Configuring the SS7 Port Adapter

To continue your SS7 Port Adapter installation, you must configure the card type as either T1 or E1 and then configure the interfaces.

This chapter contains the following sections:

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 SS7 Port Adapter interfaces can be configured as DSX-1/DS1 or G.703 interfaces. After you verify that the new SS7 Port Adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Have the following information available:

- Protocols you plan to route on each new interface
- Clock timing source you plan to use for each new interface and clock speeds for external timing

If you installed a new SS7 Port Adapter 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 SS7 Port Adapter that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configuration.

For a summary of the configuration options available and instructions for configuring interfaces on a SS7 Port Adapter, 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

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 commands, 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** command and then the **shutdown** command. Table 4-1 shows the command syntax and example.

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

Command	Purpose	Example
interface *type* i*nterface-processor-slot-number/ port-adapter-bay-number/ interface-port-number* **:***channel-group*	Specifies the interface and enters Interface configuration mode.	`Router(config)# interface serial5/0/0:0`
shutdown	Disables the interface.	`Router(config-if)# shutdown`

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 interface** command:

```
Router# show interface serial4/0/0:0
Serial4/0/0:0 is administratively down, line protocol is down
  Hardware is cxBus T1
  MTU 290 bytes, BW 56 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SS7 MTP2, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input 00:01:04, output 00:01:04, output hang never
  Last clearing of "show interface" counters 00:04:13
  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
     11 packets input, 693 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
     8 packets output, 72 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions no alarm present
  Timeslot(s) Used:1, subrate: 56Kb/s, transmit delay is 0 flags
  Transmit queue length 109
Router#
```

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 interface** 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 Configuration

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

Specifying Card Type is Required

Because the PA-MCX 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 commands, 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 0
  ```

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

  ```
  Router(config)# card type e1 1 0
  ```

Note To change the card type of the SS7 Port Adapter 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.

Configuring the Controller

This section describes line clocking on the SS7 Port Adapter and lists the steps for a basic controller configuration.

Note It is recommended that any controller that is not used for SS7 links or BITS clocking should be shut down.

Clocking on the SS7 Port Adapter

Each SS7 Port Adapter in the ITP shares a clocking source for all T1s or E1s serviced on that card. The clocking options and commands for each are as follows:

- Clocking source is internally generated.
  clock source internal
  This option imposes the requirements that all devices connected to the ITP must derive their clock from the T1/E1 by which they are connected to the ITP.
- Clocking source is derived from a T1/E1 that is terminated on the card.
  clock source line {**primary** | **secondary** *priority*}
  The SS7 Port Adapter on the ITP derives its clock from an adjacent node. All other T1s or E1s on the card are clocked with this derived source. This option imposes the restrictions that all adjacent nodes connected to T1s or E1s on that card must either derive the clock from the T1/E1 to which they are connected or are derive the clock from the same source as the ITP.
- Clocking source is provided through a dedicated port on that card via BITS (a common source received via satelite and used to synchronize all clocks across a CO and between COs)
  clock source bits {**primary** | **secondary** *priority*}
  A common dedicated clock source is wired to all devices and used by each device for all T1/E1 timing.
  A controller that is configured for BITS clocking cannot be used to carry data.

Clocking on the SS7 Port Adapter is driven by one clock source for the entire card. Each port can be configured with a priority from highest (0) to lowest (7) to determine which port's line clocking will drive the clocking for the port adapter. Table 4-2 provides the details of a hypothetical scenario. In this scenario, port 8 is configured with priority 0 (the highest priority). Therefore, if its line is up, it drives the clock for the whole card. But, if the line interface is down, as shown here, then the port with the next highest priority (in this example, port 3, with a priority of 2) would become primary.

Table 4-2 Sample Data for Determining Line Clocking Priority

Port	Source	State	Priority
1	Line	Up	2
2	Internal		

Table 4-2 Sample Data for Determining Line Clocking Priority (continued)

Port	Source	State	Priority
3	Line	Up	3
4	Internal		
5	Internal		
6	Internal		
7	Line	Down	4
8	Line	Down	0

Creating a Basic Controller Configuration for the SS7 Port Adapter

The following steps make up a basic controller configuration for the SS7 Port Adapter:

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

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

Step 2 Enter controller configuration mode and specify a controller by entering the **controller t1** or **controller e1** command, followed by the interface address of the interface you plan to configure. Table 4-3 provides examples.

Table 4-3 Examples of the controller Command

Command	Purpose	Example

controller t1 *interface-processor-slot-number/ port-adapter-bay-number/ interface-port-number*	Specifies the controller and enters Controller configuration mode.	The following example is for the first interface of a port adapter in port adapter bay 0 of interface processor slot 6:
		`Router(config)# controller t1 6/0/0`
		`Router(config-controller)#`

controller e1 *interface-processor-slot-number/ port-adapter-bay-number/ interface-port-number*	Specifies the controller and enters Controller configuration mode.	The following example is for the second interface of a port adapter in port adapter bay 1 of interface processor slot 6:
		`Router(config)# controller e1 6/1/1`
		`Router(config-controller)#`

Step 3 Enter the **framing [sf | esf]** configuration command to set the framing format for T1, as in the following example:

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

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

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

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

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

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

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

Step 5 Enter the **clock source** {**bits** {**primary** | **secondary** *priority*} | **internal** | **line** {**primary** | **secondary** *priority*}} command to set the clock source, as in the following 3 variations of the command:

```
Router(config-controller)# clock source internal
Router(config-controller)# clock source line {primary | secondary priority}
Router(config-controller)# clock source bits {primary | secondary priority}
```

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 command 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 eight-port SS7 Port Adapter is 127. All channelized interfaces configured on the SS7 Port Adapter must use the same speed.

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

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

Step 8 Enter the **cablelength {long [gain26 | gain36] [0db | -7.5db | -15db | -22.5db]}** configuration command 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 9 For T1 enter the **fdl {att | ansi}** configuration command 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 command is not allowed in Super Frame mode.

Step 10 Enter the **shutdown** configuration command 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**.

Performing a Basic Data Interface Configuration

This section provides instructions for a basic data interface configuration. You might also need to enter other configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration commands 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 commands, 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** command, followed by the interface address of the interface you plan to configure. Table 4-4 provides an example.

Table 4-4 Example of the interface serial Command

Command	Purpose	Example
interface *type* i*nterface-processor-slot-number/ port-adapter-bay-number/ interface-port-number* **:***channel-group*	Specifies the interface and enters Interface configuration mode.	`Router(config)# interface serial5/0/0:0` `Router(config-if)#`

Step 3 Configure the serial interface to use MTP2 encapsulation, as in the following example:

```
Router(config-if)# encapsulation mtp2
```

Step 4 Add any other interface commands required to enable routing protocols and adjust the interface characteristics.

Step 5 After including all of the configuration commands 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 6 Write the new configuration to NVRAM as follows:

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

Configuring Cyclic Redundancy Checks

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.

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.

Table 4-5 summarizes cyclic redundancy check (CRC) commands.

Table 4-5 CRC Commands

Command	Purpose	Example

crc *size*	Enable 32-bit CRC	The following example enables 32-bit CRC on a serial interface:
		`Router(config)# interface serial 3/0:0`
		`Router(config-if)# crc 32`

no crc *size*	Return to default 16-bit CRC	The following 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`

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* publication. For more information, see the "Related Documentation" section on page viii.

To check the interface configuration using **show** commands, proceed to the "Checking the Configuration" section on page 4-11.

Configuring Drop and Insert

Perform the steps in this section if you are setting up Drop and Insert.

Step 1 Enter the command to set up TDM channel groups for the Drop-and-Insert function, as in the following example:

```
Router(config-controller)# tdm-group tdm-group-no timeslots timeslot-list
Router(config-controller)#
```

The argument *tdm-group-no* is a value from 0 to 23 for T1 and from 0 to 30 for E1; it identifies the group. The group numbers for controller groups must be unique.

The argument *timeslot-list* is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of timeslots. The valid range is from 1 to 24 for T1. For E1, the range is from 1 to 31.

Step 2 Activate the controller with the **no shutdown** command, as in the following example:

```
Router(config-controller)# no shutdown
Router(config-controller)#
```

Step 3 Exit controller configuration mode, as follows:

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

Step 4 Set up the connection between two T1 or E1 TDM groups of timeslots for Drop and Insert.

