

controller

To configure a T1, E1, or J1 controller and enter controller configuration mode, use the **controller** command in global configuration mode.

Cisco 2600 and 3600 Series Routers

```
controller {t1 | e1 | j1} slot/port
```

Cisco 7200 Series and Cisco 7500 Series Routers

```
controller {t1 | e1} slot/port
```

Cisco AS5200 and AS5300 Access Servers and Cisco 4000 Series Routers

```
controller {t1 | e1} number
```

Cisco AS5800 Access Servers

```
controller t1 dial-shelf/slot/t3-port:t1-num
```

Cisco 7200 Series and Cisco 7500 Series Routers

```
controller {t1 | e1 } slot/port
```

Syntax	Description
t1	T1 controller.
e1	E1 controller.
j1	J1 controller.
<i>slot/port</i>	Backplane slot number and port number on the interface. See your hardware installation manual for the specific values and slot numbers.
<i>number</i>	Network processor module (NPM) number, in the range 0 through 2.
<i>dial-shelf</i>	Dial shelf chassis in the Cisco AS5800 access server containing the interface card.
<i>t3-port</i>	T3 port number. The only valid value is 0.
<i>:t1-num</i>	T1 timeslot in the T3 line. The value can be from 1 to 28.

Defaults No T1, E1, or J1 controller is configured.

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.
	10.3	The e1 keyword was added.
	11.3(5)AAA	Support was added for dial shelves on Cisco 7500 series routers.

Release	Modification
12.0(3)T	Support was added for dial shelves on Cisco AS5800 access servers.
12.2(7)XO	The j1 keyword was added on the Cisco 2600 and Cisco 3600 series.

Usage Guidelines

T1 or E1 Fractional Data Lines

This command is used in configurations where the router or access server is intended to communicate with a T1 or E1 fractional data line. Additional parameters for the T1 or E1 line must be configured for the controller before the T1 or E1 circuits can be configured by means of the **interface** global configuration command.

To view the status of the controllers use the **show controllers** command.

Examples

Cisco 7500 Series Router as a T1 Controller

The following example configures the MIP in slot 4, port 0 of a Cisco 7500 series router as a T1 controller:

```
Router(config)# controller t1 4/0
Router(config-controller)#
```

Cisco 4000 Series Router

The following example configures NIM 0 of a Cisco 4000 series router as a T1 controller:

```
Router(config)# controller t1 0
Router(config-controller)#
```

Cisco AS5800 Access Server with Dial Shelf

The following example configures the T1 controller in shelf 1, slot 0, port 0:

```
Router(config)# controller t1 1/0/0
Router(config-controller)#
```

Cisco 3660 as a J1 controller

The following example configures the Cisco IOS interface card in slot 3, port 0 of a Cisco 3660 as a J1 controller:

```
Router(config)# controller j1 3/0
Router(config-controller)#
```

Related Commands

Command	Description
bert abort	Resets the T1 or E1 controller.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).
show controllers content-engine	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
show controllers t1	Displays the total number of calls and call durations on a T1 controller.
show controllers j1	Displays information about the J1 link.

controller e3

To configure an E3 controller and enter controller configuration mode, use the **controller e3** command in global configuration mode.

controller e3 *slot/port*

Syntax Description	<i>slot/port</i>	Number of the slot and port being configured. Refer to the appropriate hardware manual for slot and port information. The slash mark is required.
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Defaults No E3 controller is configured.

Command Modes Global configuration

Command History	Release	Modification
	11.1	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Examples The following example shows the E3 controller configured in slot 0, port 0:

```
Router(config)# controller e3 0/0
Router(config-controller)#
```

Related Commands	Command	Description
	controller t3	Configures a T3 controller and enters controller configuration mode.
	show controllers e3	Displays information about E3 controllers.
	show controllers t3	Displays information about T3 controllers.

controller sonet

To configure a SONET controller and enter controller configuration mode, use the **controller sonet** command in global configuration mode.

controller sonet *slot/port*

Syntax Description	slot	Physical slot number. The slot number is in a range either from 0 to 5 or 8 to 13, depending on the slot in which the STM-1 card resides.
	/port	SONET port number. The port number is always 0 because only one STM-1 port is supported per interface. The slash mark is required.

Defaults *port: 0*

Command Modes Global configuration

Command History	Release	Modification
	12.0(14)S	This command was introduced.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines This command does not have a **no** form because the SONET controller is created automatically when the STM-1 trunk card is detected by the Cisco AS5850. Use this command to specify which slot number the STM-1 card is plugged into and to configure different attributes under controller configuration mode.

Examples The following example shows how to specify that the SONET controller is in slot number 2:

```
Router(config)# controller sonet 2/0
Router(config-controller)#
```

Related Commands	Command	Description
	show controllers sonet	Displays information about SONET controllers.

controller t3

To configure the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers or the CT3 feature board in Cisco AS5800 access servers, use the **controller t3** command in global configuration mode. To delete the defined controller, use the **no** form of this command.

Cisco 7500 Series

controller t3 *slot/port-adapter/port*

no controller t3 *slot/port-adapter/port*

Cisco AS5800 Access Server

controller t3 *dial-shelf/slot/t3-port*

no controller t3 *dial-shelf/slot/t3-port*

Syntax Description

<i>slot</i>	Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
<i>port</i>	Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
<i>port-adapter</i>	Number of the port adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.
<i>dial-shelf</i>	Dial shelf chassis in the Cisco AS5800 access server containing the CT3 interface card.
<i>slot</i>	Location of the CT3 interface card in the dial shelf chassis.
<i>t3-port</i>	T3 port number. The only valid value is 0.

Defaults

Cisco 7500 Series

No T3 controller is configured.

Cisco AS5800 Access Server

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
11.3	This command was introduced.
12.0(3)T	This command was modified to include support for the Cisco AS5800 access server.

Usage Guidelines

This command is used to configure the CT3IP and the 28 T1 channels. After the T1 channels are configured, continue to configure each T1 channel as a serial interface by using the **interface serial** global configuration command

Examples**Cisco 7500 Series**

The following example configures the CT3IP in slot 3:

```
Router(config)# controller t3 3/0/0
```

Cisco AS5800 Access Server

The following example configures the T3 controller in shelf 1, slot 0, port 0 and T1 timeslot 1:

```
Router(config)# controller t3 3/0/0
```

Related Commands

Command	Description
controller	Configures a T1, E1, or J1 controller and enters controller configuration mode.
interface	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).

description (controller)

To add a description to an E1 or T1 controller or the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **description** command in controller configuration mode. To remove the description, use the **no** form of this command.

description *string*

no description

Syntax Description	<i>string</i>	Comment or a description (up to 80 characters) to help you remember what is attached to an interface.
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Defaults	No description is added.
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Command Modes	Controller configuration
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Command History	Release	Modification
	10.3	This command was introduced.
11.3	This command was modified to include the CT3IP controller.	

Usage Guidelines	The description command is meant solely as a comment to be put in the configuration to help you remember what certain controllers are used for. The description affects the CT3IP and Multichannel Interface Processor (MIP) interfaces only and appears in the output of the show controller e1 , show controller t3 , show controller t1 , and more system:running-config EXEC commands.
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Examples	The following example describes a 3174 controller:
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```
Router(config)# controller t1
Router(config-controller)# description 3174 Controller for test lab
```

Related Commands	Command	Description
	more	Displays a specified file.
	more system:running-config	
	show controllers e1	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
	show controllers t1	Displays information about the T1 links.
	show controllers t3	Displays information about the CT3IP on Cisco 7500 series routers.

ds0-group (J1 controller)

To configure channelized J1 time slots, use the **ds0-group** command in controller configuration mode. To remove the DS-0 group, use the **no** form of this command.

ds0-group *ds0-group-no* **timeslots** *timeslot-list* **type** *ext-sig*

no ds0-group *ds0-group-no* **timeslots** *timeslot-list* **type** *ext-sig*

Syntax Description		
	<i>ds0-group-no</i>	Specifies the DS0 group number.
	timeslots <i>timeslot-list</i>	Specifies the DS0 time slot range of values from 1 to 31 for J1 interfaces. Time slot 16 is reserved for signaling.
	type <i>ext-sig</i>	The signaling method selection for type depends on the connection that you are making. The external signaling interface specifies that the signaling traffic comes from an outside source.

Defaults No DS0 group is defined.

Command Modes Controller configuration

Command History	Release	Modification
	11.2	This command was originally the cas-group command.
	12.0(1)T	The cas-group command was introduced for the Cisco 3600 series.
	12.0(5)XE	The command was renamed ds0-group on the Cisco AS5300 and on the Cisco 2600 and Cisco 3600 series.
	12.0(7)T	The command was integrated into the Cisco IOS Release 12.0(7)T.
	12.2(8)T	The command was introduced as a J1 configuration command for the Cisco 2600 and Cisco 3600 series.

Usage Guidelines The **ds0-group** command replaces the existing **cas-group** command. Making the command generic allows flexibility and scalability. It is not restricted to CAS signaling or channel bundling.

The **ds0-group** command automatically creates a logical voice port that is numbered as follows on Cisco 2600 and Cisco 3600 series routers: *slot/port:ds0-group-no*. Although only one voice port is created for each group, applicable calls are routed to any channel in the group.

Examples

The following example is sample output from the **show controllers j1** command on the Cisco 3660 series after channelized J1 time slots have been configured:

```
Router(config-controller)# ds0-group 1 timeslots 1-15,17-31 type e&m-wink-start
Router(config-controller)# end
Router# show controllers j1

*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(1), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(2), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(3), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(4), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(5), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(6), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(7), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(8), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(9), cp
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(10), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(11), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(12), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(13), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(14), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(15), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(17), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(18), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(19), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(20), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(21), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(22), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(23), p
*Mar 1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(24), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(25), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(26), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(27), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(28), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(29), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(30), p
*Mar 1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(31), p
```

Related Commands

Command	Description
ds0 busyout	To busyout one or more signal level 0s (DS0s).

dsu bandwidth

To specify the maximum allowable bandwidth used by a T3 or E3 controller or the PA-T3 and PA-E3 port adapters, use the **dsu bandwidth** command in interface configuration mode. To return to the default bandwidth, use the **no** form of this command.

dsu bandwidth *kbps*

no dsu bandwidth

Syntax Description	<i>kbps</i>	<p>Maximum bandwidth in kbps. Range is from 22 to 44736. The default values are as follows:</p> <ul style="list-style-type: none"> • 34010 kbps for E3 or PA-E3 • 44210 kbps for T3 • 44736 kbps for PA-T3
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Defaults	<p>34010 kbps for E3 or PA-E3 44210 kbps for T3 44736 kbps for PA-T3</p>
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.1 CA	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines	<p>The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16000 on the local port, you must also do the same on the remote port.</p> <p>The dsu bandwidth command reduces the bandwidth by padding the E3 and T3 frame.</p> <p>To verify the data service unit (DSU) bandwidth configured on the interface, use the show interfaces serial EXEC command.</p> <p>When G.751 framing is used, DSU bandwidth can be used to select a payload subrate from 34010 kbps down to 22 kbps. Before framing bypass can be used, a DSU bandwidth of 34010 kbps must be configured.</p>
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Even though software allows the user to configure a continuous range of bandwidths in subrate modes, vendors support bandwidths only in quanta (for example, in an E3 digital link, bandwidth must be in multiples of 358 kbps). Therefore, the software sets the user-configured bandwidth to the closest vendor-supported bandwidth. Use the **show interfaces serial slot/port** command to display the actual bandwidth that is configured.

The user-configured subrate mode, subrate bandwidth, actual subrate bandwidth configured, and scramble configuration are displayed near the end of the **show interfaces serial** command output.

The following table shows DSU modes and vendor-supported bandwidths.

Mode	DSU	Bandwidth Range	Bandwidth Multiples
0	Digital Link or Cisco	358–34010 kbps for E3	358 kbps
		300–44210 kbps for T3	300.746 kbps
1	ADC Kentrox T3/E3 IDSU	1000–34010 kbps for E3	500 kbps
		1500–44210 kbps for T3	500 kbps
2	Larscom Access T45	3100–44210 kbps	3158 kbps
3	Adtran T3SU 300	75–44210 kbps	75.186 kbps
4	Verilink HDM 2182	1500–44210 kbps	1579 kbps

The following example sets the maximum allowable DSU bandwidth to 16000 kbps on interface 1/0/0:

```
Router(config)# interface serial 1/0/0
Router(config-if)# dsu bandwidth 16000
```

The following example shows the user-configured subrate bandwidth and the actual configured subrate bandwidth as displayed in the output of the **show interfaces serial** command:

```
Router# show interfaces serial

Serial1/0 is up, line protocol is up
  Hardware is DSXPNM Serial
  MTU 1500 bytes, BW 44210 Kbit, DLY 20000 usec,
    reliability 253/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive not set
  DTR is pulsed for 0 seconds on reset, Restart-Delay is 1637167 secs
  Last input 04:59:04, output 04:59:04, output hang never
  Last clearing of "show interface" counters 00:00:02
  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 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DSU mode 0, bandwidth 34010, real bandwidth 34010, scramble 0
```

Related Commands

Command	Description
show interfaces serial	Displays information that is specific to the interface hardware.

dsu mode

To specify the interoperability mode used by a T3 or E3 controller or the PA-T3 and PA-E3 port adapters, use the **dsu mode** command in interface configuration mode. To return to the default mode, use the **no** form of this command.

dsu mode {0 | 1 | 2 | 3 | 4}

no dsu mode

Syntax Description

0	Sets the interoperability mode to 0. This is the default. Specify mode 0 to connect an E3 controller to another E3 controller or to a Digital Link DSU (DL3100). Specify mode 0 to connect a PA-E3 port adapter to another PA-E3 port adapter or to a Digital Link DSU (DL3100). Use mode 0 to connect a PA-T3 port adapter to another PA-T3 port adapter or to a Digital Link DSU (DL3100).
1	Sets the interoperability mode to 1. Specify mode 1 to connect an E3 or T3 controller or a PA-E3 or PA-T3 port adapter to a Kentrox DSU.
2	Sets the interoperability mode to 2. Specify mode 2 to connect a T3 controller or a PA-T3 port adapter to a Larscom DSU.
3	Sets the interoperability mode to 3. Specify mode 3 to connect a T3 controller to an Adtran T3SU 300.
4	Sets the interoperability mode to 4. Specify mode 4 to connect a T3 controller to a Verilink HDM 2182.

Defaults

0

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CA	This command was introduced.
12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for E3 and T3 controllers: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines

The local interface configuration must match the remote interface configuration. For example, if you define the data service unit (DSU) interoperability mode as 1 on the local port, you must also do the same on the remote port.

You must know what type of DSU is connected to the remote port to determine if it interoperates with an E3 or T3 controller or a PA-E3 or PA-T3 port adapter. The **dsu mode** command enables and improves interoperability with other DSUs.

To verify the DSU mode configured on the interface, use the **show controllers serial** or **show interfaces serial EXEC** commands.

Examples

The following example sets the DSU mode to 1 on interface 1/0/0:

```
Router(config)# interface serial 1/0/0  
Router(config-if)# dsu mode 1
```

Related Commands

Command	Description
show controllers serial	Displays information that is specific to the serial controllers.
show interfaces serial	Displays information that is specific to the interface hardware.

framing

To select the frame type for the T1 or E1 data line, use the **framing** command in controller configuration mode.

T1 Lines

```
framing {sfadm | esfadm}
```

E1 Lines

```
framing {crc4adm | pcm30adm | clear e1}
```

Syntax Description	Command	Description
	sfadm	Specifies Super Frame as the T1 channel.
	esfadm	Specifies Extended Super Frame as the T1 channel.
	crc4adm	Specifies CRC4 frame as the E1 channel.
	pcm30adm	Specifies CRC4 disabled framing mode as the E1 channel.
	clear e1	Specifies clear-e1 framing mode for the E1 channel.

Defaults

Extended Super Frame for a T1 line
CRC4 disabled framing for an E1 line

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.0(5)XE	The command was enhanced as an ATM interface configuration command.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

Use this command in configurations in which the router or access server is intended to communicate with T1 or E1 fractional data lines. The service provided determines which framing type, either **sf**, **esf**, or **crc4** is required for your T1 or E1 circuit.

Examples

The following example selects Extended Super Frame as the T1 frame type:

```
Router(config)# controller t1 4/0
Router(config-controller)# framing esfadm
```

Related Commands

Command	Description
lbo	Specifies the distance of the cable from the routers to the network equipment.
linecode	Selects the line-code type for a T1 or E1 line.

framing (E3 controller)

To specify the type of framing used by the E3 controller, use the **framing** command in controller configuration mode. To restore the default framing type, use the **no** form of this command.

framing { **bypass** | **g751** }

no framing

Syntax Description		
	bypass	Specifies that G.751 framing be bypassed.
	g751	Specifies G.751 as the E3 framing type. This is the default.

Defaults	
	G.751 framing

Command Modes	
	Controller configuration

Command History	Release	Modification
	11.1 CA	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for E3: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines	
	<p>If you do not specify the framing command, the default, g751, is used by the E3 controller to automatically determine the framing type received from the far-end equipment.</p> <p>Configure framing as G.751 when the E3 connection terminates remotely on a Digital Link or Kentrox data service unit (DSU), or when needing a subrate on an E3 connection between two T3 or E3 network modules.</p>



Note

The local interface configuration must match the remote interface, or DSU, configuration.

When G.751 framing is used, DSU bandwidth can be used to select a payload subrate from 34,010 kbps down to 22 kbps.

When framing bypass is used, DSU bandwidth of 34,010 kbps must be configured.

When G.751 framing is used, configuring the **scramble** command can prevent some payload data from being mistakenly interpreted as G.751 framing bits by switches placed between the DSUs. By default, the **no scramble** command is configured.

When framing bypass is used, the **no scramble** command must be configured.

When G.751 framing is used, bit 11 of the G.751 frame is reserved for national use and is set to 1 by default.

Configure national bit 1 only when required for interoperability with your telephone company.

Examples

The following example shows the framing for the E3 controller set to bypass:

```
Router(config)# controller e3 1/0  
Router(config-controller)# framing bypass
```

Related Commands

Command	Description
scramble	Specifies the type of framing used by the T1 channels on the CT3IP in Cisco 7500 series routers.

framing (SONET)

To select the frame type of the frame received on an optical line, use the **framing** command in controller configuration mode.

framing {sonet | sdh}

Syntax Description

sonet	Specifies the framing type as SONET.
sdh	Specifies the framing type as SDH.

Defaults

SONET is the default for the PA-MC-STM-1 port adapter.
SDH is the default for the STM-1 trunk card.

Command Modes

Controller configuration

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T and support was added for the STM-1 trunk card on the Cisco AS5850 platform.

Usage Guidelines

Use this command to configure the framing type of the SONET controller. The PA-MC-STM-1port adapter supports both the SONET and SDH framing modes. The STM-1 trunk feature card on the Cisco AS5850 only supports SDH framing.

This command does not have a **no** form.

Examples

The following example shows how to configure the framing type on a SONET controller of an STM-1 card in physical slot number 2 on a Cisco AS5850:

```
Router(config)# controller sonet 2/0
Router(config-controller)# framing sdh
```

Related Commands

Command	Description
show controllers sonet	Displays information about SONET controllers.

framing (T1/E1 controller)

To select the frame type for the E1 or T1 data line, use the **framing** command in controller configuration mode.

T1 Lines

```
framing {sf | esf}
```

E1 Lines

```
framing {crc4 | no-crc4} [australia]
```

Syntax Description

sf	Specifies Super Frame as the T1 frame type. This is the default.
esf	Specifies extended Super Frame as the T1 frame type.
crc4	Specifies CRC4 frame as the E1 frame type. This is the default for Australia.
no-crc4	Specifies no CRC4 frame as the E1 frame type.
australia	(Optional) Specifies the E1 frame type used in Australia.

Defaults

Super frame is the default on a T1 line.
CRC4 frame is the default on an E1 line.

Command Modes

Controller configuration

Usage Guidelines

Use this command in configurations where the router or access server is intended to communicate with T1 or E1 fractional data lines. The service provider determines the framing type (**sf**, **esf**, or **crc4**) required for your T1/E1 circuit.

This command does not have a **no** form.

Examples

The following example selects extended Super Frame as the T1 frame type:

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

Related Commands

Command	Description
cablelength	Specifies the distance of the cable from the routers to the network equipment.
linecode	Selects the linecode type for T1 or E1 line.

framing (T3 controller)

To specify the type of framing used by the T3 controller or by the CT3IP port adapter in Cisco 7500 series routers, use the **framing** command in controller configuration mode. To restore the default framing type, use the **no** form of this command.

T3 controllers

framing { **c-bit** | **m23** }

no framing

Cisco 7500 Series Routers with CT3IP Port Adapter

framing { **c-bit** | **m23** | **auto-detect** }

no framing

Syntax Description

c-bit	Specifies that C-bit framing is used as the T3 framing type. This is the default for most T3 controllers.
m23	Specifies that M23 framing is used as the T3 framing type.
auto-detect	Specifies that the CT3IP detects the framing type it receives from the far-end equipment. This is the default for the CT3IP in a Cisco 7500 series router.

Defaults

c-bit for most T3 controllers
auto-detect for the CT3IP in a Cisco 7500 series router

Command Modes

Controller configuration

Command History

Release	Modification
11.1 CA	This command was introduced.
12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for T3: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines

If you do not specify the **framing** command, the default **c-bit** is used by most T3 controllers to automatically determine the framing type received from the far-end equipment. If you do not specify the **framing** command on the CT3IP, the default **auto-detect** is used to automatically determine the framing type received from the far-end equipment.

Because the CT3IP supports the Application Identification Channel (AIC) signal, the setting for the framing might be overridden by the CT3IP firmware.

You can also set the framing for each T1 channel by using the **t1 framing** controller configuration command.

Examples

The following example sets the framing for the CT3IP to C-bit:

```
Router(config)# controller t3 9/0/0  
Router(config-controller)# framing c-bit
```

Related Commands

Command	Description
t1 framing	Specifies the type of framing used by the T1 channels on the CT3IP in Cisco 7500 series routers.

framing (T3/E3 interface)

To specify T3 or E3 line framing for a PA-T3 or PA-E3 port adapter, use the **framing** command in interface configuration mode. To return to the default G.751 framing or C-bit framing, use the **no** form of this command.

PA-T3

framing { **c-bit** | **m13** | **bypass** }

no framing

PA-E3

framing { **bypass** | **g751** }

no framing

Syntax Description		
c-bit	Specifies that C-bit framing is used as the T3 framing type. This is the default for the PA-T3.	
m13	Specifies m13 T3 framing.	
bypass	Specifies bypass E3 framing.	
g751	Specifies G.751 E3 framing. This is the default for the PA-E3.	

Defaults	
	C-bit framing for PA-T3 G.751 framing for PA-E3

Command Modes	
	Interface configuration

Command History	Release	Modification
	11.1 CA	This command was introduced.

Usage Guidelines	
	The default framing is described in the ITU-T Recommendation G.751.



Note

The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

When the framing mode is **bypass**, the T3 frame data is not included in the T3 frame, just the data.

When the framing mode is **bypass**, the E3 frame data is not included in the E3 frame, just the data.

If you use the **bypass** keyword, scrambling must be set to the default (disabled), the DSU mode must be set to the default (0), and the DSU bandwidth must be set to the default (44736).

To verify the framing mode configured on the interface, use the **show controllers serial** command in EXEC mode.

Examples

The following example sets the framing mode to bypass on interface 1/0/0:

```
Router(config)# interface serial 1/0/0  
Router(config-if)# framing bypass
```

Related Commands

Command	Description
show controllers serial	Displays information that is specific to the interface hardware.

loopback (E3 controller)

To loop an entire E3 line toward the line and back toward the router, use the **loopback** command in controller configuration mode. To remove the loop, use the **no** form of this command.

```
loopback {local | network {line | payload}}
```

```
no loopback
```

Syntax Description	local	network {line payload}
	Loops the data back toward the router and sends an AIS signal out toward the network.	Sets the loopback toward the network either before going through the framer (line) or after going through the framer (payload).

Defaults	local
----------	-------

Command Modes	Controller configuration
---------------	--------------------------

Command History	Release	Modification
	11.3	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for E3: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines	Use this command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the show controllers e3 EXEC command. Note that line loopback is available only in C-bit parity mode.
------------------	---

Examples	The following example configures the controller located in slot 1, port 0 for a local loopback:
----------	---

```
controller e3 1/0
 loopback local
```

Related Commands	Command	Description
	show controllers e3	Displays information about the E3 controllers.

loopback (interface)

To diagnose equipment malfunctions between the interface and device, use the **loopback** command in interface configuration mode. To disable the test, use the **no** form of this command.

loopback

no loopback

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines

Loopback on HSSI Cards

On High-Speed Serial Interface (HSSI) cards, the loopback function configures a two-way internal and external loop on the HSA applique of the specific interface.

Loopback on MCI and SCI Serial Interface Cards

On MCI and SCI serial interface cards, the loopback functions when a CSU/DSU or equivalent device is attached to the router or access server. The **loopback** command loops the packets through the CSU/DSU to configure a CSU loop, when the device supports this feature.

Loopback on MCI and MEC Ethernet Cards

On the MCI and MEC Ethernet cards, the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Loopback on CSC-FCI FDDI Cards

On the CSC-FCI FDDI card, the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Loopback on Token Ring Interface Cards

On all Token Ring interface cards (except the 4-megabit CSC-R card), the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Active Loopback Interfaces

To show interfaces currently in loopback operation, use the **show interfaces loopback EXEC** command.

**Note**

Loopback does not work on an X.21 DTE because the X.21 interface definition does not include a loopback definition.

Examples

The following example configures the loopback test on Ethernet interface 4:

```
Router(config)# interface ethernet 4
Router(config-if)# loopback
```

Related Commands

Command	Description
down-when-looped	Configures an interface to inform the system it is down when loopback is detected.
show interfaces loopback	Displays information about the loopback interface.

loopback (J1 controller)

To set the loopback method for testing the J1 interface, enter the **loopback** command in controller configuration mode. To turn off loopback, use the **no** form of this command. The command should only be used for testing purposes.

loopback {local | line | isolation}

no loopback {local | line | isolation}

Syntax Description

local	Places the interface into local loopback mode.
line	Places the interface into external loopback mode at the line level.
isolation	Both local and line loopback.

Defaults

No loopback is configured.

Command Modes

Controller configuration

Command History

Release	Modification
11.3 MA	This command was introduced as a controller configuration command for the Cisco MC3810.
12.0(5)T and 12.0(7)XR	The command was introduced as an ATM interface configuration command for the Cisco 2600 and Cisco 3600 series.
12.0(5)XE	The command was introduced as an ATM interface configuration command for the Cisco 7200 and Cisco 7500 series.
12.1(1)T	The command was introduced as a controller configuration command for the Cisco 2600 series.
12.2(8)T	The command was introduced as a J1 controller configuration command for the Cisco 2600 and Cisco 3600 series.

Examples

The following example establishes a loopback of the incoming J1 signal on controller j1 3/0:

```
Router(config)# controller j1 3/0
Router(config-controller)# loopback line
```

loopback (PA-MC-8TE1+ port adapter)

To enable loopback testing of data for the PA-MC-8TE1+ port adapter, use the **loopback** command in interface configuration mode. To disable loopback testing, use the **no** form of this command.

loopback [**internal** | **line**]

no loopback [**internal** | **line**]

Syntax Description

internal	(Optional) Loop any data received at the PA-MC-8TE1+ port adapter's network interface back into the PA-MC-8TE1+ port adapter.
line	(Optional) Loop any data received at the PA-MC-8TE1+ port adapter's network interface back into the network.

Defaults

Loopback mode is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Examples

In the following example, a loopback is set for the PA-MC-8TE1+ port adapter in slot 2:

```
Router(config)# interface 2/0
Router(config-if)# loopback line
```

loopback (T1 interface)

To loop individual T1 channels on the CT3IP in Cisco 7000 series routers with the RSP7000 and RSP7000CI and in Cisco 7500 series routers, use the **loopback** command in interface configuration mode. To remove the loopback, use the **no** form of this command.

```
loopback [local | network {line | payload} | remote {line {fdl {ansi | bellcore} | inband} |
payload {fdl} [ansi]}]
```

```
no loopback
```

Syntax Description	
local	(Optional) Loops the router output data back toward the router at the T1 framer and sends an alarm indication signal (AIS) signal out toward the network.
network {line payload}	(Optional) Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the High-Level Data Link Control (HDLC) controllers (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the HDLC controllers (payload).
remote line fdl {ansi bellcore}	(Optional) Sends a repeating, 16-bit Extended Superframe (ESF) data link code word (00001110 11111111 for FDL ANSI and 00010010 11111111 for FDL Bellcore) to the remote end requesting that it enter into a network line loopback. Specify the ansi keyword to enable the remote line Facility Data Link (FDL) ANSI bit loopback on the T1 channel, per the ANSI T1.403 Specification. Specify the bellcore keyword to enable the remote SmartJack loopback on the T1 channel, per the TR-TSY-000312 Specification.
remote line inband	(Optional) Sends a repeating, 5-bit inband pattern (00001) to the remote end requesting that it enter into a network line loopback.
remote payload [fdl] [ansi]	(Optional) Sends a repeating, 16-bit ESF data link code word (00010100 11111111) to the remote end requesting that it enter into a network payload loopback. Enables the remote payload FDL ANSI bit loopback on the T1 channel. You can optionally specify fdl and ansi , but it is not necessary.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	11.1 CA	This command was introduced.

Usage Guidelines

Use this command for troubleshooting purposes.

To better diagnose T1 provisioning problems, you can place the remote CSU or remote SmartJack into loopback. The **loopback remote line fdl** interface configuration command allows you to place either the CSU or the SmartJack into loopback:

- **ansi**—Places the CSU into loopback, per the ANSI T1.403 Specification.
- **bellcore**—Places the SmartJack into loopback, per the TR-TSY-000312 Specification.

When both are configured, transmission of LOF indication (yellow alarm) takes priority over transmission of some FDL messages.

If the remote loopback appears not to be working, use the **show controllers t3** command to determine if the given T1 is currently attempting to transmit a LOF indication (yellow alarm):

```
Router# show controllers t3 0/0/0:2

T3 0/0/0 is up.
  CT3 H/W Version: 5, CT3 ROM Version: 1.2, CT3 F/W Version: 2.5.9
  Mx H/W version: 2, Mx ucode ver: 1.34

  T1 2 is down, speed: 1536 kbs, non-inverted data
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Transmitter is sending LOF Indication.
  Receiver is getting AIS.
```

If the transmitter is sending a LOF indication, as in the previous example, stop the transmission of the LOF indication (yellow alarm) with the **no t1 2 yellow generation** configuration command as shown in the following example:

```
Router(config)# controllers t3 0/0/0
Router(config-controll)# no t1 2 yellow generation
Router(config-controll)# Ctrl-D
```

To verify that the transmission of the LOF indication (yellow alarm) has stopped, use the **show controllers t3** command:

```
Router# show controllers t3 0/0/0:2

T3 0/0/0 is up.
  CT3 H/W Version: 5, CT3 ROM Version: 1.2, CT3 F/W Version: 2.5.9
  Mx H/W version: 2, Mx ucode ver: 1.34
  T1 2 is down, speed: 1536 kbs, non-inverted data
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver is getting AIS.
  Framing is ESF, Line Code is B8ZS, Clock Source is Internal.
  Yellow Alarm Generation is disabled
```

Then retry the remote loopback command. When diagnosis is complete, remember to reenable the LOF indication (yellow alarm).

You can also loopback all the T1 channels by using the **loopback (CT3IP)** interface configuration command.

Examples

The following example configures T1 channel 5 for a local loopback:

```
Router(config)# interface serial 3/0/0:5
Router(config-if)# loopback local
```

Related Commands

Command	Description
loopback (T3 controller)	Loops the entire T3 (all 28 T1 channels) on the CT3IP in Cisco 7500 series routers.
no t1 yellow generation	Enables detection and generation of yellow alarms for a T1 channel on the CT3IP in Cisco 7500 series routers.

loopback (T3 controller)

To loop the entire T3 (all 28 T1 channels) line on the T3 controller or on the CT3IP in Cisco 7500 series routers, use the **loopback** command in controller configuration mode. To remove the loop, use the **no** form of this command.

