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t1

To create a logical T1 controller from each of the specified time slots of the T3 line, use the **t1**command in controller configuration mode. To delete the defined logical controller, use the **no** form of this command.

t1 *ds1* **controller**
no t1 *ds1* **controller**

Syntax Description

ds1	Time slot within the T3 line. The valid time-slot range is from 1 to 28.

Command Default

No default behavior or values.

Command Modes

Controller configuration

Command History

Release	Modification
11.3AA	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The purpose of this command is to convert the collection of the 28 T1 controllers comprising the T3 controller into individual T1 controllers that the system can use. In other words, the Cisco AS5800 access server cannot pass data until a T1 controller is configured (using the **controller** command), and you cannot configure a T1 controller until it has been created using the **t1** command.

Examples

The following example shows how to configure a logical T1 controller at T1 time slot 1 for the T3 controller located in shelf 1, slot 4, port 0. Note that you have to enter the command from controller configuration mode.

```
Router(config)# controller
 t3 1/4/0
Router(config-controller)# t1 1 controller
Router(config-controller)# end
```

Related Commands

Command	Description
controller	Configures a T1 and other types of controller and enters controller configuration mode.
controller t3	Configures a T3 controller.

t1 bert

To enable or disable a bit error rate tester (BERT) test pattern for a T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1bert**command in controller configuration mode. To disable a BERT test pattern, use the **no** form of this command.

t1 *channel* **bert pattern** {**0s** | **1s** | **2^15** | **2^20** | **2^23**} **interval** *minutes* [**unframed**]
no t1 *channel* **bert pattern** {**0s** | **1s** | **2^15** | **2^20** | **2^23**} **interval** *minutes* [**unframed**]

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
pattern	Specifies the length of the repeating BERT test pattern.
0s	0s--Repeating pattern of zeros (...000...).
1s	1s--Repeating pattern of ones (...111...).
2^15	215--Pseudorandom repeating pattern that is 32,767 bits in length.
2^20	220--Pseudorandom repeating pattern that is 1,048,575 bits in length.
2^23	223--Pseudorandom repeating pattern that is 8,388,607 bits in length.
interval *minutes*	Specifies the duration of the BERT test, in minutes. The interval can be a value from 1 to 14400.
unframed	(Optional) Specifies T1 unframed BERT.

Command Default

No BERT test is performed.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2S	The **unframed** keyword was added to this command.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The BERT test patterns from the CT3IP are framed test patterns (that is, the test patterns are inserted into the payload of the framed T1 signal).

To view the BERT results, use the **showcontrollert3** or **showcontrollert3brief** EXEC commands. The BERT results include the following information:

- Type of test pattern selected
- Status of the test

- Interval selected
- Time remaining on the BERT test
- Total bit errors
- Total bits received

When the T1 channel has a BERT test running, the line state is DOWN. Also, when the BERT test is running and the Status field is Not Sync, the information in the total bit errors field is not valid. When the BERT test is done, the Status field is not relevant.

The**t1bert**command is not written to NVRAM because it is only used for testing the T1 channel for a short predefined interval and for avoiding accidentally saving the command, which could cause the interface not to come up the next time the router reboots.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Examples

The following example shows how to run a BERT test pattern of all zeros for 30 minutes on T1 channel 6 on the CT3IP in slot 9:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 6 bert pattern 0s interval 30
```

Related Commands

Command	Description
show controllers t3	Displays the hardware and software driver information for a T3 controller.

t1/e1 cem-group

To create a circuit emulation (CEM) channel from one or more time slots of a T1/E1 ports on the Channelized T3/E3 Interface Module, use the **t1/e1cem-group** command in controller configuration mode.

t1/e1 *channel* **cem-group***cem-group-id***unframed**

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
cem-group-id	Specifies the cem circuit number to be used for the cem circuit. This number must be unique across all cem-circuits.
unframed	Specifies that a single CEM channel is being created including all time slots and the framing structure of the line. This unframed keyword is used to create an SAToP circuit.

Command Default

No CEM groups are defined.

Command Modes

Controller configuration

Command History

Command History

Release	Modification
XE 3.18SP	This command was introduced.
XE Everest 16.5.1	This command was introduced on the Cisco NCS 4200 Series and Cisco ASR 900 Series Routers.

Usage Guidelines

Use this command to configure cem-group for channelized T1/E1 under T3/E3 controller.

Examples

The following example shows how to create cem-group on the Channelized T3 Interface Module:

```
Router(config-controller)# t1 1 cem-group 0 unframed
```

Examples

The following example shows how to create cem-group on the Channelized E3 Interface Module:

```
Router(config-controller)# e1 1 cem-group 0 unframed
```

t1 clock source

To specify where the clock source is obtained for use by each T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1clocksource** command in controller configuration mode.

t1 *channel* **clock source** {**internal** | **line**}

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
internal	Specifies that the internal clock source is used. This is the default.
line	Specifies that the network clock source is used.

Command Default

Internal

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If you do not specify the **t1clocksource**command, the default clock source of **internal** is used by all the T1s on the CT3IP.

You can also set the clock source for the CT3IP by using the **clocksource**(CT3IP)controller configuration command.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

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

Examples

The following example shows how to set the clock source to line T1 6 and T1 8 on the CT3IP:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 6 clock source line
Router(config
```

```
-controller)
# t1 8 clock source line
```

Related Commands

Command	Description
clock source (CT3IP)	Specifies where the clock source is obtained for use by the CT3IP in Cisco 7500 series routers.

t1 external

To specify that a T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers is used as an external port so that the T1 channel can be further multiplexed on the Multichannel Interface Processor (MIP) or other multiplexing equipment, use the **t1external**command in controller configuration mode. To remove a T1 as an external port, use the **no** form of this command.

t1 external *channel* [**cablelength** *feet*] [**linecode** [**ami** | **b8zs**]]
no t1 external *channel*

Syntax Description

channel	Number 1, 2, or 3 that indicates the T1 channel.
cablelength *feet*	(Optional) Specifies the cable length, in feet, from the T1 channel to the external CSU or MIP. Values are from 0 to 655. Default is 133.
linecode ami | **b8zs**	(Optional) Specifies the line coding used by the T1. Values are alternate mark inversion (AMI) or bipolar 8 zero suppression (B8ZS). Default is B8ZS.

Command Default

No external T1 is specified. The default cable length is 133 feet. The default line coding is B8ZS.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The first three T1 channels (1, 2, and 3) of the CT3IP can be broken out to the DSUP-15 connectors on the CPT3IP so that the T1 channel can be further demultiplexed by the MIP on the same router or on another router.

After you configure the external T1 channel, you can continue configuring it as a channelized T1 (also referred to as a *fractional* T1) from the MIP. All channelized T1 commands might not be applicable to the T1 interface. After you configure the channelized T1 on the MIP, you can continue configuring it as you would a normal serial interface. All serial interface commands might not be applicable to the T1 interface.

