



## CHAPTER 4

# Configuring the PA-MC-E3

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To continue your PA-MC-E3 port adapter installation, you must configure the serial interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- [Using the EXEC Command Interpreter, page 4-1](#)
- [Configuring the Interfaces, page 4-2](#)
- [Checking the Configuration, page 4-19](#)

## Using the EXEC Command Interpreter

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

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

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

```
Router> enable
```

```
Password:
```

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

```
Router#
```

---

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

# Configuring the Interfaces

After you verify that the new PA-MC-E3 is installed correctly (the ENABLED LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

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

If you installed a new PA-MC-E3 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-E3 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-E3, 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 4-2](#)
- [Performing a Basic Interface Configuration, page 4-7](#)
- [Configuring the PA-MC-E3, page 4-9](#)
- [Configuring a BERT on an E1 Line, page 4-16](#)
- [Configuring Cyclic Redundancy Checks, page 4-18](#)

## Shutting Down an Interface

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

Follow these steps to shut down an interface:

- 
- Step 1** Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the [“Using the EXEC Command Interpreter” section on page 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 serial** subcommand (followed by the interface address of the interface), and then enter the **shutdown** command.

Table 4-1 shows the **shutdown** command syntax for the supported platforms.

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

**Table 4-1** Syntax of the **shutdown** Command for the Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	<b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter slot 1.  Router(config-if)# <b>interface serial 1/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	<b>interface</b> , followed by the <i>type (serial)</i> and <i>mod-num/bay/port</i> (module-slot-number/port-adapter-bay-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3.  Router(config-if)# <b>interface serial 3/0/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#
Cisco 7200 series routers and Cisco 7200 VXR routers	<b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter slot 6.  Router(config-if)# <b>interface serial 6/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#
Cisco uBR7223 router	<b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter slot 1.  Router(config-if)# <b>interface serial 1/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#
Cisco uBR7246 router	<b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter slot 2.  Router(config-if)# <b>interface serial 2/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#
Cisco7201 router	<b>interface</b> , followed by the <i>type (serial)</i> and <i>slot/port</i> (port-adapter-slot-number/interface-port-number)  <b>shutdown</b>	The example is for interface 0 on a port adapter in port adapter slot 1.  Router(config-if)# <b>interface serial 1/0</b> Router(config-if)# <b>shutdown</b> <b>Ctrl-Z</b> Router#

Table 4-1 Syntax of the shutdown Command for the Supported Platforms (continued)

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



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

**Step 4** Write the new configuration to NVRAM as follows:

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

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

**Step 5** Verify that new interfaces are now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface.

Table 4-2 provides examples of the **show interfaces serial** command for supported platforms.

**Table 4-2 Examples of the show interfaces serial Command for the Supported Platforms**

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	<b>show interfaces serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# <b>show interfaces serial 1/0</b>  Serial 1/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	<b>show interfaces serial</b> , followed by <i>mod-num/bay/port</i> (module-slot-number/port-adapter-bay-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3. Router# <b>show interfaces serial 3/0/0</b>  Serial 3/0/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Cisco 7200 series routers and Cisco 7200 VXR routers	<b>show interfaces serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 6. Router# <b>show interfaces serial 6/0</b>  Serial 6/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Cisco 7201 router	<b>show interfaces serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# <b>show interfaces serial 1/0</b>  Serial 1/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Cisco uBR7223 router	<b>show interfaces serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# <b>show interfaces serial 1/0</b>  Serial 1/0 is administratively down, line protocol is down  [Additional display text omitted from this example]

Table 4-2 Examples of the `show interfaces serial` Command for the Supported Platforms (continued)

Platform	Command	Example
Cisco uBR7246 router	<code>show interfaces serial</code> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 2. Router# <code>show interfaces serial 2/0</code>  Serial 2/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Cisco 7301 router	<code>show interfaces serial</code> , followed by <i>slot/port</i> (port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1. Router# <code>show interfaces serial 1/0</code>  Serial 1/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	<code>show interfaces serial</code> , followed by <i>slot/port</i> (module-slot-number/interface-port-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-if)# <code>show interfaces serial 3/0</code>  Serial 3/0 is administratively down, line protocol is down  [Additional display text omitted from this example]
VIP in Cisco 7000 series routers or Cisco 7500 series routers	<code>show interfaces serial</code> , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1 of a VIP in interface processor slot 1. Router# <code>show interfaces serial 1/1/0</code>  Serial 1/1/0 is administratively down, line protocol is down  [Additional display text omitted from this example]

- 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 enabling an interface, specifying IP routing, and setting up external timing on a DCE interface. 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 4-3](#) provides examples of the **interface serial** subcommand for the supported platforms.