```
loopback {local | network {line | payload} | remote}
```

```
no loopback
```

Syntax Description	local	network {line payload}	remote
	Loops the data back toward the router and sends an alarm indication signal (AIS) out toward the network.	Sets the loopback toward the network either before going through the framer (line) or after going through the framer (payload).	Sends a far-end alarm control (FEAC) request to the remote end requesting that it enter into a network line loopback. FEAC requests (and therefore remote loopbacks) are possible only when the T3 is configured for C-bit framing. The M23 format does not support remote loopbacks.

Defaults No loops are configured on the T3 line.

Command Modes Controller configuration

Command History	Release	Modification
	11.3	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for T3: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines Use this command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers T3 EXEC** command. Note that remote loopback is available only in C-bit parity mode.

You can also loopback each T1 channel by using the **loopback** interface configuration command for T1.

For more information, refer to the “Troubleshooting the T3 and T1 Channels” section in the “Configuring Serial Interfaces” chapter of the *Cisco IOS Interface Configuration Guide*.

Examples

The following example configures the T3 or CT3IP for a local loopback:

```
Router(config)# controller t3 3/0/0  
Router(config-controller)# loopback local
```

Related Commands

Command	Description
framing	Selects the frame type for the T1 or E1 data line.
loopback (interface)	Places the specified module in loopback mode.
loopback remote (interface)	Loops packets through a CSU/DSU, over a DS3 link or a channelized T1 link, to the remote CSU/DSU and back.
show controllers t3	Displays information about the T3 controllers.

loopback (T3/E3 interface)

To loop the serial interface on a PA-E3 or PA-T3 port adapter, use the **loopback** command in interface configuration mode. To remove the loopback, use the **no** form of this command.

PA-E3 Port Adapter

```
loopback {dte | local | network {line | payload}}
```

```
no loopback
```

PA-T3 Port Adapter

```
loopback {dte | local | network {line | payload} | remote}
```

```
no loopback
```

Syntax Description		
dte	Sets the loopback after the LIU toward the terminal.	
local	Sets the loopback after going through the framer toward the terminal.	
network {line payload}	Sets the loopback toward the network before going through the framer (line) or after going through the framer (payload).	
remote	Sends a far-end alarm control (FEAC) to set the remote framer in loopback.	

Defaults No loops are configured on the serial interface.

Command Modes Interface configuration

Command History	Release	Modification
	11.1 CA	This command was introduced.

Usage Guidelines Use this command for troubleshooting purposes.

To verify that a loopback is configured on the interface, use the **show interfaces serial** or **show interfaces loopback EXEC** command.

Examples The following example configures the serial interface located in slot 3/0/0 for a local loopback:

```
Router(config)# interface serial 3/0/0
Router(config-if)# loopback local
```

Related Commands

Command	Description
show controllers serial	Displays information that is specific to the interface hardware.
show interfaces loopback	Displays information about the loopback interface.
show interfaces serial	Displays information about a serial interface.

loopback applique

To configure an internal loop on the High Speed Serial Interface (HSSI) applique, use the **loopback applique** command in interface configuration mode. To remove the loop, use the **no** form of this command.

loopback applique

no loopback applique

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command loops the packets within the applique to provide a way to test communication within the router or access server. It is useful for sending pings to yourself to check functionality of the applique. To show a specific interface that is currently in loopback operation, use the **show interfaces loopback EXEC** command.

Examples The following example configures the loopback test on the HSSI applique:

```
Router(config)# interface serial 1
Router(config-if)# loopback applique
```

Related Commands	Command	Description
	show interfaces loopback	Displays information about the loopback interface.

loopback dte

To loop packets back to the DTE from the CSU/DSU, when the device supports this feature, use the **loopback dte** command in interface configuration mode. To remove the loop, use the **no** form of this command.

loopback dte

no loopback dte

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is useful for testing the DTE-to-DCE cable.

This command is used to test the performance of the integrated CSU/DSU. Packets are looped from within the CSU/DSU back to the serial interface of the router. Send a test ping to see if the packets successfully looped back. To cancel the loopback test, use the **no loopback dte** command.

When using the 4-wire 56/64-kbps CSU/DSU module, an out-of-service signal is transmitted to the remote CSU/DSU.

To show a specific interface that is currently in loopback operation, use the **show interfaces loopback EXEC** command.

Examples

The following example configures the loopback test on the DTE interface:

```
Router(config)# interface serial 0
Router(config-if)# loopback dte
```

Related Commands

Command	Description
show interfaces loopback	Displays information about the loopback interface.

loopback line

To loop packets completely through the CSU/DSU to configure the CSU loop, use the **loopback line** command in interface configuration mode. To remove the loop, use the **no** form of this command.

loopback line [payload]

no loopback line [payload]

Syntax Description	payload (Optional) Configures a loopback point at the DSU and loops data back to the network on an integrated CSU/DSU.				
Defaults	Disabled				
Command Modes	Interface configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	10.0	This command was introduced.
Release	Modification				
10.0	This command was introduced.				

Usage Guidelines

This command is useful for testing the DCE device (CSU/DSU) itself. When the **loopback line** command is configured on the 2-wire 56-kbps CSU/DSU module or the 4-wire 56/64-kbps CSU/DSU modules, the network data loops back at the CSU and the router data loops back at the DSU. If the CSU/DSU is configured for switched mode, you must have an established connection to perform a payload-line loopback. To loop the received data through the minimum amount of CSU/DSU circuitry, issue the **loopback line** command.

When you issue the **loopback line payload** command on an integrated CSU/DSU module, the router cannot transmit data through the serial interface for the duration of the loopback. Choosing the DSU as a loopback point loops the received-network data through the maximum amount of CSU/DSU circuitry. Data is not looped back to the serial interface. An active connection is required when operating in switched mode for payload loopbacks.

If you enable the **loopback line** command on the fractional T1/T1 module, the CSU/DSU performs a full-bandwidth loopback through the CSU portion of the module and data transmission through the serial interface is interrupted for the duration of the loopback. No reframing or corrections of bipolar violation errors or cyclic redundancy check (CRC) errors are performed. When you configure the **loopback line payload** command on the FT1/T1 module, the CSU/DSU performs a loopback through the DSU portion of the module. The **loopback line payload** command reframes the data link, regenerates the signal, and corrects bipolar violations and Extended Super Frame CRC errors.

When performing a T1-line loopback with Extended Super Frame, communication over the facilities data link is interrupted, but performance statistics are still updated. To show interfaces currently in loopback operation, use the **show service-module EXEC** command.

To show interfaces that are currently in loopback operation on other routers, use the **show interfaces loopback EXEC** command.

Examples

The following example configures the loopback test on the DCE device:

```
Router(config)# interface serial 1  
Router(config-if)# loopback line
```

The following example shows how to configure a payload loopback on a Cisco 2524 or 2525 router:

```
Router1(config-if)# loopback line payload  
Loopback in progress  
Router1(config-if)# no loopback line
```

The following example shows the output on a Cisco 2524 or 2525 router when you loop a packet in switched mode without an active connection:

```
Router1(config-if)# service-module 56k network-type switched  
Router1(config-if)# loopback line payload  
Need active connection for this type of loopback  
% Service module configuration command failed: WRONG FORMAT.
```

Related Commands

Command	Description
show interfaces loopback	Displays information about the loopback interface.
show service-module	Displays the performance report for an integrated CSU/DSU.

loopback remote (interface)

To loop packets through a CSU/DSU, over a DS-3 link or a channelized T1 link, to the remote CSU/DSU and back, use the **loopback remote** command in interface configuration mode. To remove the loopback, use the **no** form of this command.

FT1/T1 CSU/DSU Modules

loopback remote { **full** | **payload** | **smart-jack** } [**0in1** | **1in1** | **1in2** | **1in5** | **1in8** | **3in24** | **qrw** | **user-pattern** *24-bit-binary-value*]

no loopback remote { **full** | **payload** | **smart-jack** }

2- and 4-Wire, 56/64-kbps CSU/DSU Modules

loopback remote [**2047** | **511** | **stress-pattern** *pattern-number*]

no loopback remote

Syntax Description

full	Transmits a full-bandwidth line loopback request to a remote device, which is used for testing.
payload	Transmits a payload line loopback request to a remote device, which is used for testing the line and remote DSU.
smart-jack	Transmits a loopback request to the remote smart jack, which some service providers attach on the line before the customer premises equipment (CPE). You cannot put the local smart jack into loopback.
0in1	(Optional) Transmits an all-zeros test pattern used for verifying B8ZS line encoding. The remote end might report a loss of signal when using alternate mark inversion (AMI) line coding.
1in1	(Optional) Transmits an all-ones test pattern used for signal power measurements.
1in2	(Optional) Transmits an alternating ones-and-zeroes test pattern used for testing bridge taps.
1in5	(Optional) Transmits the industry-standard test-pattern loopback request.
1in8	(Optional) Transmits a test pattern used for stressing timing recovery of repeaters.
3in24	(Optional) Transmits a test pattern used for testing the ones density tolerance on AMI lines.
qrw	(Optional) Transmits a quasi-random word test pattern, which is a random signal that simulates user data.
user-pattern <i>24-bit-binary-value</i>	(Optional) Transmits a test pattern that you define. Enter a binary string up to 24 bits long. For the fixed patterns such <i>0in1</i> and <i>1in1</i> , the T1 framing bits are jammed on top of the test pattern; for the <i>user-pattern</i> , the pattern is simply repeated in the time slots.

2047	(Optional) Transmits a pseudorandom test pattern that repeats after 2047 bits.
511	(Optional) Transmits a pseudorandom test pattern that repeats after 511 bits.
stress-pattern <i>pattern-number</i>	(Optional) Transmits a DDS stress pattern available only on the 4-wire 56/64-kbps CSU/DSU module. You may enter a stress pattern from 1 to 4. A 1 pattern sends 100 bytes of all 1s and then 100 bytes of all 0s to test the stress clocking of the network. A 2 pattern sends 100 bytes of a 0x7e pattern and then 100 bytes of all 0s. A 3 pattern sends continuous bytes of a 0x46 pattern. A 4 pattern sends continuous bytes of a 0x02 pattern.

Defaults

No remote loopback interface is configured.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command is used for testing the data communication channels along with or without remote CSU/DSU circuitry. The loopback is usually performed at the line port, rather than the DTE port, of the remote CSU/DSU.

For a multiport interface processor connected to a network via a channelized T1 link, the **loopback remote** interface configuration command applies if the remote interface is served by a DDS line (56 kbps or 64 kbps) and if the device at the remote end is a CSU/DSU. In addition, the CSU/DSU at the remote end *must* react to latched DDS CSU loopback codes. Destinations that are served by other types of lines or that have CSU/DSUs that do not react to latched DDS CSU codes cannot participate in an interface remote loopback. Latched DDS CSU loopback code requirements are described in AT&T specification TR-TSY-000476, "OTGR Network Maintenance Access and Testing."

For the integrated FT1/T1 CSU/DSU module, the **loopback remote full** command sends the loopup code to the remote CSU/DSU. The remote CSU/DSU performs a full-bandwidth loopback through the CSU portion of the module. The **loopback remote payload** command sends the loopup code on the configured time slots, while maintaining the D4-extended super frame. The remote CSU/DSU performs the equivalent of a loopback line payload request. The remote CSU/DSU loops back only those time slots that are configured on the remote end. This loopback reframes the data link, regenerates the signal, and corrects bipolar violations and extended super frame CRC errors. The **loopback remote smart-jack** command sends a loopup code to the remote smart jack. You cannot put the local smart jack into loopback.

Failure to loopup or initiate a remote loopback request could be caused by enabling the **no service-module t1 remote-loopback** command or having an alternate remote-loopback code configured on the remote end. When the loopback is terminated, the result of the pattern test is displayed.

For the 2- and 4-wire, 56/64-kbps CSU/DSU module, an active connection is required before a loopup can be initiated while in switched mode. When transmitting V.54 loopbacks, the loopback mode is initiated on the remote device using V.54 messages. Failure to loopup or initiate a remote loopback request could be caused by enabling the **no service-module 56k remote-loopback** command.

To show interfaces that are currently in loopback operation, use the **show interfaces loopback** command in EXEC mode.

Examples

Example for Remote Loopback Test

The following example configures a remote loopback test:

```
Router(config)# interface serial 0
Router(config-if)# loopback remote
```

Example of Full-Bandwidth Line Loopback

The following example configures the remote device into full-bandwidth line loopback while specifying the **qrw** test pattern over the T1 CSU/DSU module on a Cisco 2524 or Cisco 2525 router:

```
Router(config)# interface serial 0
Router(config-if)# loopback remote full qrw
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
%LINK-3-UPDOWN: Interface Serial0, changed state to down
%SERVICE_MODULE-5-LOOPUPREMOTE: Unit 0 - Remote unit placed in loopback
```

Example of Loopback Stress Pattern

The following example transmits a remote loopback stress pattern over the 4-wire, 56/64-kbps CSU/DSU module, which tests the stress clocking of the network:

```
Router(config-if)# loopback remote stress-pattern 1
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial11, changed state to down
%LINK-3-UPDOWN: Interface Serial11, changed state to down
%SERVICE_MODULE-5-LOOPUPREMOTE: Unit 1 - Remote unit placed in loopback
```

Related Commands

Command	Description
clear service-module serial	Resets an integrated CSU/DSU.
loopback dte	Loops packets back to the DTE device from the CSU/DSU.
loopback line	Loops packets completely through the CSU/DSU to configure the CSU loop.
service-module 56k remote-loopback	Enables the acceptance of a remote loopback request on a serial interface on a 2- or 4-wire, 56/64-kbps CSU/DSU module.
service-module t1 remote-loopback	Specifies whether the fractional T1/T1 CSU/DSU module enters loopback mode when it receives a loopback code on the line.
show interfaces loopback	Displays information about the loopback interface.
show service-module serial	Displays the performance report for an integrated CSU/DSU.

microcode reload controller (J1)

To reload the firmware and field programmable gate array (FPGA) without reloading the Cisco IOS image, use the **microcode reload controller** command in privileged EXEC mode.

microcode reload controller j1 slot/port

Syntax Description	j1	J1 controller.
	slot/port	Backplane slot number and port number on the controller.

Defaults No microcode reload activity is initiated.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(2)XH	This command was introduced.
	12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T.
	12.2(8)T	The j1 keyword was added.

Usage Guidelines Configurations such as loopbacks in the running configuration are restored after this command is entered. If the controller is in a looped state before this command is issued, the looped condition is dropped. You have to re-initiate the loopbacks from the remote end by doing **no loop** from the controller configuration.

The following example shows the microcode reload activity being initiated:

```
Router# microcode reload controller j1 3/0

TDM-connections and network traffic will be briefly disrupted.
Proceed with reload microcode?[confirm]
Router#
*Mar  3 209.165.200.225: clk_src_link_up_down: Status of this CLK does not matter

*Mar  3 209.165.200.226: clk_src_link_up_down: Status of this CLK does not matter

*Mar  3 209.165.200.227: %CONTROLLER-5-UPDOWN: Controller J1 3/0, changed state to)
*Mar  3 209.165.200.227: clk_src_link_up_down: Status of this CLK does not matter

*Mar  3 209.165.200.228: clk_src_link_up_down: Status of this CLK does not matter

*Mar  3 209.165.200.229: %CONTROLLER-5-UPDOWN: Controller J1 3/0, changed state top
*Mar  3 209.165.200.229: clk_src_link_up_down: Status of this CLK does not matter

*Mar  3 209.165.200.229: clk_src_link_up_down: Status of this CLK does not matter
```

mode (HSA redundancy)

To configure the high availability mode, use the **mode** command in redundancy configuration mode. To use the default redundancy mode, use the **no** form of this command.

```
mode {hsa | rpr | rpr-plus}
```

```
no mode {hsa | rpr | rpr-plus}
```

Syntax Description

hsa	Selects High System Availability redundancy mode. This is the default.
rpr	Selects RPR redundancy mode.
rpr-plus	Selects RPR+ redundancy mode.

Defaults

High System Availability redundancy mode

Command Modes

Redundancy configuration

Command History

Release	Modification
12.0(16)ST	This command was introduced.
12.0(19)ST1	The rpr-plus keyword was added.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(15)T	This feature was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines

The mode selected by the **mode** redundancy configuration command must be fully supported by the image that has been set into both the active and standby RSPs. A high availability image must be installed into the RSPs before RPR+ can be configured. Use the **hw-module slot image** command to specify a high availability image to run on the standby RSP.

If the mode cannot be set on both RSPs, HSA is the default mode. A Cisco 7507 or Cisco 7513 router that has only one RSP installed operates in single Route Processor mode.

Examples

The following example enters redundancy configuration mode and sets RPR+ as the redundancy mode for a Cisco 7500 series router.

```
Router(config)# redundancy
Router(config-r)# mode rpr-plus
Router(config-r)# end
```

Related Commands

Command	Description
hw-module sec-cpu reset	Resets and reloads the standby RSP with the specified Cisco IOS image and executes the image.
hw-module slot image	Specifies a high availability Cisco IOS image to run on an active or standby RSP.
redundancy	Enters redundancy configuration mode.
redundancy force-switchover	Switches control of a router from the active RSP to the standby RSP.
show redundancy	Displays the current redundancy mode.

mode (RSC redundancy)

To choose between classic-split mode (maximal throughput with no load-sharing) and handover-split mode (maximal availability with load-sharing), use the **mode** command in configuration-redundancy mode. To reset to the default mode, use the **no** form of this command.

mode { **classic-split** | **handover-split** }

no mode

Syntax Description

classic-split	Nonredundant mode in which slots are split in a fixed 6/6 pattern between the two route-switch-controller (RSC) cards and no handover occurs.
handover-split	Redundant mode in which, if one RSC fails, the peer RSC takes over control of the failed RSC's resources (slots and cards).

Defaults

Classic-split mode

Command Modes

Configuration-redundancy

Command History

Release	Modification
12.2(2)XB1	This command was introduced.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.

Usage Guidelines

You must be connected to an RSC card on your Cisco AS5850 to use this command.

Examples

The following example selects handover-split mode:

```
Router(config)# redundancy
Router(config-red)# mode handover-split
```

Related Commands

Command	Description
show chassis	Displays, for a router with two RSCs, information about mode (handover-split or classic-split), RSC configuration, and slot ownership.
show chassis clocks	Displays all configured clock sources, even those from non-owned cards. This is because only one RSC can provide the master clock, and it may need to have backup clock sources configured from all cards present, regardless of ownership.
show context	Displays information about specified slots.
show redundancy debug-log	Displays up to 256 redundancy-related debug entries.

mode (T1/E1 controller)

To set the T1 or E1 controller into ATM mode and create an ATM interface (ATM 0) or to set the T1 or E1 controller into channel-associated signaling (CAS) mode, use the **mode** command in controller configuration mode. To disable the controller mode, use the **no** form of this command.

```
mode { atm [aim aim-slot] | cas }
```

```
no mode { atm [aim aim-slot] | cas }
```

Syntax Description	
atm	<p>Sets the controller into ATM mode and creates an ATM interface (ATM 0). When ATM mode is enabled, no channel groups, DS0 groups, PRI groups, or TDM groups are allowed, because ATM occupies all the DS0s on the T1/E1 trunk.</p> <p>When you set the controller to ATM mode, the controller framing is automatically set to ESF for T1 or CRC4 for E1. The linecode is automatically set to B8ZS for T1 or HDLC for E1. When you remove ATM mode by entering the no mode atm command, ATM interface 0 is deleted.</p> <p>On the Cisco MC3810, ATM mode is supported only on controller 0 (T1 or E1 0).</p> <p>Note The mode atm command without the aim keyword uses software to perform ATM segmentation and reassembly (SAR). This is supported on Cisco 2600 series WIC slots only, and is not supported on network module slots.</p>
aim	Specifies that the configuration on this controller uses the Advanced Integration Module (AIM) in the specified slot for ATM SAR. The aim keyword does not apply to the Cisco MC3810.
<i>aim-slot</i>	<p>AIM slot number on the router chassis:</p> <ul style="list-style-type: none"> • Cisco 2600 series and Cisco 2600XM—0 • Cisco 3660—0 or 1 • Cisco 3700 series—0 or 1
cas	(Cisco 2600 series WIC slots only) Specifies that the T1 or E1 in this WIC slot is mapped to AIM DSPs to support T1 or E1 voice (that is, it is configured in a DS0 group or a PRI group).

Defaults No default behavior or values.

Command Modes Controller configuration

Command History

Release	Modification
11.3 MA	This command was introduced on the Cisco MC3810.
12.1(5)XM	Support for this command was extended to the merged SGCP/MGCP software.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.2(2)XB	Support was extended to the Cisco 2600 series and Cisco 3660. The keyword aim and the argument <i>aim-slot</i> were added. The parenthetical modifier for the command was changed from “Voice over ATM” to “T1/E1 controller.”
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(15)T	This command was implemented on the Cisco 2691 and the Cisco 3700 series.

Usage Guidelines

This command has these platform-specific usage guidelines:

- Cisco 2600 series and Cisco 3660 or Cisco 3700 series that use an AIM for ATM processing must use the **mode atm aim** *aim-slot* command.
- Cisco 2600 series routers that use an AIM for DSP processing and specify DS0 groups must use the **mode cas** command if they are using WIC slots for voice. This command does not apply if network modules are being used.
- Cisco 3660 or Cisco 3700 series that use an AIM only for DSP resources should not use this command.
- On Cisco 2600 series routers that use WIC slots for voice, the **mode atm** command without the **aim** keyword specifies software ATM segmentation and reassembly. When the **aim** keyword is used with the **mode atm** command, the AIM performs ATM segmentation and reassembly.
- Cisco MC3810 routers cannot use the **aim** keyword.
- Cisco MC3810 routers with digital voice modules (DVM) use some DS0s exclusively for different signaling modes. The DS0 channels have the following limitations when mixing different applications (such as voice and data) on the same network trunk:
 - On E1 controllers, DS0 16 is used exclusively for either CAS or CCS, depending on which mode is configured.
 - On T1 controllers, DS0 24 is used exclusively for CCS.
- Cisco MC3810—When no mode is selected, channel groups and clear channels (data mode) can be created using the **channel group** and **tdm-group** commands, respectively.
- Cisco MC3810 is not supported in the AIM-ATM, AIM-VOICE-30, and AIM-ATM-VOICE-30 on the Cisco 2600 Series, Cisco 3660, and Cisco 3700 Series feature.

Examples

The following example configures ATM mode on controller T1 0. This step is required for Voice over ATM.

