably because the card type has not been specified. Because the PA-MC-8TE1+ port adapter can be configured for E1 or T1 connectivity, you **must** specify the card type as E1 or T1, as described in "Performing a Basic Interface Configuration" section on page 4-4. There is no default card type. The port adapter is not functional until the card type is set.

This section includes the following subsections:

- Using the show controllers Commands, page 4-10
- Using the show protocols Command, page 4-10
- Using the show running-config Command, page 4-11

■ Checking the Configuration

Proceed to the "Using the ping Command to Verify Network Connectivity" section on page 4-22 when you have finished using the **show** commands.

Using the show controllers Commands

Display all the current interface processors and their interfaces using the **show controllers** 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 is an example of the **show controllers** command:

```
router# show controllers
MEMD at 40000000, 2097152 bytes (unused 3360, recarves 1, lost 0)
  RawQ 48000100, ReturnQ 48000108, EventQ 48000110
  BufhdrQ 48000128 (2900 items), LovltrQ 48000140 (5 items, 2016 bytes)
  IpcbufQ 48000150 (16 items, 4096 bytes)
  IpcbufQ_classic 48000148 (8 items, 4096 bytes)
  3570 buffer headers (48002000 - 4800FF10)
  pool0: 9 buffers, 256 bytes, queue 48000130
  pool1: 344 buffers, 1536 bytes, queue 48000138
  pool2: 284 buffers, 4544 bytes, queue 48000158
  pool3: 4 buffers, 4576 bytes, queue 48000160
  slot2: VIP2, hw 2.4, sw 22.20, ccb 5800FF40, cmdq 48000090
    software loaded from flash slot0:vip2_22-20.atmdx.191897
    IOS (tm) VIP Software (SVIP-DW-M), Experimental Version 11.3
  ROM Monitor version 17.0
    ATM2/0/0, applique is DS3 (45Mbps)
      gfreeq 48000158, lfreeq 48000168 (4544 bytes), throttled 0
      rxlo 4, rxhi 284, rxcurr 1, maxrxcurr 5
      txq 48001A00, txacc 48001A02 (value 284), txlimit 284
[Additional display text for remaining interfaces omitted]
```

Using the show protocols Command

Display protocols configured for the entire system and for specific interfaces using the **show protocols** 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 is an example of the **show protocols** command:

```
Router# show protocols
line protocol is up
```

Using the show running-config Command

Display the running configuration file using the **show running-config** command.

![Note]

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 is an example of the **show running-config** command:

```
Router# show running-config
Building configuration...
Current configuration:
!
!
!
user add admin uid 0  capability admin-access
!
!
!
hostname CR4430
!
interface ethernet 0
 ip address 10.2.2.8 255.255.255.0
 ip broadcast-address 10.2.2.255
 exit
!
interface ethernet 1
 exit
!
ip default-gateway 10.2.2.1
ip name-server 10.2.2.6
ip route 0.0.0.0 0.0.0.0 10.2.2.1
```

Using the show startup-config Command

Display the configuration stored in the NVRAM using the **show startup-config** command.

![Note]

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 is an example of the **show startup-config** command:

```
Router# show startup-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rp-3640-2b
!
ip subnet-zero
!
ip audit notify log
```

```
ip audit po max-events 100
!
crypto isakmp policy 1
hash md5
authentication pre-share
crypto isakmp key cisco123 address 95.95.95.2
!
crypto ipsec transform-set rtpset esp-des esp-md5-hmac
!
crypto map rtp 1 ipsec-isakmp
set peer 95.95.95.2
set transform-set rtpset
match address 115
!
interface Ethernet0/0
ip address 98.98.98.1 255.255.255.0
no ip directed-broadcast
!
interface Ethernet0/1
ip address 99.99.99.2 255.255.255.0
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
crypto map rtp
!
interface Ethernet0/2
no ip address
no ip directed-broadcast
shutdown
!
interface Ethernet0/3
no ip address
no ip directed-broadcast
shutdown
!
ip classless
ip route 0.0.0.0 0.0.0.0 99.99.99.1
no ip http server
!
access-list 115 permit ip 98.98.98.0 0.0.0.255 10.103.1.0 0.0.0.255
access-list 115 deny ip 98.98.98.0 0.0.0.255 any
!
line con 0
transport input none
line aux 0
line vty 0 4
login
!
end
```