**Table 4-3** Examples of the interface serial Subcommand for Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 0.  Router(config)# <b>interface serial 0/0</b> Router(config-if)#
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	<b>interface serial</b> , followed by <i>mod-num/bay/port</i> (module-slot-number/ port-adapter-bay-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3.  Router(config)# <b>interface serial 3/0/0</b> Router(config-if)#
Cisco 7200 series routers and Cisco 7200 VXR routers	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 6.  Router(config)# <b>interface serial 6/0</b> Router(config-if)#

Table 4-3 Examples of the interface serial Subcommand for Supported Platforms (continued)

Platform	Command	Example
Cisco 7201 router	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 1.  Router (config)# <b>interface serial 1/0</b> Router (config-if)#
Cisco uBR7223 router	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 1.  Router (config)# <b>interface serial 1/0</b> Router (config-if)#
Cisco uBR7246 router	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 2.  Router (config)# <b>interface serial 2/0</b> Router (config-if)#
Cisco 7301 router	<b>interface serial</b> , followed by <i>slot/port</i> (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 1.  Router (config)# <b>interface serial 1/0</b> Router (config-if)#
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	<b>interface serial</b> , followed by <i>slot/port</i> (module-slot-number/ interface-port-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-if)# <b>interface serial 3/0</b> Router (config-if)#
VIP in Cisco 7000 series routers or Cisco 7500 series routers	<b>interface serial</b> , followed by <i>slot/port adapter/port</i> (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for interface 0 of a port adapter in port adapter slot 1 of a VIP in interface processor slot 1.  Router (config)# <b>interface serial 1/1/0</b> Router (config-if)#

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

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

**Step 4** Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

**Step 5** Re-enable the interfaces using the **no shutdown** command. (See the “[Shutting Down an Interface](#)” section on page 4-2.)

**Step 6** Configure all additional port adapter interfaces as required.

**Step 7** 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 8** Write the new configuration to NVRAM as follows:

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

## Configuring the PA-MC-E3

Following are the procedures to configure the E3 controller, E1 lines, and serial interfaces for the PA-MC-E3. Note that all of these procedures are optional except for “[Configuring E1 Lines](#)”:

- [Configuring the E3 Controller](#), page 4-9
- [Configuring E1 Lines](#), page 4-10
- [Configuring the Serial Interface](#), page 4-14

These procedures are followed by a sample configuration in the “[Configuration Example](#)” section on [page 4-15](#).

### Configuring the E3 Controller

If you do not modify the E3 controller configuration of the PA-MC-E3, the configuration defaults in [Table 4-4](#) are used:

**Table 4-4 PA-MC-E3 Controller Defaults**

Attribute	Default Value
Clock source	line
National reserve bit	1
Idle pattern	0x55

This procedure is optional, however, if you need to change any of the default configuration attributes, follow these steps:

**Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```



**Note** The port number for the PA-MC-E3 is always 0.

**Step 2** Change the clock source used by the E3 controller:

```
Router(config-controller)# clock source {internal | line}
```

**Step 3** Change the national reserve bit.

```
Router(config-controller)# national bit {0 | 1}
```

**Step 4** Change the idle pattern.

```
Router(config-controller)# idle pattern hex-number
```

## Configuring E1 Lines

You can configure the E1 lines as any of the following four configuration options:

- Channelized
- Fractional
- Unframed
- PRI ISDN

If you assign only one channel group to an E1 line, it is a fractional E1 line. If you assign more than one channel group to an E1 line, it is a channelized E1 line.

For channelized (**e1 channel-group** command), fractional (**e1 channel-group** command), and unframed (**e1 unframed** command) configurations, each configured channel group, which might contain individual timeslots and/or ranges of timeslots, uses only one of the 128 available logical channels. For example, if you assign the range of timeslots 3-7 to a channel group, only one logical channel is used. Likewise, if you assign just timeslot 3 to a channel group, only one logical channel is used.

For PRI ISDN (**e1 pri-group** command) configurations, each timeslot you assign to a PRI group for a configured E1 line, including each timeslot within a range of timeslots, uses one of the 128 available logical channels. For example, if you assign the range of timeslots 3-7 to a PRI group, five logical channels are used (because you assigned timeslots 3, 4, 5, 6, and 7), whereas if you assign just timeslot 3 to a PRI group, only one logical channel is used.

After you configure the E1 lines, they are recognized by the software as a serial interface, and all configuration commands for a serial interface are available. You can configure the serial interface to carry data traffic with the encapsulation of PPP, HDLC, SMDS, and Frame Relay. For information on configuring a serial interface, see the [“Configuring the Serial Interface”](#) section on page 4-14.

### Changing the E1 Channel Default Settings

If you do not modify the E1 configuration of the PA-MC-E3, the configuration defaults in [Table 4-5](#) are used:

**Table 4-5 PA-MC-E3 E1 Channel Defaults**

Attribute	Default Value
Clock source	line
National reserve bit pattern	0x1f1
Framing format	crc4

If you need to change any of the default configuration attributes, follow these steps:

**Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

**Note**

The port number for the PA-MC-E3 is always 0; the **e1 line** is a value from 1 to 16.