```
controller T1 0
 mode atm
```

The following example configures ATM mode on controller T1 1/0 on a Cisco 2600 series router, using an AIM in slot 0 for ATM segmentation and reassembly:

```
controller T1 1/0
mode atm aim 0
```

The following example configures CAS mode on controller T1 1 on a Cisco MC3810:

```
controller T1 1
mode cas
```

Related Commands

Command	Description
channel-group	Defines the time slots of each T1 or E1 circuit.
ds0-group	Defines T1/E1 channels for compressed voice calls and the CAS method by which the router connects to the private branch exchange (PBX) or public switched telephone network (PSTN).
tdm-group	Configures a list of time slots for creating clear channel groups (pass-through) for time-division multiplexing (TDM) cross-connect.

redundancy handover

To hand over control of resources (slots and cards) from a route-switch-controller (RSC) card to its peer RSC card, use the **redundancy handover** command in privileged EXEC mode. The command can be run from either RSC and can specify that slots be handed over to the peer RSC.

```
redundancy handover {cancel | {peer-resources | shelf-resources}
                    [busyout-period mins] [at hh:mm [{day month | month day} year]]}
```

Syntax Description		
cancel		Any pending handover is canceled.
peer-resources		Resources to be handed over are those on the side of the peer RSC. This parameter applies only when the system is in extraload.
shelf-resources		Resources to be handed over are those on the side of the RSC from which the command is run.
busyout-period mins		(Optional) Time period for which all slots in the selected resources are to be busied out before handover.
at hh:mm day month year		(Optional) Time of the handover or start of the busyout period, in 24-hour time format; hour and minute are required; day, month, and year are optional. If omitted, handover or busyout period begins immediately.

Defaults Control remains with the assigned RSC.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(2)XB1	This command was introduced.
	12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.

Usage Guidelines To use this command, you must have two RSC cards installed on your Cisco AS5850 and you must be connected to one of them in handover-split mode.

After handover and subsequent restoration of the failed RSC, connect to the active RSC and use this command to return control of cards to the previously failed but now restored RSC.

Note that when you enter the command with the **shelf-resources** option, the RSC reloads.

Examples

The following example hands over control, to the peer RSC, of the slots and cards on the corresponding side of the chassis. Note the prompt to confirm clearing of calls, handover, and reload on the last line.

```
Router# redundancy handover shelf-resources busyout-period 10 at 22:00 3 Sep 2005
```

```
Newly entered handover schedule:
```

```
Busyout period at 22:00:00 PDT Sat Sep 3 2005 for a duration of 10 minutes
```

```
Handover pending at 22:10:00 PDT Sat Sep 3 2005
```

```
Clear calls, handover and reload as specified above? y
```

Related Commands

Command	Description
show redundancy debug-log	Displays up to 256 relevant debug entries.
show redundancy handover	Displays details of any pending handover (that is, a handover command that was entered previously and is not yet completed).
show redundancy history	Displays logged handover events.

service-module 56k clock rate

To configure the network line speed for a serial interface on a 4-wire, 56/64-kbps CSU/DSU module, use the **service-module 56k clock rate** command in interface configuration mode. To enable a network line speed of 56 kbps, which is the default, use the **no** form of this command.

service-module 56k clock rate *speed*

no service-module 56k clock rate *speed*

Syntax Description

<i>speed</i>	Network line speed in kbps. The default speed is 56 kbps. Choose from one of the following optional speeds: <ul style="list-style-type: none"> • 2.4—2400 kbps • 4.8—4800 kbps • 9.6—9600 kbps • 19.2—19200 kbps • 38.4—38400 kbps • 56—56000 kbps • 64—64000 kbps • auto—Automatic line speed mode. Configure this option if your line speed is constantly changing.
--------------	---

Defaults

56 kbps

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

The 56-kbps line speed is available in switched mode, which is enabled using the **service-module 56k network-type** interface configuration command on the 4-wire CSU/DSU. If you have a 2-wire CSU/DSU module, the default is automatically set to switched mode.

The 64-kbps line speed cannot be used with back-to-back digital data service (DDS) lines. The subrate line speeds are determined by the service provider.

The **auto** keyword enables the CSU/DSU to decipher current line speed from the signaling current running on the network. Use the **auto** keyword only when transmitting over telco DDS lines and the clocking source is taken from the line.

Examples

The following example displays two routers connected in back-to-back DDS mode. However, notice that at first the configuration fails because the **auto** option is used. Later in the example the correct matching configuration is issued, which is 38.4 kbps.

```
Router1(config)# interface serial 0
Router1(config-if)# service-module 56k clock source internal
Router1(config-if)# service-module 56k clock rate 38.4

Router2(config-if)# service-module 56k clock rate auto

Router1# ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

Router2(config-if)# service-module 56k clock rate 38.4

Router1# ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/54/56 ms
```

When transferring from DDS mode to switched mode, you must set the correct clock rate, as shown in the following example:

```
Router2(config-if)# service-module 56k network-type dds
Router2(config-if)# service-module 56k clock rate 38.4
Router2(config-if)# service-module 56k network-type switched
% Have to use 56k or auto clock rate for switched mode
% Service module configuration command failed: WRONG FORMAT.

Router2(config-if)# service-module 56k clock rate auto
% WARNING - auto rate will not work in back-to-back DDS.
Router2(config-if)# service-module 56k network-type switched
```

Related Commands

Command	Description
service-module 56k clock source	Sets up the clock source on a serial interface for a 4-wire, 56/64-kbps CSU/DSU module.
service-module 56k network-type	Sends packets in switched dial-up mode or DDS mode using a serial interface on a 4-wire, 56/64-kbps CSU/DSU module.

service-module 56k clock source

To set up the clock source on a serial interface for a 4-wire, 56/64-kbps CSU/DSU module, use the **service-module 56k clock source** command in interface configuration mode. To specify that the clocking come from line, use the **no** form of this command.

```
service-module 56k clock source {line | internal}
```

```
no service-module 56k clock source {line | internal}
```

Syntax Description

line	Uses the clocking provided by the active line coming in to the router. This is the default.
internal	Uses the internal clocking provided by the hardware module.

Defaults

Line clock

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

In most applications, the CSU/DSU should be configured with the **clock source line** command. For back-to-back configurations, configure one CSU/DSU with the **clock source internal** command and the other with **clock source line** command.

Examples

The following example configures internal clocking and transmission speed at 38.4 kbps.

```
Router(config)# interface serial 0
Router(config-if)# service-module 56k clock source internal
Router(config-if)# service-module 56k clock rate 38.4
```

Related Commands

Command	Description
clock source (interface)	Controls the clock used by a G.703-E1 interface.
service-module 56k clock rate	Configures the network line speed for a serial interface on a 4-wire, 56/64-kbps CSU/DSU module.

service-module 56k data-coding

To prevent application data from replicating loopback codes when operating at 64 kbps on a 4-wire CSU/DSU, use the **service-module 56k data-coding** command in interface configuration mode. To enable normal transmission, use the **no** form of this command.

```
service-module 56k data-coding {normal | scrambled}
```

```
no service-module 56k data-coding {normal | scrambled}
```

Syntax Description

normal	Specifies normal transmission of data. This is the default.
scrambled	Scrambles bit codes or user data before transmission. All control codes such as out-of-service and out-of-frame are avoided.

Defaults

Normal data transmission

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Enable the scrambled configuration only in 64-kbps digital data service (DDS) mode. If the network type is set to switched, the configuration is refused.

If you transmit scrambled bit codes, both CSU/DSUs must have this command configured for successful communication.

Examples

The following example scrambles bit codes or user data before transmission:

```
Router(config)# interface serial 0
Router(config-if)# service-module 56k clock rate 64
Router(config-if)# service-module 56k data-coding scrambled
```

Related Commands

Command	Description
service-module 56k clock rate	Configures the network line speed for a serial interface on a 4-wire, 56/64-kbps CSU/DSU module.

service-module 56k network-type

To transmit packets in switched dial-up mode or digital data service (DDS) mode using a serial interface on a 4-wire, 56/64-kbps CSU/DSU module, use the **service-module 56k network-type** command in interface configuration mode. To transmit from a dedicated leased line in DDS mode, use the **no** form of this command.

```
service-module 56k network-type { dds | switched }
```

```
no service-module 56k network-type { dds | switched }
```

Syntax Description	Command	Description
	dds	Transmits packets in DDS mode or through a dedicated leased line. The default is DDS enabled for the 4-wire CSU/DSU.
	switched	Transmits packets in switched dial-up mode. On a 2-wire, switched 56-kbps CSU/DSU module, this is the default and only setting.

Defaults	Description
	DDS is enabled for the 4-wire CSU/DSU.
	Switched is enabled for the 2-wire CSU/DSU.

Command Modes	Description
	Interface configuration

Command History	Release	Modification
	11.2	This command was introduced.

Usage Guidelines	Description
	In switched mode, you need additional dialer configuration commands to configure dial-out numbers. Before you enable the service-module 56k network-type switched command, both CSU/DSUs must use a clock source coming from the line and have the clock rate configured to auto or 56 kbps. If the clock rate is not set correctly, this command will not be accepted.
	The 2-wire and 4-wire, 56/64-kbps CSU/DSU modules use V.25 <i>bis</i> dial commands to interface with the router. Therefore, the interface must be configured using the dialer in-band command. Data terminal ready (DTR) dial is not supported.



Note

Any loopbacks in progress are terminated when switching between modes.

Examples	Description
	The following example configures transmission in switched dial-up mode:

```
Router(config)# interface serial 0
Router(config-if)# service-module 56k clock rate auto
Router(config-if)# service-module 56k network-type switched
Router(config-if)# dialer in-band
Router(config-if)# dialer string 5551111
Router(config-if)# dialer-group 1
```

Related Commands

Command	Description
dialer in-band	Specifies that DDR is to be supported.
service-module 56k clock rate	Configures the network line speed for a serial interface on a 4-wire, 56/64-kbps CSU/DSU module.
service-module 56k clock source	Sets up the clock source on a serial interface for a 4-wire, 56/64-kbps CSU/DSU module.
service-module 56k switched-carrier	Selects a service provider to use with a 2- or 4-wire, 56/64-kbps dial-up serial line.

service-module 56k remote-loopback

To enable the acceptance of a remote loopback request on a serial interface on a 2- or 4-wire, 56/64-kbps CSU/DSU module, use the **service-module 56k remote-loopback** command in interface configuration mode. To disable the module from entering loopback, use the **no** form of this command.

service-module 56k remote-loopback

no service-module 56k remote-loopback

Syntax Description This command has no arguments or keywords.

Defaults Enabled

Command Modes Interface configuration

Command History	Release	Modification
	11.2	This command was introduced.

Usage Guidelines The **no service-module 56k remote-loopback** command prevents the local CSU/DSU from being placed into loopback by remote devices on the line. The line provider is still able to put the module into loopback by reversing sealing current. Unlike the T1 module, the 2- or 4-wire, 56/64-kbps CSU/DSU module can still initiate remote loopbacks with the **no** form of this command configured.

Examples The following example enables transmitting and receiving remote loopbacks:

```
Router(config)# interface serial 0
Router(config-if)# service-module 56k remote-loopback
```

Related Commands	Command	Description
	loopback remote (interface)	Loops packets through a CSU/DSU, over a DS3 link or a channelized T1 link, to the remote CSU/DSU and back.

service-module 56k switched-carrier

To select a service provider to use with a 2- or 4-wire, 56/64-kbps dial-up serial line, use the **service-module 56k switched-carrier** command in interface configuration mode. To enable the default service provider, use the **no** form of this command.