Using the show version or show hardware Commands

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

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

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

Cisco 7200 Series Routers and Cisco 7200 VXR 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 PA-MC-8TE1+ installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-IS-M), Experimental Version 12.1(20001114:043438)]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Mon 13-Nov-00 20:34 by ananda
Image text-base: 0x60008960, data-base: 0x61376000

ROM: System Bootstrap, Version 12.0(19990210:195103) [12.0XE 105], DEVELOPMENT E
BOOTFLASH: 7200 Software (C7200-BOOT-M), Version 12.1(3.5)PI,  MAINTENANCE INTEE

Router uptime is 51 minutes
System returned to ROM by reload at 10:57:04 UTC Mon Nov 20 2000
System image file is "tftp://223.255.254.254/muck/ananda/kumo-int/c7200-is-mz"

cisco 7206VXR (NPE300) processor (revision D) with 122880K/40960K bytes of memo.
Processor board ID 18285403
R7000 CPU at 262Mhz, Implementation 39, Rev 1.0, 256KB L2, 2048KB L3 Cache
6 slot VXR midplane, Version 2.0

Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
Primary Rate ISDN software, Version 1.1.
8 Ethernet/IEEE 802.3 interface(s)
3 FastEthernet/IEEE 802.3 interface(s)
10 Channelized T1/PRI port(s)
1 Packet over SONET network interface(s)
1 Voice resource(s)
125K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 256K).
4096K 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
c7201alpha1 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 2222222222222
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 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
PA-MC-8TE1+ installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7401ASR Software (C7401ASR-IS-M), Experimental Version 12.1(20001114:043438)]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Mon 13-Nov-00 20:34 by ananda
Image text-base: 0x60008960, data-base: 0x61376000

ROM: System Bootstrap, Version 12.0(19990210:195103) [12.0XE 105], DEVELOPMENT E
BOOTFLASH: 7401ASR Software (C7401ASR-BOOT-M), Version 12.1(3.5)PI,  MAINTENANCE INTEE

Router uptime is 51 minutes
System returned to ROM by reload at 10:57:04 UTC Mon Nov 20 2000
System image file is "tftp://223.255.254.254/muck/ananda/kumo-int/c7200-is-mz"

Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
Primary Rate ISDN software, Version 1.1.
8 Ethernet/IEEE 802.3 interface(s)
3 FastEthernet/IEEE 802.3 interface(s)
```

```
10 Channelized T1/PRI port(s)
1 Packet over SONET network interface(s)
1 Voice resource(s)
125K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 256K).
4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

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 VIP2:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-A), Version 11.1(7)CA [biff 125]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sat 10-Aug-96 17:56 by biff
Image text-base: 0x600108A0, data-base: 0x60952000

ROM: System Bootstrap, Version 5.3(16645) [biff 571], RELEASE SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(7)CA, RELEASE SOFTWARE (fc1)

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

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.
1 EIP controller (6 Ethernet).
1 VIP2 controller (8 Ethernet)(1 HSSI).
14 Ethernet/IEEE 802.3 interfaces.
1 HSSI network interface.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
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 the Cisco 7200 series routers, Cisco 7200 VXR routers, 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 7500 series routers with a VIP. In the FlexWAN module, the **show diag** command is used without the *slot* designation.