**Step 2**

Change the clock source used by the E3 controller:

```
Router(config-controller)# e1 line clock source {internal | line}
```

**Caution**

Hardware version 3.1.0 of the PA-MC-E3 port adapter has a limitation on the use of the internal clock. In this hardware, if you change the E1 clock source from line to internal or from internal to line, it is possible, although rare, that the change will cause the E1 line to transmit an invalid E1 framing pattern causing a loss of frame at the far end. To recover from this condition, manually reset the affected E1 line by using the **e1 shutdown** controller configuration command followed by the **no e1 shutdown** controller configuration command. To determine the hardware version on the port adapter, use the **show controllers e3 EXEC** command. You cannot use the **e1 shutdown** command while running BERT or loopbacks; you must stop these functions first. In addition, you cannot start a BERT or loopback while an E1 line is shut down.

**Step 3**

Change the national reserve bit pattern:

```
Router(config-controller)# e1 line national bit hex-number
```

**Step 4**

Change the framing format:

```
Router(config-controller)# e1 line framing {crc4 | no-crc4 | none}
```

## Configuring Channelized E1 Lines

You can configure any of the 16 E1 lines as channelized E1 lines, but you are limited to a total of 128 logical channels. You can group the time slots in these E1 lines into several individual logical channel groups, each of which carries data with different data link layer protocol encapsulations. You can configure timeslot 16 as a data channel, although it is typically used for common channel signaling. Channel associated signaling (CAS) for voice channels and E1 Facilities Data Link (FDL) on timeslot 16 are not supported.

Each logical channel group can be composed of individual 64-kbps timeslots and/or ranges of timeslots, for example, 1, 9, 12-14. Each logical channel group can contain from 1-31 timeslots maximum; the same timeslot cannot be used in more than one logical channel group. Any unused timeslots are filled with programmable idle-channel data.

**Note**

If you assign only one channel group to an E1 line, it is a fractional E1 line. If you assign more than one channel group to an E1 line, it is a channelized E1 line.

To configure a channelized E1 line, following these steps, beginning in global configuration mode:

**Step 1**

Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
```

```
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

- Step 2** Configure the E1 line (values are 1 to 16) in a logical channel group (values are 0 to 30) and specify the timeslots (values are 1 to 31).

```
Router(config-controller)# e1 line channel-group number timeslots range
```

- Step 3** Repeat Step 2 for each logical channel group and exit when done.

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

---

This configuration creates a serial interface. For more information on serial interfaces, see the [“Configuring the Serial Interface”](#) section on page 4-14.

### Configuring Fractional E1 Lines

You can configure any of the 16 E1 lines as fractional E1 lines, each of which can be either E1 frames or E1 cyclic redundancy check (CRC) multiframes, as specified by CCITT/ITU G.704 and G.706. A fractional E1 line is a subset of the full E1 bandwidth, which uses Nx64 kbps; where N is a timeslot in the range of 1-31.

Fractional E1 lines contain only a single logical channel group that can be either a single 64-kbps timeslot or a range of timeslots; for example timeslot 1, or timeslots 15-23. Any unused timeslots are filled with programmable idle-channel data (**idle pattern** controller configuration command).



#### Note

If you assign only one channel group to an E1 line, it is a fractional E1 line. If you assign more than one channel group to an E1 line, it is a channelized E1 line.

To configure a fractional E1 line, follow these steps, beginning in global configuration mode:

- Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

- Step 2** Configure the E1 line (values are 1 to 16) in a logical channel group (values are 0 to 30) and specify the timeslots (values are 1 to 31).

```
Router(config-controller)# e1 line channel-group number timeslots range
```

---

This configuration creates a serial interface. For more information on serial interfaces, see the [“Configuring the Serial Interface”](#) section on page 4-14.

## Configuring Unframed E1 Lines

You can configure any of the 16 E1 lines as unframed E1 data lines. Each unframed E1 line contains no framing overhead and is not divided into timeslots.

To configure an unframed E1 line, follow these steps, beginning in global configuration mode:

**Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

**Step 2** Configure an unframed E1 line (values are 1 to 16).

```
Router(config-controller)# e1 line unframed
```

This configuration creates a serial interface. For more information on serial interfaces, see the [“Configuring the Serial Interface”](#) section on page 4-14.

## Configuring PRI ISDN E1 Lines

You can configure any of the E1 lines to support the PRI ISDN application. You assign a PRI group to the E1 line. Each PRI group can contain from 1-31 timeslots maximum. It is not necessary to allocate all 30 timeslots for the ISDN application. Timeslot 16 is used for common channel signaling. Any unused timeslot are filled with programmable idle-channel data (**idle pattern** controller configuration command).