The line coding on the T1 channel and the MIP must be the same. Because the default line coding format on the T1 channel is B8ZS and the default line coding on the MIP is AMI, you must change the line coding on the MIP or on the T1 so that they match.

To determine if the external device connected to the external T1 port is configured and cabled correctly before configuring an external port, use the **showcontrollerst3** command and locate the line Ext1... in the display output. The line status can be one of the following:

- LOS--Loss of signal indicates that the port is not receiving a valid signal. This is the expected state if nothing is connected to the port.

- AIS--Alarm indication signal indicates that the port is receiving an all-ones signal.
- OK--A valid signal is being received and the signal is not an all-ones signal.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Note Although you can specify a cable length from 0 to 655 feet, the hardware only recognizes the following ranges: 0 to 133, 134 to 266, 267 to 399, 400 to 533, and 534 to 655. For example, entering 150 feet uses the 134 to 266 range. If you later change the cable length to 200 feet, there is no change because 200 is within the 134 to 266 range. However, if you change the cable length to 399, the 267 to 399 range is used. The actual number you enter is stored in the configuration file.

Examples

The following example shows how to configure T1 1 on the CT3IP as an external port using AMI line coding and a cable length of 300 feet:

```
Router(config
)
# controllers t3 9/0/0
Router(config
-controller)
# t1 external 1 cablelength 300 linecode ami
```

Related Commands

Command	Description
show controllers t3	Displays the hardware and software driver information for a T3 controller.

t1 fdl ansi

To enable the 1-second transmission of the remote performance reports via the Facility Data Link (FDL) per ANSI T1.403 for a T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1fdlansi** command in controller configuration mode. To disable the performance report, use the **no** form of this command.

t1 *channel* **fdl ansi**
no t1 *channel* **fdl ansi**

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.

Command Default

Disabled

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The**t1fdlansi** command can be used only if the T1 framing type is Extended Super Frame (ESF).

To display the remote performance report information, use the**showcontrollerst3remoteperformance** command.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Examples

The following example shows how to generate the performance reports for T1 channel 8 on the CT3IP:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 8 fdl ansi
```

Related Commands

Command	Description
show controllers t3	Displays the hardware and software driver information for a T3 controller.

t1 framing

To specify the type of framing used by T1 channels, use the**t1framing** command in controller configuration mode.

Cisco 7500 Series Routers with Channelized T3 Interface Processor
t1 *channel* **framing** {**esf** | **sf**}

Channelized T3 Shared Port Adapters
t1 channel framing {**esf** | **sf** [**hdlc-idle** {**0x7e** | **0xff**}] [**mode j1**]}
no t1 channel framing {**esf** | **sf** [**hdlc-idle** {**0x7e** | **0xff**}] [**mode j1**]}

Syntax Description

channel	Number indicating the T1 channel. • On the CT3IP--1 to 28 • On the 2-Port and 4-Port Channelized T3 SPA --0 to 23
esf	Specifies that Extended Super Frame (ESF) is used as the T1 framing type. This is the default for the CT3IP.
sf	Specifies that Super Frame (SF) is used as the T1 framing type. This is the default for the 2-Port and 4-Port Channelized T3 SPA.
hdlc-idle {**0x7e** | **0xff**}	(Optional) Sets the idle pattern for the T1 interface to either **0x7e** (the default) or **0xff**.
mode {**j1**}	(Optional) Specifies the JT-G704 Japanese frame type. The mode keyword is not supported on Cisco 7304 routers with the 2-Port and 4-Port Channelized T3 SPA.

Command Default

esf (for C3TIP)

sf (for 2-Port and 4-Port Channelized T3 SPA)

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.0(14)S	This command was integrated into Cisco IOS Release 12.0(14)S. The **hdlc-idle** keyword option was added.
12.2S	This command was integrated into Cisco IOS Release 12.2S.
12.2(25)S3	This command was integrated into Cisco IOS Release 12.2(25)S3 to support SPAs on the Cisco 7304 series routers.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE to support SPAs on the Cisco 7600 series router and Catalyst 6500 series switch. The **mode** keyword option was added.

Release	Modification
12.0(31)S	This command was integrated into Cisco IOS Release 12.0(31)S to support SPAs on the Cisco 12000 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

If you do not specify the **t1framing**command, the default ESF is used.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

To return to the default mode, use the no form of this command. This command does not have a **no** form on the Cisco 7500 series router with the CT3IP.

The mode keyword is not supported on Cisco 7304 routers with the 2-Port and 4-Port Channelized T3 SPA.

Examples

The following example shows how to set the framing for the T1 6 and T1 8 on the CT3IP to Super Frame:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 6 framing sf
Router(config
-controller)
# t1 8 framing sf
```

Related Commands

Command	Description
controller	Configures a T1, E1, or T3 controller and enters controller configuration mode.
show controller	Displays controller configuration.

t1 linecode

To specify the type of line coding used by the T1 channels on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1linecode**command in controller configuration mode.

t1 *channel* **linecode** [**ami** | **b8zs**]

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
ami	Specifies that alternate mark inversion (AMI) line coding is used by the T1 channel.
b8zs	Specifies that bipolar 8 zero suppression (B8ZS) line coding is used by the T1 channel. This is the default.

Command Default

B8ZS

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If you do not specify the **t1linecode**command, the default B8ZS is used.

AMI Line Coding

If you select **ami** line coding for the T1 channel, you must also invert the data on the T1 channel by using the **invertdata** interface command. This is required because the T1 channel is bundled into the T3 signal, so there are no local T1 line drivers and receivers associated with it. Therefore, the **t1***channel***linecodeami** command does not modify local line driver settings. Rather, it advises the CT3IP what line code the remote T1 is using. The CT3IP uses this information solely for the purpose of determining whether or not to enable the pulse density enforcer for that T1 channel.

B8ZS Line Coding

When you select **b8zs** line coding, the pulse density enforcer is disabled. When you select **ami** line coding, the pulse density enforcer is enabled. To avoid having the pulse density enforcer corrupt data, the T1 channel should be configured for inverted data.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Examples

The following example shows how to set the line coding for T1 channel 16 on the CT3IP to AMI:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 16 linecode ami
Router(config
-controller)
# exit
Router(config
)
# interface serial 9/0/0:16
Router(config
-if)
# invert data
```

Related Commands

Command	Description
invert data	Inverts the data stream.
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.

t1 logging-events

To print typical T1 controller Up and Down messages on a channelized T3 port adapterin T3 controller, use the t1 **logging-eventscommand**configuration mode**.TodisableprintingoftheT1controllerUpandDownmessages,usethenoformofthiscommand.**

t1 t1 logging-events [**detail**]
[**no**] **t1 t1 logging-events**

Syntax Description

t1	Number between 1 and 28 that represents the T1 channel for the Channelized T3 Interface Processor (CT3IP) on Cisco 7500 series and Cisco 7200 series routers.
detail	(Optional) Enables printing the reason code when a T1 controller of a T3 controller changes from the Up state to the Down state.

Command Default

The **t1logging-eventscommandisthedefault.**

Command Modes

T3 controller configuration mode.

Command History

Release	Modification
12.2(19c)	This command was introduced.

Usage Guidelines

This command refers to the T1 controller as part of a T3 controller.

The no t1 logging-events command disables printing of the controller Up and Down messages. These messages will appear neither on the console nor in the logs.

Examples

The following example uses the **t1logging-events**command to print normal controller Up and Down messages, without indicating the reason code for a changed state. The T1 1 controller is part of the T3 controller with a bay/port of 4/1.