```
service-module 56k switched-carrier {att | sprint | other}
```

```
no service-module 56k switched-carrier {att | sprint | other}
```

Syntax Description

att	AT&T or other digital network service provider. This is the default on the 4-wire, 56/64-kbps CSU/DSU module.
sprint	Sprint or other service provider whose network requires echo cancelers. This is the default on the 2-wire, switched 56-kbps CSU/DSU module.
other	Any other service provider.

Defaults

ATT is enabled on the 4-wire, 56/64-kbps CSU/DSU module.

Sprint is enabled on the 2-wire, switched 56-kbps CSU/DSU module.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

On a Sprint network, echo-canceler tones are sent during call setup to prevent the echo cancelers from damaging digital data. The transmission of echo-canceler tones may increase call setup times by 8 seconds on the 4-wire module. Having echo cancellation enabled does not affect data traffic.

This configuration command is ignored if the network type is DDS.

Examples

The following example configures AT&T as a service provider:

```
Router(config)# interface serial 0
Router(config-if)# service-module 56k network-type switched
Router(config-if)# service-module 56k switched-carrier att
```

Related Commands

Command	Description
service-module 56k network-type	Sends packets in switched dial-up mode or DDS mode using a serial interface on a 4-wire, 56/64-kbps CSU/DSU module.

service-module content-engine reload

To perform a graceful halt and reboot of a content engine (CE) network module operating system, use the **service-module content-engine reload** command in privileged EXEC mode.

service-module content-engine *slot/unit* reload

Syntax Description

<i>slot</i>	Number of the router chassis slot for the network module.
<i>unit</i>	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

At the confirmation prompt, press **Enter** to confirm the action or **n** to cancel.

Examples

The following example gracefully halts and reboots the CE network module operating system in slot 1:

```
Router# service-module content-engine 1/0 reload
```

```
Do you want to proceed with reload?[confirm]
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
service-module content-engine reset	Resets the hardware on a CE network module.
service-module content-engine shutdown	Gracefully halts a CE network module.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module content-engine reset

To reset the hardware on a content engine (CE) network module, use the **service-module content-engine reset** command in privileged EXEC mode.

service-module content-engine slot/unit reset

Syntax Description	slot	Number of the router chassis slot for the network module.
	unit	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(11)YT	This command was introduced.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines At the confirmation prompt, press **Enter** to confirm the action or **n** to cancel.

Examples The following example resets the hardware on the CE network module in slot 1:

```
Router# service-module content-engine 1/0 reset
```

```
Use reset only to recover from shutdown or failed state
Warning: May lose data on the hard disc!
Do you want to reset?[confirm]
```

Related Commands	Command	Description
	interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
	service-module content-engine reload	Performs a graceful halt and reboot of a CE network module operating system.
	service-module content-engine shutdown	Gracefully halts a CE network module.
	show controllers content-engine	Displays controller information for CE network modules.
	show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module content-engine session

To access a content engine (CE) network module console and begin a configuration session, use the **service-module content-engine session** command in privileged EXEC mode.

service-module content-engine slot/unit session

Syntax Description

<i>slot</i>	Number of the router chassis slot for the network module.
<i>unit</i>	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Only one session at a time is allowed into the content engine from the internal CE network-module-side interface. This interface provides console access to the CE network module from the router command-line interface (CLI) by initiating a reverse Telnet connection that uses the IP address of the CE interface and the terminal (TTY) line associated with the CE network module. The TTY line number is calculated using the formula $(n*32)+1$, where n is the number of the chassis slot that contains the CE network module. The CE interface must be up before you can use this command.

Once a session is started, you can perform any CE configuration task. You first access the CE console in a user-level shell. To access the privileged EXEC command shell, where most commands are available, use the **enable** command. Note that this is a Cisco Application and Content Networking System (ACNS) software command, not a Cisco IOS software command.

CE configuration tasks are described in the documentation for [Cisco Application and Content Networking Software](#), Release 4.2. Initial CE configuration tasks are covered in the [Cisco Content Delivery Networking Products Getting Started Guide](#), section 6, "Perform an Initial Startup Configuration."

After you finish CE configuration and exit the CE console session, use the **service-module content-engine session clear** command to clear the session.

Examples

The following example shows a CE session being opened for a CE network module in slot 2:

```
Router# service-module content-engine 2/0 session

Trying 10.10.10.1, 2129 ... Open

CE-netmodule con now available

Press RETURN to get started!

CE-netmodule> enable
CE-netmodule#
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
service-module content-engine session clear	Clears an existing CE configuration session on a CE network module.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module content-engine session clear

To clear an existing content engine (CE) configuration session on a CE network module, use the **service-module content-engine session clear** command in privileged EXEC mode.

service-module content-engine *slot/unit* session clear

Syntax Description

<i>slot</i>	Number of the router chassis slot for the network module.
<i>unit</i>	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Press **Enter** when asked to confirm this command or **n** to cancel.

Examples

The following example clears the session that had been used to configure the CE in the network module in slot 1:

```
Router# service-module content-engine 1/0 session clear

[confirm]
[OK]
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
service-module content-engine session	Accesses a CE network module console and begins a configuration session.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module content-engine shutdown

To gracefully halt a content engine (CE) network module, use the **service-module content-engine shutdown** command in privileged EXEC mode.

service-module content-engine slot/unit shutdown

Syntax Description

<i>slot</i>	Number of the router chassis slot for the network module.
<i>unit</i>	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

At the confirmation prompt, press **Enter** to confirm the action or **n** to cancel.

The **service-module content-engine shutdown** command brings down the operating system of the specified content engine network module in an orderly fashion to protect the network module's hard drive. When the system has been shut down, the network module can be removed from the router.

Examples

The following example gracefully halts the CE network module in slot 1:

```
Router# service-module content-engine 1/0 shutdown

Shutdown is used for Online removal of Service Module.
Do you want to proceed with shutdown?[confirm]
Use service module reset command to recover from shutdown.
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
service-module content-engine reload	Performs a graceful halt and reboot of a CE network module operating system.
service-module content-engine reset	Resets the hardware on a CE network module.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module content-engine status

To display configuration information related to the hardware and software on the content engine (CE) side of a CE network module, use the **service-module content-engine status** command in privileged EXEC mode.

service-module content-engine *slot/unit* status

Syntax Description	slot	Number of the router chassis slot for the network module.
	unit	Number of the daughter card on the network module. For CE network modules, always use 0.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(11)YT	This command was introduced.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Examples

The following example displays information for a CE network module in router slot 1:

```
Router# service-module content-engine 1/0 status

Service Module is Cisco Content-Engine1/0
Service Module supports session via TTY line 33
Service Module is in Steady state
Getting status from the Service Module, please wait..
Application and Content Networking Software (ACNS)
Copyright (c) 1999-2002 by Cisco Systems, Inc.
Application and Content Networking Software Release 4.2.2 (build b3 May  6 2002)
Version: ce2636-sw-<unknown-version>
Compiled 18:03:40 May  6 2002 by smith
Compile Time Options: PP

System was restarted on Mon Jan  7 20:30:37 1980.
The system has been up for 8 minutes, 30 seconds.

Core CPU is GenuineIntel Pentium III (Coppermine) (rev 8) running at 498MHz.
246 Mbytes of Physical memory.
2 FastEthernet interfaces
1 Console interface

List of disk drives:
disk00: Normal          (h00 c00 i00 100)    19075MB( 18.6GB)
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module external ip address

To define the IP address for the external LAN interface on a content engine (CE) network module, use the **service-module external ip address** command in content-engine interface configuration mode. To delete the IP address associated with this interface, use the **no** form of this command.

service-module external ip address *external-ip-addr subnet-mask*

no service-module external ip address

Syntax Description

<i>external-ip-addr</i>	IP address of the external LAN interface on a CE network module.
<i>subnet-mask</i>	Subnet mask to append to the IP address.

Defaults

No default behavior or values

Command Modes

Content-engine interface configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Examples

The following example defines an IP address for the external LAN interface on the CE network module in slot 1:

```
Router(config)# interface content-engine 1/0
Router(config-if)# service-module external ip address 172.18.12.28 255.255.255.0
Router(config-if)# exit
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module ip address

To define the IP address for the internal network-module-side interface on a content engine (CE) network module, use the **service-module ip address** command in content-engine interface configuration mode. To delete the IP address associated with this interface, use the **no** form of this command.

```
service-module ip address ce-side-ip-addr subnet-mask
```

```
no service-module ip address
```

Syntax Description		
	<i>ce-side-ip-addr</i>	IP address of the internal network-module-side interface on a CE network module.
	<i>subnet-mask</i>	Subnet mask to append to the IP address.

Defaults No default behavior or values

Command Modes Content-engine interface configuration

Command History	Release	Modification
	12.2(11)YT	This command was introduced.
	12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Examples The following example defines an IP address for the internal network-module-side interface on the CE network module in slot 1:

```
Router(config)# interface content-engine 1/0
Router(config-if)# service-module ip address 172.18.12.26 255.255.255.0
Router(config-if)# exit
```

Related Commands	Command	Description
	interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
	show controllers content-engine	Displays controller information for CE network modules.
	show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module ip default-gateway

To define a default gateway (router) for a content engine (CE) network module, use the **service-module ip default-gateway** command in content-engine interface configuration mode. To remove the default gateway from the CE configuration, use the **no** form of this command.

```
service-module ip default-gateway gw-ip-addr
```

```
no service-module ip default-gateway
```

Syntax Description

<i>gw-ip-addr</i>	IP address of the default gateway.
-------------------	------------------------------------

Defaults

No default behavior or values

Command Modes

Content-engine interface configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Examples

The following example configures a default gateway for the CE network module in slot 1:

```
Router(config)# interface content-engine 1/0
Router(config-if)# service-module ip default-gateway 172.18.12.1
Router(config-if)# exit
```

Related Commands

Command	Description
interface content-engine	Configures an interface for a CE network module and enters interface configuration mode.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.

service-module t1 clock source

To specify the clock source for the fractional T1/T1 CSU/DSU module, use the **service-module t1 clock source** command in interface configuration mode. To return to the default line clock, use the **no** form of this command.