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 some platform-specific output examples using the **show diag** command:

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

Following is an example of the **show diag** command that shows a PA-MC-8TE1+ installed in port adapter slot 2 of a Cisco 7200 series router:

```
Router# show diag 2
Slot 2:
        PA-MC-8TE1+ Port adapter, 8 ports
        Port adapter is analyzed
        Port adapter insertion time 00:52:22 ago
        EEPROM contents at hardware discovery:
        Hardware Revision       : 1.0
        PCB Serial Number       : SIC04412B7S
        Part Number             : 115-22681-01
        Board Revision          : 02
        RMA Test History        : 00
        RMA Number              : 0-0-0-0
        RMA History             : 00
        Deviation Number        : 0-0
        IDPROM FIELD FORMAT ERROR, index 0x29
        EEPROM format version 4
        EEPROM contents (hex):
          0x00: 04 FF 40 02 70 41 01 00 C1 8B 53 49 43 30 34 34
          0x10: 31 32 42 37 53 82 73 58 99 01 42 30 32 03 00 81
          0x20: 00 00 00 00 04 00 80 00 00 00 00 CB 00 00 00 00
          0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
          0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
          0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
          0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
          0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

> **Note** Port adapters used with Cisco 7200 VXR routers require the correct base hardware revision in order to function. An error message similar to the following occurs on bootup if the incorrect hardware revision is used:
>
> ```
> > PA-MC-REVNOTSUPPORTED:PA in slot 1 (Ethernet) requires base h/w revision of (1.14) for
> this chassis
> ```
>
> Use the **show diag** command to display the hardware revision.

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-2OC3
    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 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

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

Following is an example of the **show diag** command that shows a PA-MC-8TE1+ installed in a Cisco 7401ASR router:

```
Router# show diag 1
Slot 1:
        PA-MC-8TE1+ Port adapter, 8 ports
        Port adapter is analyzed
        Port adapter insertion time 00:52:22 ago
        EEPROM contents at hardware discovery:
        Hardware Revision       : 1.0
        PCB Serial Number       : SIC04412B7S
        Part Number             : 115-22681-01
        Board Revision          : 02
        RMA Test History        : 00
        RMA Number              : 0-0-0-0
        RMA History             : 00
```

```
             Deviation Number      : 0-0
             IDPROM FIELD FORMAT ERROR, index 0x29
             EEPROM format version 4
             EEPROM contents (hex):
               0x00: 04 FF 40 02 70 41 01 00 C1 8B 53 49 43 30 34 34
               0x10: 31 32 42 37 53 82 73 58 99 01 42 30 32 03 00 81
               0x20: 00 00 00 00 04 00 80 00 00 00 00 CB 00 00 00 00
               0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Cisco 7500 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7500 series router:

```
Router# show diag 1
Slot 1:
Mueslix serial (RS232) port adapter, 8 ports
Port adapter is analyzed
Port adapter insertion time 2d09h ago
Hardware revision 1.4          Board revision UNKNOWN
Serial number    4294967295    Part number    255-65535-255
Test history     0xFF          RMA number     255-255-255
EEPROM format version 1
EEPROM contents (hex):
0x20:01 0F 01 04 FF FF FF FF FF FF FF FF FF FF FF FF
0x30:FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        Slot database information:
        Flags: 0x4      Insertion time: 0x12A0 (08:56:58 ago)

        Controller Memory Size: 8 MBytes

        PA Bay 0 Information:
                Mueslix Serial PA, 8 ports
                EEPROM format version 1
                HW rev 1.0, Board revision A0
                Serial number: 4294967295  Part number: 255-65535-255

        PA Bay 1 Information:
                Fast-Serial PA, 4 ports
                EEPROM format version 1
                HW rev 1.0, Board revision A0
                Serial number: 02024473  Part number: 73-1389-05
```

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 interfaces on supported platforms, refer to the publications listed in the "Related Documentation" section on page viii.