To configure an E1 line to support the PRI ISDN, follow these steps, beginning in global configuration mode:

**Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco
7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

**Step 2** Configure the E1 line (values are 1 to 16) as a PRI group and specify the timeslots (values are 1 to 31 the default is all timeslots):

```
Router(config-controller)# e1 line pri-group [timeslots range]
```

This configuration creates a serial interface. For more information on serial interfaces, see the [“Configuring the Serial Interface”](#) section on page 4-14.

## Configuring the Serial Interface

After you configure the E1 lines on the PA-MC-E3, you can continue configuring it as you would a normal serial interface. All serial interface commands might not be applicable to the E1 channel. You can configure the serial interface to carry data traffic with the encapsulation of PPP, HDLC, SMDS, and Frame Relay.

For more information on other commands available for serial interfaces, refer to the “Configure a Synchronous Serial Interface” subsection in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

To enter interface configuration mode and configure the serial interface that corresponds to an E1 line, enter the **interfaces serial** command in global configuration mode.



### Note

When configuring the serial interface, you must specify the e1 line number and channel in addition to the standard slot and port information for each router. For unframed E1 lines, the channel is always zero (for example, interface serial 3/0/0/1:0). For channelized and fractional E1 lines, the channel is the number specified as the channel group number (for example, interface serial 3/0/0/3:20, where 20 is the channel group number). For PRI E1 lines, the channel is always 15 (for example, interface serial 3/0/0/3:15).

Table 4-6 provides examples of the **interface serial** subcommand for an E1 line for the supported platforms.

**Table 4-6** Examples of the **interface serial** Subcommand for an E1 Line for Supported Platforms

Platform	Command	Example
Catalyst RSM/VIP2 in Catalyst 5000 family switches	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 0.  Router (config) # <b>interface serial 0/0/1:0</b> Router (config-if) #
Catalyst 6000 family FlexWAN module in Catalyst 6000 family switches	<b>interface serial</b> , followed by <i>mod-num/bay/port/e1-line:channel</i> (module-slot-number/port-adapter-bay-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter bay 0 of a FlexWAN module installed in slot 3.  Router (config) # <b>interface serial 3/0/0/1:0</b> Router (config-if) #
Cisco 7200 series routers and Cisco 7200 VXR routers	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 6.  Router (config) # <b>interface serial 6/0/1:0</b> Router (config-if) #
Cisco 7201 router	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1.  Router (config) # <b>interface serial 1/0/1:0</b> Router (config-if) #

**Table 4-6** Examples of the interface serial Subcommand for an E1 Line for Supported Platforms (continued)

Platform	Command	Example
Cisco uBR7223 router	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# <b>interface serial 1/0/1:0</b> Router(config-if)#
Cisco uBR7246 router	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 2. Router(config)# <b>interface serial 2/0/1:0</b> Router(config-if)#
Cisco 7301 router	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (port-adapter-slot-number/interface-port-number/e1-line-number:channel-group-number)	The example is for interface 0 of a port adapter in port adapter slot 1. Router(config)# <b>interface serial 1/0/1:0</b> Router(config-if)#
Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	<b>interface serial</b> , followed by <i>slot/port/e1-line:channel</i> (module-slot-number/interface-port-number/e1-line-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-if)# <b>interface serial 3/0/1:0</b> Router(config-if)#
VIP in Cisco 7000 series routers or Cisco 7500 series routers	<b>interface serial</b> , followed by <i>slot/port adapter/port/e1-line:channel</i> (interface-processor-slot-number/port-adapter-slot-number/interface-port-number/e1-line-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)# <b>interface serial 1/1/0/1:0</b> Router(config-if)#

## Configuration Example

The following example shows a condensed PA-MC-E3 configuration example in which multiple E1 lines at remote sites are aggregated onto a single E3 line at the edge router. This example concentrates the E1 lines to the router without an E123 multiplexer or E1 CSU/DSU.

In the following example, the PA-MC-E3 in slot 4 is configured as follows:

- E1 line 2 is assigned to channel group 0 and is using all timeslots (full E1 bandwidth)
- E1 line 3 is assigned to channel group 0 and is using timeslots 1 through 15
- E1 line 3 is also assigned to channel group 1 and is using timeslots 16 through 31
- For the E3, the default clock source, national, bit, and idle pattern are used
- For each E1 line, the default framing, national bits, and clock source are used
- Each E1 channel is assigned an IP address

Note that the example below is only a partial example; other interface configuration commands can be assigned to the E1 channel.

For more information, refer to the “Configuring the E3 Controller” section on page 4-9 and the “Configuring E1 Lines” section on page 4-10.

```
Router# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller e3 4/0/0

Router(config-controller)# e1 2 channel-group 0 timeslot 1-31

Router(config-controller)# e1 3 channel-group 0 timeslot 1-15

Router(config-controller)# e1 3 channel-group 1 timeslot 16-31

...
Router(config)# interface serial 4/0/0/2:0

Router(config-if)# ip address 10.20.30.1 255.255.255.0

Router(config)# interface serial 4/0/0/3:0

Router(config-if)# ip address 10.20.40.1 255.255.255.0

Router(config)# interface serial 4/0/0/3:1

Router(config-if)# ip address 10.20.50.1 255.255.255.0

...
Router(config-if)# end
```

## Configuring a BERT on an E1 Line

Bit error rate test (BERT) circuitry is built into the PA-MC-E3. Using BERTs you can test cables and signal problems in the field. You can configure any E1 line to connect to the onboard BERT circuitry.