```
Router(config-controller)# t1 1 logging-events
*Jun 20 00:29:39: %CONTROLLER-5-UPDOWN: Controller T3 4/1 T1 1, changed state to UP
*Jun 20 00:30:09: %CONTROLLER-5-UPDOWN: Controller T3 4/1 T1 1, changed state to DOWN
```

The following example uses the **t1logging-eventsdetail**command to show the Out-of-Frame (OOF) reason code when the T1 1 controller of a T3 controller with a bay/port of 4/1 changes from an Up state to a Down state:

```
Router(config-controller)# t1 1 logging-events detail
*Jun 19 17:47:50: %CONTROLLER-5-DOWNDETAIL: Controller T3 4/1 T1 1, changed state to down
due to OOF
```

Related Commands

Command	Description
logging-events	**Prints typical T3 controller Up and Down messages** on a channelized T3 port adapter**.**

t1/e1 loopback

To set the loopback method for testing T1, E1, T3 or E3 interface module, use the **t1loopback** command in controller configuration mode. To remove the existing loopback, use the no form of this command.

t1 *t1 number* **loopback** { *local* | *network* { *line* | *payload* } }

e1 *e1 number* **loopback** { *local* | *network* { *line* | *payload* } }

Syntax Description

t1 number	Displays the T1 channel number. It ranges from 1-28.
e1 number	Displays the E1 channel number. It ranges from 1-16.
local	Places the interface into local loopback mode and creates a loopback wherein information received from the locally-attached customer premises equipment (CPE) is transmitted back to the locally-attached CPE.
network	Creates a loopback wherein data received over the network from the remote CPE is transmitted back to the remote CPE. • payload: Creates a loopback of only the data in individual time slots. In this mode, framing bits are terminated and then regenerated instead of being looped back. This mode is not available if the port is configured for framing unframed. • line: Creates a full physical layer loopback of all bits, including data and framing bits.

Command Default

No loopback is configured

Command Modes

Controller configuration

Command History

Command History

Release	Modification
XE 3.18SP	This command was introduced on the Cisco NCS 4200 series.
XE Everest 16.5.1	This command was integrated into Cisco NCS 4200 Series and Cisco ASR 900 Series Routers.

Examples

The following example shows how to create the local loopback on the controller :

```
Router(config-controller)# t1 1 loopback local
```

The following example shows how to create a network line loopback on a controller.

```
Router(config-controller)# t1 1 loopback network line
```

Examples

The following example shows how to create the local loopback on the controller :

```
Router(config-controller)# e1 1 loopback local
```

Related Commands

Command	Description
controller	Enters controller configuration mode.
show controller t3	Displays the information about T3 controller.

t1 t1-line-number cem-group

To create a single Structure-Agnostic TDM over Packet (SAToP) CEM group, use the **t1** *t1-line-number* **cem-group** command in controller configuration mode.

t1 *t1-line-number* **cem-group** *cem-group-number* **unframed**

Syntax Description

t1-line-number	Specifies the T1 line number. The range is 1 to 4.
cem-group-number	The **cem-group-number** keyword identifies the channel number to be used for this channel. For T1 ports, the range is 0 to 23. For E1 ports, the range is 0 to 30.
unframed	Use the **unframed** keyword to specify that a single CEM channel is being created including all time slots and the framing structure of the line. It assigns all the T1 timeslots to the CEM channel.

Command Default

None

Command Modes

Controller configuration

Command History

Release	Modification
XE 3.18 SP	Support for this command was introduced on NCS 4200 Series.

Usage Guidelines

The command is used to configure t1 channels under CT3 mode. You can configure 28 T1 channels with CT3 mode.

Examples

The following example shows how to configure DS1 CT3 SAToP mode :

```
enable
configure terminal
controller Mediatype 0/5/0
mode sonet
controller sonet 0/5/0
rate oc12
sts-1 1
mode ct3
t1 1 cem-group 100 unframed
interface cem 0/5/0
no ip address
cem 100
xconnect 2.2.2.2 10 encapsulation mpls
exit
```

Related Commands

Command	Description
controller sonet	Displays information about Synchronous Optical Network (SONET) controllers.
show controller sonet	Displays SONET controller configuration.

t1 t1-line-number clock source

To specify where the clock source is obtained for use by each T1 channel, use the **t1** *t1-line-number* **clock source** command in controller configuration mode.

t1 *t1-line-number* **clock source** {*internal* | *line*}

Syntax Description

Syntax Description

t1-line-number	Specifies the T1 line number. The range is 1 to 4.
internal	Specifies that the internal clock source is used. This is the default.
line	Specifies that the network clock source is used.

Command Default

The default mode is internal.

Command Modes

Controller configuration

Command History

Release	Modification
XE 3.18 SP	Support for this command was introduced on NCS 4200 Series.

Usage Guidelines

If you do not specify the **t1 clock source** command, the default clock source of internal is used by all the T1s. The no form of this command is available for clock source line mode.

Examples

The following example shows how to configure DS1 CT3 SAToP mode:

```
enable
configure terminal
controller MediaType 0/5/0
mode sonet
controller sonet 0/5/0
rate oc12
sts-1 1
mode ct3
t1 1 cem-group 100 unframed
t1 1 framing unframed
t1 1 clock source internal
end
```

Related Commands

Command	Description
controller sonet	Configures a T1, E1, or T3 controller and enters controller configuration mode.
show controller sonet	Displays controller configuration.

t1 t1 line-number framing

To specify the type of framing used by T1 channels, use the **t1** *t1-line-number* **framing** command in controller configuration mode.

t1 *t1-line-number* **framing** {*esf* | *sf* | *unframed*}

Syntax Description

Syntax Description

t1-line-number	The name of a CEM interface parameters class.
esf	Specifies that Extended Super Frame (ESF) is used as the T1 framing type.
sf	Specifies that Super Frame (SF) is used as the T1 framing type.
unframed	Creates an unframed (clear channel) logical channel group on a T1 line.

Command Default

None

Command Modes

Controller configuration

Command History

Release	Modification
XE 3.18SP	Support for this command was introduced on NCS 4200 Series.

Usage Guidelines

If you do not specify the **t1** *t1-line-number* **framing** command, the default ESF is used.

Examples

The following example shows how to configure DS1 CT3 SAToP mode:

```
enable
configure terminal
controller MediaType 0/5/0
mode sonet
controller sonet 0/5/0
rate oc12
sts-1 1
mode ct3
t1 1 cem-group 100 unframed
t1 1 framing unframed
exit
```

Related Commands

Command	Description
controller sonet	Configures a T1, E1, or T3 controller and enters controller configuration mode.
show controller sonet	Displays controller configuration.

t1 span

To enable link noise monitoring on a clear channel T1 link on Cisco 10000 series routers, use the **t1span** command in controller configuration mode. To disable link noise monitoring, use the **no** form of this command.

t1 *channel* **span** {**minor-warn** | **remove** | **major-warn**} [**duration** *seconds* | **lcv** *threshold* [**pcv** *threshold*] [**set** | **clear**]]
no t1 *channel* **span** {**minor-warn** | **remove** | **major-warn**} [**duration** *seconds* | **lcv** *threshold* [**pcv** *threshold*] [**set** | **clear**]]

Syntax Description

channel	Number that indicates the T1 channel. The range is from 1 to 28.
minor-warn	Enables minor warning messages for noisy T1 links.
major-warn	Enables major warning messages for noisy T1 links.
remove	Enables removal of noisy T1 links from a multilink bundle.
lcv *threshold*	Specifies the line code violation (LCV) threshold value in bit error per second. The valid range on a T1 link is 5 to 1544 seconds. The valid range on an E1 link is 7 to 2048 seconds. • The default LCV value for minor-warn on a T1 link is 154 seconds and on E1 link is 205 seconds. • The default LCV value for major-warn or removal on a TI link is 1544 seconds and on E1 link is 2048 seconds.
duration *seconds*	Specifies the number of consecutive seconds that a threshold is exceeded or improved for a condition to occur. The valid range on a T1/E1 link is 4 to 600 seconds. The default value for T1 and E1 links is 10 seconds.
pcv *threshold*	Specifies the number of timeslots in error per second. The valid range on a T1 link is 3 to 320 seconds and on an E1 link is 8 to 832 seconds. **Note** A T1 link has 24 timeslots and an E1 link has 32 timeslots. • The default path code violation (PCV) value for minor-warn on a T1 link is 145 seconds and on E1 link is 205 seconds. • The default PCV value for major-warn or removal on a TI link is 320 seconds and on E1 link is 832 seconds.
set	(Optional) Specifies the set condition. Set is used as the default when no conditions are given.
clear	(Optional) Specifies the clear condition.

Command Default

Link Noise Monitoring on any T1 or E1 link is disabled by default. If enabled without specifying any thresholds, the default values are used as mentioned in the Syntax Description.

Command Modes

Controller configuration (config-controller)

Command History

Release	Modification
12.2(33)XNE	This command was introduced.

Usage Guidelines

Note the following when configuring link noise monitoring on T1 and E1 links:

- The **major-warn** and **remove** keywords cannot be used at the same time; disable one to use the other.
- If the **warn** and **remove** keywords are specified without any other options, the LCV and PCV thresholds and duration defaults are used to determine set (**set**) and clear (**clear**) conditions.
- If the **span** command is issued with the **set** keyword and the command is not issued again with the **clear** keyword, or vice versa, the values configured for the threshold and duration is used for both keywords.
- If the **span** command is issued without the **set** or **clear** keywords specified, **set** is the default keyword.
- The **set** and **clear** keywords can be specified only if the threshold values for the LCV and/or duration is specified.
- The threshold for a clear condition must be less than the threshold for a set condition.
- The threshold for a warn event must be less than the threshold for a remove event.
- The duration is calculated in seconds and is the number of consecutive seconds by which either of the thresholds (exceed or improve) must be surpassed for a condition to occur.
- For events, the BER on a line should be greater than or equal to (>=) the thresholds for exceed condition. For improve condition, BER has to be less than (<) the threshold.
- If the PCV threshold is not configured (using the **pcv** keyword and value), this threshold is calculated by the linear extrapolation of the Gaussian probability that is representative of most noise environments based on the configured LCV threshold. If the LCV threshold is specified, it is not mandatory to specify the PCV threshold.

Examples

The following example shows how to generate an exceed event for a minor warning, if the number of LCVs on the T1 line remain above or equal to 20, or the number of PCVs remains above or equal to 10 for 10 continuous seconds.

```
Router(config-controller)# t1 1 span minor-warn lcv 20 pcv 10 duration 10 set
```

The following example shows how to generate an improve event for a minor warning, if the number of LCVs on the T1 line remain below 15 or the number of PCVs remain below 8 for 20 continuous seconds.

```
Router(config-controller)# t1 1 span minor-warn lcv 15 pcv 8 duration 20 clear
```

The following example shows the same threshold value being used by the **set** and **clear** conditions, when both keywords are not specified. In this example, the threshold value is 80 for both conditions.

```
Router(config-controller)# t1 1 span major-warn lcv 150 pcv 100 duration 80
Router(config-controller)# end
Router# show running-config | section controller sonet 7/0/0
controller SONET 7/0/0
```

```
 framing SONET
 path 1 controller t3
 clock source internal
controller T3 7/0/0.1
 t1 1 channel-group 0 timeslots 1-24
 t1 1 span minor-warn lcv 150 pcv 100 duration 80 set
t1 1 span minor-warn lcv 150 pcv 100 duration 80 clear
```

The following example shows how the threshold value specified for the clear condition is used by the set condition when set condition is not specified. In this example, the threshold value of 100 specified for the clear condition is used for the set condition.

```
Router(config-controller)# t1 1 span major-warn lcv 100 pcv 70 duration 100 clear
Router(config-controller)# end
Router# show running-config | section controller sonet 7/0/0
controller SONET 7/0/0
 framing SONET
 path 1 controller t3
 clock source internal
controller T3 7/0/0.1
t1 1 channel-group 0 timeslots 1-24
 t1 1 span minor-warn lcv 100 pcv 70 duration 100 set
 t1 1 span minor-warn lcv 100 pcv 70 duration 100 clear
```

The following is a sample output showing the details of the calculated PCV threshold value. The calculated PCV value is 141:

```
Router# debug c10k lnm
Router(config-controller)# t1 1 span major-warn lcv 150
Router(config-controller)# end
*Sep 10 20:34:43.923:  T1 extrapolation: pcv_delta=130 lcv_delta=139 factor=140 pcv_const=14

 computed pcv_threshold = 141
*Sep 10 20:34:43.923: CMD for minor-warn set
*Sep 10 20:34:43.923: clear taking set thresholds
*Sep 10 20:34:43.923: T3 7/0/0.1#1 setting values to be sent to LC for WARN ENABLE 3
*Sep 10 20:34:43.923:
 3, 150, 150, 141, 141, 10, 10, 0, 0, 0, 0, 0, 0
Router# show running-config | section controller sonet 7/0/0
controller SONET 7/0/0
 framing SONET
 path 1 controller t3
 clock source internal
controller T3 7/0/0.1
 t1 1 channel-group 0 timeslots 1-24
 t1 1 span minor-warn lcv 150 pcv 141 duration 10 set
 t1 1 span minor-warn lcv 150 pcv 141 duration 10 clear
```

Related Commands

Command	Description
t1 clock source	Specifies where the clock source is obtained for use by each T1 channel on the channelized T3 interface.
show controllers t3	Displays the hardware and software driver information for a T3 controller.
t1 span syslog	Generates syslog messages for spans that are enabled with the link noise monitoring feature.

t1 span syslog

To generate syslog messages for all the spans on which the link noise monitoring feature is enabled, use the **t1spansyslog**command in controller configuration mode. To disable the generation of syslog messages, use the **no** form of this command.

t1 *channel* **span syslog**
no t1 *channel* **span syslog**

Syntax Description

channel	Number that indicates the T1 channel. The range is from 1 to 28.
syslog	Generates syslog messages for T1 links that are enabled with the Link Noise Monitoring feature.

Command Default

Syslog messages are disabled by default.

Command Modes

Controller configuration (config-controller)

Command History

Release	Modification
12.2(33)XNE	This command was introduced.

Usage Guidelines

The Cisco 10000 series router is a scalable platform and supports up to 4000 T1 links on one chassis. When enabled, syslog messages are generated for all T1 links on which link noise monitoring is configured. A syslog event is reported as a message. The syslog report stores the last five events.

When an 'exceed' event is reported, a syslog message is generated. Such syslog messages from all links clog up the logging buffer. When enabling syslog messages, a message prompts you to confirm whether to generate syslog messages or not.

To view the events for a line card, use the **showcontroller***typenumber***lnmevent**command in the privileged EXEC mode. To view the events for a SPA, use the **showplatformspa***slot/subslot***lnmevent**command.

Examples

The following example shows the message displayed when the minor warning threshold has exceeded:

```
LNM-3- MINWARNEXCEED: Interface Serial7/0/0.1/1:0, noise exceeded above minor warning
threshold
```

The following example shows the sample output of the **showcontroller** command, when executed for a specified T1 channel:

```
Router# show controllers t3 7/0/0.1 /5 lnm

Channel    Monitoring type                Thresholds (lcv/pcv/duration)
-------------------------------------------------------------------------------
  5     minor-warn (syslog disabled)   Set(154 /145 /10  ) Clear(154 /145 /10  )
Router#
```

The following example shows the sample output of the last five stored messages:

```
Router# show controller t3 7/0/0.1 lnm events
Channel          Last five events
```

```
-------------------------------------------------------------------------------
 1      MINWARNEXCEED : Noise exceeded minor-warn thresholds at Jun 11 1995 13:42:01
         MAJWARNEXCEED : Noise exceeded major-warn thresholds at Jun 11 1995 13:42:01
     MINWARNIMPROVE: Noise improved minor-warn thresholds at Jun 11 1995 13:42:01
        MAJWARNIMPROVE: Noise improved major-warn thresholds at Jun 11 1995 13:42:01
 2       Channel not configured for E1/T1
 3      Channel not configured for E1/T1
 4      No events
 5        Channel not configured for E1/T1
```

Related Commands

Command	Description
t1 clock source	Specifies where the clock source is obtained for use by each T1 channel on the channelized T3 interface.
show controllers t3	Displays the hardware and software driver information for a T3 controller.
t1 span	Enables link noise monitoring on T1 links.

t1 test

To break out a T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers to the test port for testing, use the **t1test**command in controller configuration mode. To remove the T1 channel from the test port, use the **no** form of this command.

t1 test *channel* [**cablelength** *feet*] [**linecode** [**ami** | **b8zs**]]
no t1 test *channel*

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
cablelength *feet*	(Optional) Specifies the cable length, in feet, from the T1 channel to the external CSU or Multi-Channel Interface Processor (MIP). Values are from 0 to 655. Default is 133.
linecode {**ami** | **b8zs**	(Optional) Specifies the line coding format used by the T1 channel. Values are alternate mark inversion (AMI) or bipolar 8 zero suppression (B8ZS). Default is B8ZS.

Command Default

No test port is configured. The default cable length is 133 feet. The default line coding is B8ZS.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

You can use the T1 test port available on the CT3IP to break out any of the 28 T1 channels for testing (for example, 24-hour bit error-rate tester (BERT) testing as is commonly done by telephone companies before a line is brought into service).

The T1 test port is also available as an external port. For more information on configuring an external port, see the **t1external**controller configuration command.

To determine if the external device connected to the T1 test port is configured and cabled correctly before configuring a test port, use the **showcontrollerst3** command and locate the line Ext1... in the display output. The line status can be one of the following:

- LOS--Loss of signal indicates that the port is not receiving a valid signal. This is the expected state if nothing is connected to the port.
- AIS--Alarm indication signal indicates that the port is receiving an all-ones signal.
- OK--A valid signal is being received and the signal is not an all-ones signal.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Note Although you can specify a cable length from 0 to 655 feet, the hardware only recognizes the following ranges: 0 to 133, 134 to 266, 267 to 399, 400 to 533, and 534 to 655. For example, entering 150 feet uses the 134 to 266 range. If you later change the cable length to 200 feet, there is no change because 200 is within the 134 to 266 range. However, if you change the cable length to 399, the 267 to 399 range is used. The actual number you enter is stored in the configuration file.

Examples

The following example shows how to configure T1 6 on the CT3IP as a test port using the default cable length and line coding:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 test 6
```

Related Commands

Command	Description
show controllers t3	Displays the hardware and software driver information for a T3 controller.
t1 external	Specifies that a T1 channel on the CT3IP in Cisco 7500 series routers is used as an external port so the T1 channel can be further multiplexed on the MIP or other multiplexing equipment.

t1 timeslot

To specify the time slots and data rate used on each T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1timeslot**command in controller configuration mode. To remove the configured T1 channel, use the **no** form of this command.

t1 *channel* **timeslot** *range* [**speed** {**56** | **64**}]
no t1 *channel* **timeslot**

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
range	Specifies the time slots assigned to the T1 channel. The range can be from 1 to 24. A dash represents a range of time slots, and a comma separates time slots. For example, 1-10,15-18 assigns time slots 1 through 10 and 15 through 18.
speed {**56** | **64**}	(Optional) Specifies the data rate for the T1 channel, in kbps. Values are 56 or 64. The default is 64. The 56-kbps speed is valid only for T1 channels 21 through 28.