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

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

Following is an example of the **show interfaces serial** command from a Cisco 7200 series router. In this example, the PA-MC-8TE1+ is located in port adapter slot 2.

```
Router# show interfaces serial 2/0
Serial2/0:0 is down, line protocol is down
  Hardware is PA-MC-8TE1 Plus
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/16 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 1152 kilobits/sec
  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, 0 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
```

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 7401ASR Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces serial** command from a Cisco 7401ASR router. In this example, the PA-MC-8TE1+ is located in port adapter slot 1.

```
Router# show interfaces serial 1/0
Serial1/0:0 is down, line protocol is down
  Hardware is PA-MC-8TE1 Plus
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/16 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 1152 kilobits/sec
  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, 0 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
```

Cisco 7500 Series Routers—Example Output of the show interfaces Command

Following are examples of the **show interfaces serial** command used with a VIP2. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in slot 1 of a VIP2 in interface processor slot 3; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
    Hardware is cyBus Serial
  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 not set
[Additional display text omitted from this example]

Router# show interfaces serial 3/1/1
Serial3/1/1 is up, line protocol is up
    Hardware is cyBus Serial
  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 not set
[Additional display text omitted from this example]

Router# show interfaces serial 3/1/2
Serial3/1/2 is up, line protocol is up
    Hardware is cyBus Serial
  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 not set
[Additional display text for remaining interfaces omitted]
```

Following is an example of the **show interfaces** command, which shows all of the information specific to interface 0 on a port adapter in slot 1 of a VIP2 in interface processor slot 3:

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
  Hardware is cyBus Serial
  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 not set
  Last input 2d18h, output 00:00:54, 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
    16 packets input, 1620 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort
```

```
3995 packets output, 1147800 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
1 carrier transitions
RTS up, CTS up, DTR up, DCD up, DSR up
```

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.

Using loopback Commands

With the loopback test, you can detect and isolate equipment malfunctions by testing the connection between the PA-MC-8TE1+ interface and a remote device such as a modem or a CSU/DSU. The **loopback** subcommand places an interface in loopback mode, which enables test packets that are generated from the **ping** command to loop through a remote device or compact serial cable. If the packets complete the loop, the connection is good. If not, you can isolate a fault to the remote device or compact serial cable in the path of the loopback test.

Depending on the mode of the port, issuing the **loopback** command checks the following path:

- When no compact serial cable is attached to the PA-MC-8TE1+ interface port, or if a DCE cable is attached to a port that is configured as line protocol up, the **loopback** command tests the path between the network processing engine and the interface port only (without leaving the network processing engine and port adapter).

- When a DTE cable is attached to the port, the **loopback** command tests the path between the network processing engine and the near (network processing engine) side of the DSU or modem to test the PA-MC-8TE1+ interface and compact serial cable.

T1 Loopback Examples

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.

Examples of specific loopback modes for the T1 controller follow:

• Diagnostic loopback mode 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]
```

The following example sets the first T1 into diagnostic loopback:

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

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

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

The following example sets the first T1 into local loopback:

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

• Remote loopback mode causes the far end to loop its receive signal back to transmit. The syntax of the **loopback remote** command follows:

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

The following example sets the first T1 into remote line inband loopback:

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

E1 Loopback Examples

Specify loopback for an E1 controller using the **loopback** command. There are two main loopback modes: diagnostic and local (line and payload). Specify the loopback format using the **loopback** [**diagnostic** | **local**] command.

To shut down the E1 controller, use the **shutdown** command at the controller prompt.

Examples of specific loopback modes for the E1 controller follow:

- Diagnostic loopback mode loops the outgoing transmit signal back to the receive signal and sends an AIS out to the network. The syntax of the **loopback diagnostic** command is as follows:

```
loopback [diagnostic]
```

The following example sets the first E1 into diagnostic loopback:

```
Router# config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller E1 2/0
Router(config-controller)# loopback diagnostic
```

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

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

The following example sets the first E1 into local loopback:

```
Router# config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller E1 2/0
Router(config-controller)# loopback local payload
```