There are two categories of test patterns that can be generated by the onboard BERT circuitry: pseudorandom and repetitive. The former test patterns are exponential numbers and conform to CCITT/ITU O.151 and O.153; the latter test patterns are zeroes or ones, or alternating zeroes and ones.

A description of each type of test pattern follows:

- Pseudorandom patterns:
  - $2^{11}$  (per CCITT/ITU O.151)
  - $2^{15}$  (per CCITT/ITU O.151)
  - $2^{20}$  (per CCITT/ITU O.153)
  - $2^{20}$  QRSS (per CCITT/ITU O.151)
  - $2^{23}$  (per CCITT/ITU O.151)
- Repetitive patterns:
  - All zeros (0s)
  - All ones (1s)
  - Alternating zeros (0s) and ones (1s)

Both the total number of error bits received and the total number of bits received are available for analysis. You can select the testing period from 1 minute to 24 hours, and you can also retrieve the error statistics anytime during the BERT. (Note that BER testing for the E3 link is not supported.) When running a BERT, your system expects to receive the same pattern that it is transmitting. To help ensure this, two common options are available:

- Use a loopback somewhere in the link or network.
- Configure remote testing equipment to transmit the same BER test pattern at the same time.

## Sending a BERT Pattern on an E1 Line

You can send a BERT pattern on an E1 line with the following controller command:

**e1** *e1-line-number* **bert pattern** *pattern* **interval** *time*.

where:

- *e1-line-number* is 1–16
- *time* is 1–1440 minutes
- *pattern* is:
  - 0s, repetitive test pattern of all zeros (as 00000...)
  - 1s, repetitive test pattern or all ones (as 11111...)
  - 2<sup>11</sup>, pseudo-random test pattern (2,048 bits long)
  - 2<sup>15</sup>, pseudo-random O.151 test pattern (32,768 bits long)
  - 2<sup>20</sup>-O153, pseudo-random O.153 test pattern (1,048,575 bits long)
  - 2<sup>20</sup>-QRSS, pseudo-random QRSS O.151 test pattern (1,048,575 bits long)
  - 2<sup>23</sup>, pseudo-random O.151 test pattern (8,388,607 bits long)
  - alt-0-1, repetitive alternating test pattern of zeros (0s) and ones (1s), as 01010101...



### Note

To terminate a BER test during the specified test period, use the **no e1 line bert** command.

The following examples show how to configure a BER test to send a BERT pseudorandom pattern of 2<sup>20</sup> through E1 line 10 for 5 minutes for various supported routers:

For a Cisco 7200 series or a Cisco uBR7200 series router:

```
Router(config)# controller e3 1/0
Router(config-controller)# e1 10 bert pattern 2^20 interval 5
```

For a VIP2:

```
Router(config)# controller e3 1/0/0
Router(config-controller)# e1 10 bert pattern 2^20 interval 5
```

For a Catalyst RSM/VIP2:

```
Router(config)# controller e3 1/0
Router(config-controller)# e1 10 bert pattern 2^20 interval 5
```

## Viewing BERT Results

To view the BERT results for the above examples, you would enter the following **show controllers** commands:

For the Cisco 7200 series or a Cisco uBR7200 series router:

```
Router(config)# show controllers e3 1/0/10
```

For a VIP2:

```
Router(config)# show controllers e3 1/0/0/10
```

For a Catalyst RSM/VIP2:

```
Router(config)# show controllers e3 1/0/10
```

## 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 4-7 summarizes the CRC commands.

**Table 4-7** CRC Commands

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

You 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:

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

The preceding command example applies to all systems in which the PA-MC-E3 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.

## Checking the Configuration

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

- [Using show Commands to Verify the New Interface Status, page 4-19](#)
- [Using the ping Command to Verify Network Connectivity, page 4-33](#)
- [Using loopback Commands, page 4-33](#)

## Using show Commands to Verify the New Interface Status

[Table 4-8](#) demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the PA-MC-E3 appears in them correctly. Sample displays of the output of selected **show** commands appear in the sections that follow. For complete command descriptions and examples, refer to the publications listed in the “[Related Documentation](#)” section on page 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 4-8** Using show Commands

Command	Function	Example
<b>show version</b> or <b>show hardware</b>	Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images	Router# <b>show version</b>
<b>show controllers</b>	Displays all the current interface processors and their interfaces	Router# <b>show controllers</b>

Table 4-8 Using show Commands (continued)