Command Default

No time slots are specified for the T1 channel. The default data rate is 64 kbps.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

You must specify the time slots used by each T1 channel.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with telco numbering schemes for T1 channels within channelized T3 equipment.

Examples

The following example shows how to assign time slots 1 through 24 to T1 1 for full T1 bandwidth usage:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 1 timeslot 1-24
```

The following example shows how to assign time slots 21 to 23 and 26 to 28 and a data rate of 56 kbps to T1 6 for fractional T1 bandwidth usage:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 6 timeslot 21-23,26-28 speed 56
```

t1 yellow

To enable detection and generation of yellow alarms for a T1 channel on the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **t1yellow**command in controller configuration mode. To disable the detection and generation of yellow alarms, use the **no** form of this command.

t1 *channel* **yellow** {**detection** | **generation**}
no t1 *channel* **yellow** {**detection** | **generation**}

Syntax Description

channel	Number between 1 and 28 that indicates the T1 channel.
detection	Detects yellow alarms. This is the default, along with **generation**.
generation	Generates yellow alarms. This is the default, along with **detection**.

Command Default

Yellow alarms are detected and generated on the T1 channel.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection because the yellow alarm can be incorrectly detected with SF framing.

Note T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This numbering scheme ensures consistency with Telco numbering schemes for T1 channels within channelized T3 equipment.

Examples

The following example shows how to disable the yellow alarm detection on T1 channel 6 on the CT3IP:

```
Router(config
)
# controller t3 9/0/0
Router(config
-controller)
# t1 6 framing sf
Router(config
-controller)
# no t1 6 yellow detection
```

tcam priority

To prioritize the interfaces for forwarding to software in the event of Ternary Content Addressable Memory (TCAM) entry or label exhaustion, use the **tcampriority** command interface configuration mode. To revert to the default setting, use the **no** form of this command.

tcam priority [**high** | **low**]
no tcam priority

Syntax Description

high	Sets priority to high.
low	Sets priority to low.

Command Default

normal

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	This command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The interfaces are chosen in the following order:

1. Low-priority interfaces without Vlan Access Control Lists (VACLs) and without multicast
2. Low-priority interfaces without VACLs and approved by multicast
3. Low-priority interfaces with VACLs and approved by multicast
4. Low-priority interfaces (not approved by multicast)
5. Normal-priority interfaces without VACLs and without multicast
6. Normal-priority interfaces without VACLs and approved by multicast
7. Normal-priority interfaces with VACLs and approved by multicast
8. Normal-priority interfaces (not approved by multicast)
9. High-priority interfaces without VACLs and without multicast
10. High-priority interfaces without VACLs and approved by multicast
11. High-priority interfaces with VACLs and approved by multicast
12. High-priority interfaces (not approved by multicast)

Examples

The following example shows how to set the priority to low:

```
Router(config-if)# tcam priority low
```

Related Commands

Command	Description
show tcam interface	Displays information about the interface-based TCAM.

termination

To configure the termination mode of the controller, use the **termination** command in the controller configuration mode.

termination [**co** | **cpe**]

Syntax Description

co	Set the line termination for the interface as CO (network)
cpe	Termination cpe (customer)

Command Default

The command default termination mode is CPE.

Command Modes

Controller configuration mode (config-controller)

Command History

Release	Modification
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.

Examples

The following example shows the line termination set to “co”:

```
Router(config-controller)# termination
 co
```

Related Commands

Command	Description
controller shdsl	Configures a controller for single-pair high-bit-rate digital subscriber line (SHDSL) mode.
controller shdsl	Configures a controller for single-pair high-bit-rate digital subscriber line (SHDSL) mode.

test aim eeprom

To test the data compression Advanced Interface Module (AIM) after it is installed in the Cisco 2600 series router, use the **testaimeeprom**command in privileged EXEC mode.

test aim eeprom

Syntax Description

This command has no arguments or keywords.

Command Default

No tests are performed on the data compression AIM card.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(2)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

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

Caution Using this command can erase all locations in EEPROM memory.

This command is the AIM counterpart of the **testpaseeprom** command, which performs similar tasks for port modules.

The table below shows the questions asked of the user when the **testaimeeprom** command is entered, and the recommended user responses.

Table 1: Questions and Responses for test aim eeprom Command

Questions	Responses
AIM Slot [0]:	User responds by entering the slot number of the AIM whose EEPROM is to be modified. If the user presses ENTER, the default slot 0 is used.
Use NMC93C46 ID EEPROM [y]:	User responds with “y” if the AIM contains an NMC93C46 type EEPROM and “n” if the AIM contains an X2444 EEPROM. The compression Advanced Interface Module (CAIM) contains a NMC93C46 EEPROM, and this is the default if the user just pressed ENTER.
AIM Slot %d eeprom (? for help)[%c]	General command prompt for the **testaimeeprom** command dialog. The AIM slot number chosen is displayed, and the default command is the last command entered.

Questions	Responses
Address within slot %d eeprom, [0x%02x]	Enter the desired address within the EEPROM to modify. The default is the next address beyond the byte last modified. If the user wishes to enter a hexadecimal number, it must be preceded by “0x”.
Read or Write access to slot %d at 0x%02x [%c]?	Respond with a W to write to the addressed byte or with an R to read from the addressed byte. The default value is selected by just pressing Enter and is the same as the value specified in the last primitive access.
Write data (hex 8 bits) [%02x]?:	If you respond to prompt B with “W”, then prompt C is issued, requesting the user to enter the data to write to the addressed byte. The user enters the desired value. Note that if the user desires to enter a hex value, the hex value entered must be preceded by “0x”. Otherwise, the value entered is assumed to be in decimal radix.

There is a danger that you can erase all bytes in the entire EEPROM. Though it is good to have a diagnostic tool that allows you to read and write data, there is a danger that lost data will make the Advanced Interface Module (AIM) card fail.

During your session with the test dialog, you have access to the following commands:

H or**h**	Displays a summary of the available commands.
d	Dump EEPROM contents--Displays the contents of the EEPROM in hex.
e	Erase EEPROM--Erases the entire EEPROM (all bytes set to 0xff).
p	Primitive access--Erases the EEPROM.
q	Exit EEPROM test--Causes the **testaimeepromp** command dialog to exit to the command line interface (CLI).
z	Zero EEPROM--Zeros the entire EEPROM.

Examples

The following example displays the **testaimeeprom** command user dialog:

```
Router# test aim eeprom
 AIM Slot [0]: 0
 Use NMC93C46 ID EEPROM [y]: y
 AIM Slot 0 eeprom (? for help)[?]:  ?
  d - dump eeprom contents
  e - erase all locations (to 1)
  p - primitive access
  q - exit eeprom test
  z - zero eeprom
  'c' rules of radix type-in and display apply.
 AIM Slot 0 eeprom (? for help)[?]:
```

test cable-diagnostics

To test the condition of 10-Gigabit Ethernet links or copper cables on 48-port 10/100/1000 BASE-T modules, use the **testcable-diagnostics**command in privileged EXEC mode.

test cable-diagnostics tdr interface *type number*

Syntax Description

tdr	Activates the TDR test for copper cables on 48-port 10/100/1000 BASE-T modules.
interface *type*	Specifies the interface type; see the "Usage Guidelines" section for valid values.
number	Module and port number.