```
Router(config)# connect id {T1 | E1} slot/port-1 tdm-group-no-1 {T1 | E1} slot/port-2
tdm-group-no-2
Router(config)#
```

The argument *id* is a name for the connection.

The argument *slot/bay/port* identify each controller by its location.

The arguments *tdm-group-no-1* and *tdm-group-no-2* identify the TDM group numbers (from 0 to 23 or 30) on the specified controller. The groups were set up in Step 1.

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

Table 4-6 demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the SS7 Port Adapter 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.

Troubleshooting Tips

If information about the PA-MCX port adapter is not indicated in show command output, it is probably because the card type has not been specified.

Because the PA-MCX 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 Configuration" section on page 4-4. There is no default card type. The port adapter is not functional until the card type is set.

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

Table 4-6 Using show Commands

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

Table 4-6 Using show Commands

Command	Function	Example
show diag *slot*	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	`Router# show diag 2`
show interfaces *type interface-processor-slot-number/ port-adapter-bay-number interface-port-number*	Displays status information about a specific type of interface (for example, serial) in a router	`Router# show interfaces serial 5/0/0:0`
show protocols	Displays protocols configured for the entire system and for specific interfaces	`Router# show protocols`
show running-config	Displays the running configuration file	`Router# show running-config`
show startup-config	Displays the configuration stored in NVRAM	`Router# show startup-config`

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

- Using the show version or show hardware Commands, page 4-12
- Using the show diag Command, page 4-12
- Using the show interfaces Command, page 4-13

Choose the subsection appropriate for your system. Proceed to the "Using the ping cs7 Command to Verify Network Connectivity between ITPs" section on page 4-14 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.

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 router.

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.

Following is an example of the **show diag** command that shows an SS7 Port Adapter in interface processor slot 2 of a Cisco 7513 router:

```
Router# show diag 2
Slot 2:
         PA-MCX-8TE1-M 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 03 52 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
```

Using the show interfaces Command

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

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.

Following is an example of the **show interfaces serial** command. In this example, the SS7 Port Adapter is located in port adapter slot 4.

```
Router#show interface serial 4/0/0:0
Serial4/0/0:0 is up, line protocol is up
  Hardware is cxBus T1
  MTU 290 bytes, BW 56 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SS7 MTP2, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input 00:00:46, output 00:00:46, output hang never
  Last clearing of "show interface" counters 00:32:16
  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
     65 packets input, 714 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
     67 packets output, 598 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions no alarm present
```

```
  Timeslot(s) Used:1, subrate: 56Kb/s, transmit delay is 0 flags
  Transmit queue length 109
Router#
```

Using the ping cs7 Command to Verify Network Connectivity between ITPs

To verify connectivity to another ITP, use the following command in EXEC mode:

Command	Purpose
Router# **ping cs7** [**-duration** *seconds*] [**-ni** *network-indicator*] [**-rate** *MSU-per-second*] [**-size** *bytes*] [**-sls** *value* | **round-robin**] [**stop**] *point-code*	Verify that you can reach ITP nodes.

The following is typical output of the **cs7 ping** command:

```
Router# ping cs7 2.2.2
3d19h:%CS7PING-6-RTT:Test Q.755 2.2.2:MTP Traffic test rtt 16/16/16
3d19h:%CS7PING-6-STAT:Test Q.755 2.2.2:MTP Traffic test 100% successful (1/1)
3d19h:%CS7PING-6-TERM:Test Q.755 2.2.2:MTP Traffic test terminated.
```

If the connection fails, verify that you have the correct point code for the ITP and that the ITP is active (powered on), and repeat the **ping cs7** command.

Using loopback Commands

With the loopback test, you can detect and isolate equipment malfunctions by testing the connection between the SS7 Port Adapter interface and a remote device such as a modem or a CSU/DSU. The **loopback** command places an interface in loopback mode, which enables test packets that are generated from the **ping cs7** 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 SS7 Port Adapter 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 SS7 Port Adapter 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:

- The syntax of the **loopback diagnostic** command is as follows:

  loopback [**diagnostic**]

  Set the first T1 into diagnostic loopback.

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

  In the preceding example, diagnostic loopback loops the outgoing transmit signal back to the receive signal and sends an alarm indication signal (AIS) to the network.

- The syntax of the **loopback local** command is as follows:

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

  Set the first T1 into local loopback.

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

  In the preceding example, local loopback loops the incoming signal back to the line.

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

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

  Set 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 2/0/0
Router(config-controller)# loopback remote esf line
```

  This command causes the far end to loop its receive signal back to transmit.

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 follow:

- The syntax of the **loopback diagnostic** command is as follows:

  loopback [**diagnostic**]

  Set the first E1 into diagnostic loopback.

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

  In the preceding example, the **loopback diagnostic** command loops the outgoing transmit signal back to the receive signal and sends an AIS out to the network.

- The syntax of the **loopback local** command is as follows:

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

  Set the first E1 into local loopback.

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

  In the preceding example, the **loopback local** command loops the incoming signal back to the line.