Command	Function	Example
<b>show controllers e3</b> [ <i>slot/port/e1-line</i> ] [ <b>brief</b>   <b>tabular</b> ]	Displays the status of the E3 controller on the Catalyst RSM/VIP2, Cisco7200 series routers, Cisco 7200 uBR series routers, Cisco 7200 VXR routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	Router# <b>show controllers e3 1/0/1 brief</b>
<b>show controllers e3</b> [ <i>module-slot-number/port-adapter-bay-number/interface-port-number/e1-line</i> ] [ <b>brief</b>   <b>tabular</b> ]	Displays the status of the E3 controller on a Catalyst 6000 family FlexWAN module	Router# <b>show controllers e3 3/0/0/1 brief</b>
<b>show controllers e3</b> [ <i>interface-processor-slot-number/port-adapter-slot-number/interface-port-number/e1-line</i> ] [ <b>brief</b>   <b>tabular</b> ]	Displays the status of the E3 controller on a VIP in a Cisco 7000 series router or Cisco 7500 series router	Router# <b>show controllers e3 3/1/0/1 tabular</b>
<b>show diag slot</b> <b>Note</b> 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# <b>show diag 2</b>
<b>show interfaces type 0 or 1/</b> <i>interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) on a Catalyst RSM/VIP2	Router# <b>show interfaces serial 1/0</b>
<b>show interfaces type</b> <i>module-slot-number/port-adapter-bay-number/interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) on a Catalyst 6000 family FlexWAN module	Router# <b>show interfaces serial 3/0/0</b>
<b>show interfaces type</b> <i>port-adapter-slot-number/</i> <i>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, or Cisco 7301 router	Router# <b>show interfaces serial 1/0</b>
<b>show interfaces type</b> <b>1/</b> <i>interface-port-number</i>	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7223 router	Router# <b>show interfaces serial 1/1</b>

Table 4-8 Using show Commands (continued)

Command	Function	Example
<b>show interfaces</b> <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# <b>show interfaces serial 2/0</b>
<b>show interfaces</b> <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# <b>show interfaces serial 3/0</b>
<b>show interfaces</b> <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# <b>show interfaces serial 3/1/0</b>
<b>show interfaces serial</b> <i>slot/port/e1-line:channel-group</i>	Display statistics about the serial information for a specific E1 line (values are 1 to 16) and channel group (values are 0 to 30) on the Catalyst RSM/VIP2, Cisco7200 series routers, Cisco 7200 uBR series routers, Cisco 7200 VXR routers, Cisco 7201 router, Cisco 7301 router, and Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router	Router# <b>show interfaces serial 1/0/1:0</b>
<b>show interfaces serial</b> <i>module-slot-number/port-adapter-bay-number/ interface-port-number/e1-line:channel-group</i>	Display statistics about the serial information for a specific E1 line (values are 1 to 16) and channel group (values are 0 to 30) on a Catalyst 6000 family FlexWAN module	Router# <b>show interfaces serial 3/0/1:0</b>
<b>show interfaces serial</b> <i>interface-processor-slot-number/port-adapter-slot-number/e1-line:channel-group</i>	Display statistics about the serial information for a specific E1 line (values are 1 to 16) and channel group (values are 0 to 30) on a VIP in a Cisco 7000 series router or Cisco 7500 series router	Router# <b>show interfaces serial 3/0/1:0</b>
<b>show protocols</b>	Displays protocols configured for the entire system and for specific interfaces	Router# <b>show protocols</b>
<b>show running-config</b>	Displays the running configuration file	Router# <b>show running-config</b>
<b>show startup-config</b>	Displays the configuration stored in NVRAM	Router# <b>show startup-config</b>

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

- [Using the show version or show hardware Commands, page 4-22](#)
- [Using the show diag Command, page 4-26](#)
- [Using the show interfaces Command, page 4-29](#)

Choose the subsection appropriate for your system. Proceed to “[Using the ping Command to Verify Network Connectivity](#)” section on [page 4-33](#) when you have finished using the **show** commands.

## Using the show version or show hardware Commands

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



### Note

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

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 4-22](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show version Command, page 4-23](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show version Command, page 4-24](#)
- [Cisco 7201 Router—Example Output of the show version Command, page 4-24](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command, page 4-25](#)

### 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 the PA-MC-E3:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) C5RSM Software (C5RSM-JSV-M), Version 11.2(9)P
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Tue 24-Jun-97 17:09 by biff
Image text-base: 0x600108E0, data-base: 0x6095E000

ROM: System Bootstrap, Version 11.2(15707)
BOOTFLASH: C5RSM Software (C5RSM-JSV-M), Version 11.2