```
service-module t1 clock source {internal | line}
```

```
no service-module t1 clock source {internal | line}
```

Syntax Description

internal	Specifies the CSU/DSU internal clock.
line	Specifies the line clock. This is the default.

Defaults

Line clock

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Examples

The following example sets an internal clock source on serial line 0:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 clock source line
```

Related Commands

Command	Description
service-module 56k clock source	Sets up the clock source on a serial interface for a 4-wire, 56/64-kbps CSU/DSU module.

service-module t1 data-coding

To guarantee the ones density requirement on an alternate mark inversion (AMI) line using the fractional T1/T1 module, use the **service-module t1 data-coding** command in interface configuration mode. To enable normal data transmission, use the **no** form of this command.

```
service-module t1 data-coding {inverted | normal}
```

```
no service-module t1 data-coding {inverted | normal}
```

Syntax Description

inverted	Inverts bit codes by changing all 1 bits to 0 bits and all 0 bits to 1 bits.
normal	Requests that no bit codes be inverted before transmission. This is the default.

Defaults

Normal transmission

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Data inversion is used to guarantee the ones density requirement on an AMI line when using bit-oriented protocols such as High-Level Data Link Control (HDLC), PPP, X.25, and Frame Relay. If the time slot speed is set to 56 kbps, this command is rejected because line density is guaranteed when transmitting at 56 kbps. Use this command with the 64-kbps line speed.

If you transmit inverted bit codes, both CSU/DSUs must have this command configured for successful communication.

Examples

The following example inverts bit codes using a time slot speed of 64 kbps:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 timeslots all speed 64
Router(config-if)# service-module t1 data-coding inverted
```

Related Commands

Command	Description
service-module t1 linecode	Selects the linecode for the fractional T1/T1 module.
service-module t1 timeslots	Defines time slots that constitute a fractional T1/T1 (FT1/T1) channel.

service-module t1 fdl

To set the FDL parameter to either ATT or ANSI, use the **service-module t1 fdl** command in interface configuration mode. To ignore the FDL parameter, use the **no** form of this command.

```
service-module t1 fdl {ansi | att}
```

```
no service-module t1 fdl
```

Syntax Description

ansi	Sets the FDL parameter to ANSI.
att	Sets the FDL parameter to ATT.

Defaults

Determined by the telephone company.

Command Modes

Interface configuration mode

Command History

Release	Modification
11.2 P	This command was introduced.

Usage Guidelines

The default is **no service-module t1 fdl**. The **ansi** or **att** options are determined by your service provider or telephone company.

Examples

The following example sets the FDL parameter to ANSI:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 fdl ansi
```

service-module t1 framing

To select the frame type for a line using the fractional T1/T1 (FT1/T1) module, use the **service-module t1 framing** command in interface configuration mode. To revert to the default, Extended Super Frame, use the **no** form of this command.

```
service-module t1 framing { esf | sf }
```

```
no service-module t1 framing { esf | sf }
```

Syntax Description

esf	Specifies Extended Super Frame as the T1 frame type. This is the default.
sf	Specifies D4 Super Frame as the T1 frame type.

Defaults

Extended Super Frame (ESF)

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command in configurations in which the router communicates with FT1/T1 data lines. The service provider determines which framing type, either **esf** or **sf**, is required for your circuit.

Examples

The following example enables Super Frame as the FT1/T1 frame type:

```
Router(config-if)# service-module t1 framing sf
```

service-module t1 lbo

To configure the CSU line-build-out (LBO) on a fractional T1/T1 CSU/DSU module, use the **service-module t1 lbo** command in interface configuration mode. To disable line-build-out, use the **no** form of this command.

```
service-module t1 lbo {-15 db | -7.5 db | none}
```

```
no service-module t1 lbo {-15 db | -7.5 db | none}
```

Syntax Description

-15 db	Decreases outgoing signal strength by 15 dB.
-7.5 db	Decreases outgoing signal strength by 7.5 dB.
none	Transmits packets without decreasing outgoing signal strength.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command to decrease the outgoing signal strength to an optimum value for a fractional T1 line receiver. The ideal signal strength should be -15 dB to -22 dB, which is calculated by adding the phone company loss, cable length loss, and line build out.

You may use this command in back-to-back configurations, but it is not needed on most actual T1 lines.

Examples

The following example sets the LBO to -7.5 dB:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 lbo -7.5 db
```

service-module t1 linecode

To select the line code for the fractional T1/T1 module, use the **service-module t1 linecode** command in interface configuration mode. To select the default, the B8ZS line code, use the **no** form of this command.

```
service-module t1 linecode {ami | b8zs}
```

```
no service-module t1 linecode {ami | b8zs}
```

Syntax Description

ami	Specifies alternate mark inversion (AMI) as the line code.
b8zs	Specifies binary 8 zero substitution (B8ZS) as the line code. This is the default.

Defaults

The default line code is B8ZS.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Configuring B8ZS is a method of ensuring the ones density requirement on a T1 line by substituting intentional bipolar violations in bit positions four and seven for a sequence of eight zero bits. When the CSU/DSU is configured for AMI, you must guarantee the ones density requirement in your router configuration using the **service-module t1 data-coding inverted** command or the **service-module t1 time slots speed 56** command.

Your T1 service provider determines which line code, either **ami** or **b8zs**, is required for your T1 circuit.

Examples

The following example specifies AMI as the line code:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 linecode ami
```

Related Commands

Command	Description
service-module t1 data-coding	Guarantees the ones density requirement on an AMI line using the fractional T1/T1 module.
service-module t1 timeslots	Defines time slots that constitute a fractional T1/T1 (FT1/T1) channel.

service-module t1 remote-alarm-enable

To generate remote alarms (yellow alarms) at the local CSU/DSU or detect remote alarms sent from the remote CSU/DSU, use the **service-module t1 remote-alarm-enable** command in interface configuration mode. To disable remote alarms, use the **no** form of this command.

service-module t1 remote-alarm-enable

no service-module t1 remote-alarm-enable

Syntax Description

This command has no arguments or keywords.

Defaults

Remote alarms are disabled

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Remote alarms are transmitted by the CSU/DSU when it detects an alarm condition, such as a red alarm (loss of frame) or blue alarm (unframed ones). The receiving CSU/DSU then knows that there is an error condition on the line.

With D4 Super Frame configured, a remote alarm condition is transmitted by setting the bit 2 of each time slot to zero. For received user data that has the bit 2 of each time slot set to zero, the CSU/DSU interprets the data as a remote alarm and interrupts data transmission, which explains why remote alarms are disabled by default. With Extended Super Frame configured, the remote alarm condition is signalled out of band in the facilities data link.

You can see if the FT1/T1 CSU/DSU is receiving a remote alarm (yellow alarm) by issuing the **show service-module** command.

Examples

The following example enables remote alarm generation and detection:

```
Router(config)# interface serial 0
Router(config-if)# service-module t1 remote-alarm-enable
```

Related Commands

Command	Description
service-module t1 framing	Selects the frame type for a line using the fractional T1/T1 (FT1/T1) module.

service-module t1 remote-loopback

To specify if the fractional T1/T1 CSU/DSU module enters loopback mode when it receives a loopback code on the line, use the **service-module t1 remote-loopback** command in interface configuration mode. To disable remote loopbacks, use the **no** form of this command.

```
service-module t1 remote-loopback {full | payload} [alternate | v54]
```

```
no service-module t1 remote-loopback {full | payload}
```

Syntax Description

full	Configures the remote loopback code used to transmit or accept CSU loopback requests. This is the default, along with payload .
payload	Configures the loopback code used by the local CSU/DSU to generate or detect payload-loopback commands. This is the default, along with full .
alternate	(Optional) Transmits a remote CSU/DSU loopback request using a 4-in-5 pattern for loopup and a 2-in-3 pattern for loopdown. This is an inverted version of the standard loopcode request.
v54	(Optional) Industry standard loopback code. Use this configuration for CSU/DSUs that may not support the Accunet loopup standards. This keyword is used only with a payload request, not a full request.



Note

By entering the **service-module t1 remote-loopback** command without specifying any keywords, you enable the standard-loopup codes, which use a 1-in-5 pattern for loopup and a 1-in-3 pattern for loopdown.

Defaults

Full and payload loopbacks with standard-loopup codes

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

You can simultaneously configure the **full** and **payload** loopback points. However, only one loopback code can be configured at a time. For example, if you configure the **service-module t1 remote-loopback payload alternate** command, a **payload v54** request cannot be transmitted or accepted.

The **no** form of this command disables loopback requests. For example, the **no service-module t1 remote-loopback full** command ignores all full-bandwidth loopback transmissions and requests. Configuring the **no** form of this command may not prevent telco line providers from looping your router in esf mode, because fractional T1/T1 lines use facilities data link messages to initiate loopbacks.

If you enable the **service-module t1 remote-loopback** command, the **loopback remote** commands on the FT1/T1 CSU/DSU module will not be successful.

Examples

The following example displays two routers connected back-to-back through a fractional T1/T1 line:

```
Router# no service-module t1 remote-loopback full
Router# service-module t1 remote-loopback payload alternate

Router# loopback remote full
%SERVICE_MODULE-5-LOOPUPFAILED: Unit 0 - Loopup of remote unit failed

Router# service-module t1 remote-loopback payload v54
Router# loopback remote payload
%SERVICE_MODULE-5-LOOPUPFAILED: Unit 0 - Loopup of remote unit failed

Router# service-module t1 remote-loopback payload alternate
Router# loopback remote payload
%SERVICE_MODULE-5-LOOPUPREMOTE: Unit 0 - Remote unit placed in loopback
```

Related Commands

Command	Description
loopback remote (interface)	Loops packets through a CSU/DSU, over a DS3 link or a channelized T1 link, to the remote CSU/DSU and back.

service-module t1 timeslots

To define time slots that constitute a fractional T1/T1 (FT1/T1) channel, use the **service-module t1 timeslots** command in interface configuration mode. To resume the default setting (all FT1/T1 time slots transmit at 64 kbps), use the **no** form of this command.

```
service-module t1 timeslots {range | all} [speed {56 | 64}]
```

```
no service-module t1 timeslots {range | all}
```

Syntax Description

<i>range</i>	The DS0 time slots that constitute the FT1/T1 channel. The range is from 1 to 24, where the first time slot is numbered 1 and the last time slot is numbered 24. Specify this field by using a series of subranges separated by commas.
all	Selects all FT1/T1 time slots.
speed	(Optional) Specifies the time slot speed.
56	(Optional) 56 kbps.
64	(Optional) 64 kbps. This is the default.

Defaults

64 kbps is the default for all time slots.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

This command specifies which time slots are used in fractional T1 operation and determines the amount of bandwidth available to the router in each FT1/T1 channel.

The time-slot range must match the time slots assigned to the channel group. Your service provider defines the time slots that comprise a channel group.

To use the entire T1 line, enable the **service-module t1 timeslots all** command.

Examples

The following example displays a series of time-slot ranges and a speed of 64 kbps:

```
Router(config-if)# service-module t1 timeslots 1-10,15-20,22 speed 64
```

Related Commands

Command	Description
service-module t1 data-coding	Guarantees the ones density requirement on an AMI line using the fractional T1/T1 module.
service-module t1 linecode	Selects the linecode for the fractional T1/T1 module.