Command Default

This command has no default settings.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(17a)SX	Support for this command was introduced on the Cisco 7600 series routers.
12.2(17b)SXA	This command was changed to provide support for the 4-port 10GBASE-E serial 10-Gigabit Ethernet module (WS-X6704-10GE).
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Cable diagnostics can help you detect whether your cable has connectivity problems.

The TDR test guidelines are as follows:

- TDR can test cables up to a maximum length of 115 meters.
- The TDR test is supported on Cisco 7600 series routers running Release 12.2(17a)SX and later releases on specific mdoules. See the Release Notes for Cisco IOS Release 12.2SX on the Catalyst 6500 and Cisco 7600 Supervisor Engine 720, Supervisor Engine 32, and Supervisor Engine 2 for the list of the modules that support TDR.
- The valid values for **interface***type*are **fastethernet** and **gigabitethernet**.
- Do not start the test at the same time on both ends of the cable. Starting the test at both ends of the cable at the same time can lead to false test results.
- Do not change the port configuration during any cable diagnostics test. This action may result in incorrect test results.
- The interface must be up before running the TDR test. If the port is down, the **testcable-diagnosticstdr** command is rejected and the following message is displayed:

```
Router# test cable-diagnostics tdr interface gigabitethernet2/12
```

```
% Interface Gi2/12 is administratively down
% Use 'no shutdown' to enable interface before TDR test start.
```

- If the port speed is 1000 and the link is up, do not disable the auto-MDIX feature.
- For fixed 10/100 ports, before running the TDR test, disable auto-MDIX on both sides of the cable. Failure to do so can lead to misleading results.
- For all other conditions, you must disable the auto-MDIX feature on both ends of the cable (use the **nomdixauto**command). Failure to disable auto-MDIX will interfere with the TDR test and generate false results.
- If a link partner has auto-MDIX enabled, this action will interfere with the TDR-cable diagnostics test and test results will be misleading. The workaround is to disable auto-MDIX on the link partner.
- If you change the port speed from 1000 to 10/100, enter the **nomdixauto**command before running the TDR test. Note that entering the **speed1000** command enables auto-MDIX regardless of whether the **nomdixauto**command has been run.

Examples

This example shows how to run the TDR-cable diagnostics:

```
Router # test cable-diagnostics tdr interface gigabitethernet2/1
TDR test started on interface Gi2/1
A TDR test can take a few seconds to run on an interface
Use 'show cable-diagnostics tdr' to read the TDR results.
```

Related Commands

Command	Description
clear cable-diagnostics tdr	Clears a specific interface or clears all interfaces that support TDR.
show cable-diagnostics tdr	Displays the test results for the TDR cable diagnostics.

test interface fastethernet

To test the Fast Ethernet interface by causing the interface to ping itself, use the **testinterfacefastethernet** command in user EXEC or privileged EXEC mode.

test interface fastethernet *number*

Syntax Description

number	Port, connector, or interface card number. On a Cisco 4500 or Cisco 4700 series router, specifies the network processor module (NPM) number. The numbers are assigned at the factory at the time of installation or when added to a system and are displayed with the **showinterfaces** command.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command sends pings from the specified interface to itself. Unlike the **ping** command, the **testinterfacefastethernet** command does not require the use of an IP address.

Examples

The following example shows how to test a Fast Ethernet interface on a Cisco 4500 router:

```
Router# test interface fastethernet 0
```

Related Commands

Command	Description
ping (privileged)	Diagnoses basic network connectivity on AppleTalk, CLNS, DECnet, IP, or Novell IPX networks.
ping (user)	Provides simple ping diagnostics of network connectivity.
show interfaces	Displays information about interfaces.

test platform police get

To get the IPv6 internal police rate, use the *test platform police get* command in privileged EXEC mode.

test platform police get

Syntax Description

This command has no arguments or keywords.

Command Default

0 (No rate has been applied.)

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SRD1	The command was introduced on the Cisco 7600 series routers for the ES+ line cards, the SIP-400, and the 7600-ES+ITU-2TG and 7600-ES+ITU-4TG.

Usage Guidelines

Use this command under the exec command of the line card console. It is not visible from the route processor (RP) console.

Examples

The following example shows how to get the IPv6 internal police rate:

```
Router> enable
Router# test platform police get
IPv6 with HBH header is policed at 100000 kbps
```

Related Commands

Command	Description
test platform police set	Sets the IPv6 internal police rate.

test platform debugger rommon

To configure the ROM monitor (ROMMON) variables on a Route Processor (RP) or a Switch Processor (SP), use the **test platform debugger rommon** command in privileged EXEC mode.

test platform debugger rommon[**dump** | **get** *string* | **set** *string* | **unset** *string*]

Syntax Description

dump	Displays all configured ROMMON variables.
get	Reads the specified ROMMON variable.
set	Modifies the specified ROMMON variable.
unset	Unsets the specified ROMMON variable.
string	Name of the specified ROMMON variable.

Command Default

None

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.2(4)S	This command was introduced.

Usage Guidelines

This command is supported on both Route Switch Processor (RSP) and Supervisor Engine (SUP), but works only on the RSP.

Examples

This example shows how to configure a ROMMON variable:

```
Router# test platform debugger rommon dump
Router# test platform debugger rommon unset string
Router# test platform debugger rommon get string
Router# test platform debugger rommon set string
```

test platform police ipv6 disable

To disable the IPv6 internal policer, use the **test platform police ipv6 disable** command in privileged EXEC mode.

test platform police ipv6 disable

Syntax Description

This command has no arguments or keywords.

Command Default

0 (No rate has been applied)

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(3)S1	The command was introduced on the Cisco 7600 series routers for the ES+ line cards, the SIP-400, and the 7600-ES+ITU-2TG and 7600-ES+ITU-4TG.

Usage Guidelines

Use this command under the **exec** command of the line card console. It is not visible from the route processor (RP) console.

Examples

This example shows how to disable the IPv6 internal police rate:

```
Router(config)#test platform police ipv6 disable
```

Related Commands

Command	Description
test platform police ipv6 set	Sets the IPv6 internal police rate.
test platform police ipv6 get	Gets the IPv6 internal police rate.

test platform police set

To set the IPv6 internal police rate, use the *test platform police set* command in privileged EXEC mode. This command does not have a no form.