Router uptime is 17 hours, 17 minutes
System restarted by reload
System image file is "c5rsm-jsv-mz.7P", booted via tftp

cisco RSP2 (R4700) processor with 32768K bytes of memory.
```

```

R4700 processor, Implementation 33, Revision 1.0
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.
1 C5IP controller (15 Vlan).
2 MIP controllers (4 E1).
1 VIP2 controller (2 E1)(4 Token Ring).
6 Channelized E1/PRI ports.
123K 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 0x100

```

### 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 switch with the PA-MC-E3:

```

Router# show version

Cisco Internetwork Operating System Software
IOS (tm) MSFC Software (C6MSFC-JSV-M), Experimental Version 12.1(20000209:134547)
[amcrae-cosmos_e_nightly 163]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Wed 09-Feb-00 07:10 by
Image text-base: 0x60008900, data-base: 0x6140E000

ROM: System Bootstrap, Version 12.0(3)XE, RELEASE SOFTWARE

const-uut uptime is 5 minutes
System returned to ROM by reload
System image file is "bootflash:c6msfc-jsv-mz.Feb9"

cisco Cat6k-MSFC (R5000) processor with 122880K/8192K bytes of memory.
Processor board ID SAD03457061
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
Channelized E1, Version 1.0.
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
6 FlexWAN controllers (13 Serial)(8 E1)(8 T1)(2 HSSI)(2 ATM)(1 Channelized T3)(1
Channelized E3)(2 POS).
1 Virtual Ethernet/IEEE 802.3 interface(s)
17 Serial network interface(s)
2 HSSI network interface(s)
2 ATM network interface(s)
2 Packet over SONET network interface(s)
1 Channelized T3 port(s)
1 Channelized E3 port(s)
123K bytes of non-volatile configuration memory.
4096K bytes of packet SRAM memory.

16384K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x1

```

## 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 the PA-MC-E3:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 11.1(7)CA [biff 105]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 04-Aug-96 06:00 by biff
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 11.1(7)CA RELEASED SOFTWARE

Router uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "c7200-j-mz", booted via slot0

cisco 7206 (NPE150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV INC).
Chassis Interface.
4 Ethernet/IEEE 802.3 interfaces.
2 FastEthernet/IEEE 802.3 interfaces.
4 Token Ring /IEEE802.5 interfaces.
12 Serial network interfaces.
1 Compression port adapter.
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```

## 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
c7201alphal 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

```

### 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 the PA-MC-E3:

```

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 a Catalyst 5000 family switch, 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 a 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 outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.


**Note**

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

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 4-26](#)
- [Cisco 6000 Family FlexWAN Module—Example Output of the show diag Command, page 4-27](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show diag Command, page 4-27](#)
- [Cisco 7201 Router —Example Output of the show diag Command, page 4-27](#)
- [VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command, page 4-28](#)

### 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 PA-MC-E3 on a Catalyst RSM/VIP2:

```
Router# show diag
Slot 0:
  Physical slot 0, ~physical slot 0xF, logical slot 0, CBus 1
  Microcode Status 0x4
  Master Enable, LED, WCS Loaded
  Board is analyzed
  Pending I/O Status: Console I/O, Debug I/O
  EEPROM format version 1
  C5IP controller, HW rev 1.0, board revision A0
  Serial number: 00000001 Part number: 00-0000-01
  Test history: 0x00 RMA number: 00-00-00
  Flags: cisco 7000 board; 7500 compatible
EEPROM contents (hex):
  0x20: 01 1C 01 00 00 00 00 01 00 00 00 01 00 00 00 00
  0x30: 50 00 00 00 00 00 00 00 00 00 00 00 78 00 00 00 00
[Additional display text omitted]
```

### Cisco 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-E3 on a Catalyst 6000 family FlexWAN module:

```
Router# show diag

(Additional displayed text omitted from this example.)

Slot 5: Logical_index 11
Board is analyzed ipc ready FlexWAN controller

Slot database information:
Flags: 0x2004Insertion time: unknown

CWAN Controller Memory Size: Unknown
PA Bay 1 Information:
    CE3 PA, 1 port
EEPROM format version 0
HW rev 0.00, Board revision UNKNOWN
Serial number: 00000000 Part number: 00-0000-00
```

### 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 PA-MC-E3 in port adapter slot 1 of a Cisco 7200 series router:

```
Router# show diag 1
Slot 1:
CE3 Port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 00:18:56 ago
EEPROM contents at hardware discovery:
Hardware revision 1.0          Board revision A0
Serial number    9007030      Part number    73-2410-02
Test history     0x0          RMA number     00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20:01 61 01 00 00 89 6F B6 49 09 6A 02 00 00 00 00
0x30:50 00 00 00 98 05 26 00 FF FF FF FF FF FF FF FF
```

### Cisco 7201 Router—Example Output of the show diag Command

Following is an example of the **show diag** command on 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
 0x60: 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

```

## 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 PA-MC-E3 in port adapter slot 0 on a VIP2 in interface processor slot 1:

```

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
0x30: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 the individual platforms and VIP interfaces, 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 4-29](#)
- [Catalyst 6000 Family FlexWAN Module—Example Output of the show interfaces Command, page 4-30](#)
- [Cisco 7200 Series Routers, Cisco 7200 VXR Routers, and Cisco uBR7200 Series Routers—Example Output of the show interfaces Command, page 4-30](#)
- [Cisco 7201 Router—Example Output of the show interfaces Command, page 4-31](#)
- [VIP in Cisco 7000 Series Routers or Cisco 7500 Series Routers—Example Output of the show interfaces Command, page 4-32](#)

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

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

```
Router# show interfaces serial 1/0
Serial1/0 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 1/1
Serial1/1 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 1/2
Serial1/2 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]
```

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

Following is an example of the **show interfaces serial** command from a Catalyst 6000 family FlexWAN module. In this example, the Catalyst 6000 family FlexWAN module is in slot 5, and the MC-E3 port adapter is in port adapter bay 1:

```
Router(config)# show interface serial 5/1/0/1:0
Serial5/1/0/1:0 is down, line protocol is down
  Hardware is E3
  MTU 1500 bytes, BW 1984 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  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:1-31, Transmitter delay is 0 flags, transmit queue length 999
```

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

Following are examples of the **show interfaces serial** command from a Cisco 7200 series router. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 1; also, most of the status information for each interface is omitted. (Interfaces are administratively shut down until you enable them.)

```
Router# show interfaces serial 1/0
Serial1/0 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 1/1
Serial1/1 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 1/2
Serial1/2 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]
```

Following is an example of the **show interfaces serial** command, which shows all of the information specific to interface port 0 on a PA-MC-E3 installed in port adapter slot 1:

```
Router# show interfaces serial 1/0
Serial1/0 is up, line protocol is up
  Hardware is M8T-RS232
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output 1d17h, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  24 packets output, 5137 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions      DCD=down  DSR=down  DTR=down  RTS=down  CTS=down
```

### 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
```

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

Following are examples of the **show interfaces serial** command used with the VIP. In these examples, the eight serial interfaces (0 to 7) are on a port adapter in port adapter slot 1 of a VIP 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 serial** command, which shows all of the information specific to interface 0 on a port adapter in port adapter slot 1 of a VIP 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
```

Proceed to the next section, “[Using the ping Command to Verify Network Connectivity](#),” to check network connectivity of the PA-MC-E3 and switch or router.

## 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

Use the **loopback {dte | local | network {line | payload}}** command to troubleshoot the E3 serial port adapter at the physical interface level. The command loops all packets from the E3 interface either back to the interface or from the network back out toward the network.

Use the **no** form of the command to remove the loop.

The following examples of the **loopback {dte | local | network {line | payload}}** command that configure loopback modes on the single interface (interface 0) of a one-port E3 serial port adapter in port adapter slot 0 of a VIP2 in chassis slot 10 of a Cisco 7500 series router:

The **loopback dte** command places an interface into loopback data terminal equipment (DTE) mode, which loops the router output data back toward the router (after the line interface unit).

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback dte
```

The **loopback local** command places an interface into local loopback mode, which loops the router output data back toward the router at the framer.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback local
```

The **loopback network line** command places an interface into network line loopback mode, which loops the data back toward the network (before the framer).

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback network line
```

The **loopback network payload** command places the interface into network payload loopback mode, which loops just the payload data back toward the network at the E3 framer.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface serial 10/0/0
router(config-if)# loopback network payload
```

In addition to using loopback commands at the physical interface level, you can also use the **loopback local** command to diagnose problems with cables between the E3 controller and the central switching office at the E3 link level, or to diagnose problems with cables between the port adapter and the central switching office at the E1 line level.

An E3 local loopback simultaneously loops all channels toward the router and loops the E3 link back toward the network.

An E1 local loopback sets both local and line (remote) loopback modes simultaneously and loops data toward the router. An E1 remote line loopback loops the E1 line to the remote end. You can also use this loopback mode with bit error rate (BER) tests.

To set a loopback on the E3 or E1 lines, follow these steps, beginning in global configuration mode:

---

**Step 1** Select the E3 controller and enter controller configuration mode:

```
Router(config)# controller E3 0/0 (Catalyst RSM/VIP2)
Router(config)# controller E3 3/0/0 (Catalyst 6000 family FlexWAN module)
Router(config)# controller E3 1/0 (Cisco 7200 series router)
Router(config)# controller E3 1/0 (Cisco uBR7200 series router)
Router(config)# controller E3 1/0 (Cisco 7201, Cisco 7301)
Router(config)# controller E3 3/0 (Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router)
Router(config)# controller E3 1/0/0 (Cisco 7000 and 7500 series routers with VIP)
```

**Step 2** Set a local loopback on the E3 controller:

```
Router(config-controller)# loopback local
```

**Step 3** Set a local loopback on the E1 line:

```
Router(config-controller)# e1 line loopback local
```

---