If you have set a rate limit and wish to cancel it, you will need to use this command to set the rate to 0.

test platform police set rate

Syntax Description

rate	Specifies the internal police rate. The range is from 0 to 100000 kbps.
	• For the SIP-400, you can configure a rate up to, and including 25600 packets per second (PPS).
	• For the ES+ line cards and the 7600-ES+ITU-2TG and 7600-ES+ITU-4TG line cards, you can configure rates of:
	  • 16 Kbps to 2 Mbps; granularity of 16 kbps
	  • 2 Mbps to 100 Mbps; granularity of 64 kbps

Command Default

For ES40 line cards, the default police rate is 12.8 Mbps.

For the SIP-400, the default police rate is 21.36 kpps.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SRD1	The command was introduced on the Cisco 7600 series routers for the ES+ line cards, the SIP-400, and the 7600-ES+ITU-2TG and 7600-ES+ITU-4TG.

Usage Guidelines

Use this command under the EXEC command of the line card console. It is not visible from the route processor (RP) console.

For both the ES+ line cards and the SIP-400, setting the police rate to 0 turns off the policing.

For both the ES+ line cards and the SIP-400, when the policer is set from the the line card console, the setting remains effective even if the line card is moved to another chassis running the Cisco IOS Release 12.2(33)SRD1 (or later) image.

For the SIP-400, IPv6 HBH packets will continue to go through the QoS policing configured on the line card. For ES+ line cards, IPv6 HBH packets will bypass any QoS configured on the line card.

Examples

The following examples shows how to set the IPv6 with HBH header to be policed at 100000 kbps:

```
Router> enable
Router# test platform police set 100000
```

Related Commands

Command	Description
test platform police get	Gets the IPv6 internal police rate.

test satellite satellite mfg link

To force the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT) to show that the backbone link to the hub is up, even when the link is actually down, use the **testsatellitesatellitemfglink** command in privileged EXEC mode.

test satellite satellite *slot/unit* **mfg link** {**force** | **normal**}

Syntax Description

slot	Router chassis slot in which the network module is installed.
unit	Interface number. For NM-1VSAT-GILAT network modules, always use 0.
force	Forces the satellite link to appear to be UP.
normal	Allows the satellite link to display the actual status, UP or DOWN.

Command Default

The actual status (UP or DOWN) of the satellite link is displayed.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.3(14)T	This command was introduced.

Usage Guidelines

Use the **testsatellitesatellitemfglink**command only when instructed by your satellite service provider or a technical support representative.

Examples

The following example shows how to force the NM-1VSAT-GILAT network module to show that the backbone link to the hub is up, even if the link is actually down:

```
Router# test satellite satellite 1/0 mfg link force
```

The following example shows how to allow the NM-1VSAT-GILAT network module to show the actual status (UP or DOWN) of the satellite link:

```
Router# test satellite satellite 1/0 mfg link normal
```

test satellite satellite reset

To reset the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT), use the **testsatellitesatellitereset** command in privileged EXEC mode.

test satellite satellite *slot*/*unit* **reset** [**hard**]

Syntax Description

slot	Router chassis slot in which the network module is installed.
unit	Interface number. For NM-1VSAT-GILAT network modules, always use 0.
hard	Hardware reset. Not available on all routers.

Command Default

Without the **hard** keyword, the command initiates a software reset.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.3(14)T	This command was introduced.

Usage Guidelines

Use the **testsatellitesatellitereset** command only when instructed by your satellite service provider or a technical support representative. You will lose satellite network connectivity while the NM-1VSAT-GILAT network module resets.

We recommend that you first try a software reset. The hardware reset option is not available on all routers.

Examples

The following example shows how to initiate a software reset of the NM-1VSAT-GILAT network module:

```
Router# test satellite satellite 1/0 reset
```

The following example shows how to initiate a hardware reset of the NM-1VSAT-GILAT network module:

```
Router# test satellite satellite 1/0 reset hard
```

test service-module

To perform self-tests on an integrated CSU/DSU serial interface module, such as a 4-wire, 56/64 kbps CSU/DSU, use the **testservice-module** command in privileged EXEC mode.

test service-module commandtest service-module *interface-type interface-number*

Syntax Description

interface-type	Interface type.
interface-number	Interface number.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The following tests are performed on the CSU/DSU:

- ROM checksum test
- RAM test
- EEPROM checksum test
- Flash checksum test
- DTE loopback with an internal pattern test

These self-tests are also performed at power on.

This command cannot be used if a DTE loopback, line loopback, or remote loopback is in progress.

Data transmission is interrupted for 5 seconds when you issue this command. To view the output of the most recent self-tests, use the**showservice-module**command.

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

Examples

The following example shows how to perform a self-test on serial interface 0:

```
Router# test service-module serial 0
SERVICE_MODULE(0): Performing service-module self test
SERVICE_MODULE(0): self test finished: Passed
```

Related Commands

Command	Description
channelized	Clears the interface counters.
clear service-module serial	Resets an integrated CSU/DSU.
show service-module serial	Displays the performance report for an integrated CSU/DSU.

test trunk

To configure the test port on a trunk card, use the **testtrunk** command in privileged EXEC mode.

test trunk stm1 {**drop** | **monitor**} {**tx** | **rx**} {**on** | **off**} **e1** *controller*

Syntax Description

stm1	Specifies the test port on an STM-1 trunk card. This keyword is supported only on the Cisco AS5850 platform.
drop	Specifies drop mode where the existing signal is dropped and the signal from the test port is sent to the controller.
monitor	Specifies monitor mode where the signal from the specified E1 controller is monitored via the test port. The original signal is not disturbed.
tx	Specifies that signal is sent on the transmit line.
rx	Specifies that signal is sent on the receive line.
on	Switches the test port on.
off	Switches the test port off.
e1	Specifies that an E1 controller is to be used for testing.
controller	Slot and port numbers to identify the E1 controller.

Command Default

The test port is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.
12.2(15)T	The **stm-1** keyword was added.

Usage Guidelines

If a controller does not go up, or there are a large number of errors associated with a specific E1 controller, you might be able to determine whether the problem is in the server card or in an external line by using the test port. The test port is located on the front panel of the SDH/STM-1 trunk card.

This command does not have a **no** form because the command itself switches the test port on or off.

To use this command, one E1 controller is selected and the transmit and receive lines can be put into drop or monitor mode. Both drop and monitor modes can be used at the same time on either the transmit or receive lines, but both transmit and receive lines cannot be used in drop or monitor mode at the same time.

Examples

The following example shows how to configure a test port to use drop mode on the receive line of an E1 controller in the second path of an STM-1 trunk card in slot 2 of a Cisco AS5850 chassis:

```
Router# test trunk stm-1 drop rx on E1 2/0.2/1/2
```

threshold

To set the path BER threshold values, configure the **threshold** command in the controller configuration mode. To return to the default value, use the no form of this command.

threshold { *b1-tca* | *b2-tca* | *b3-tca* | *sd-ber* | *sf-ber* *bit-error-rate*

Syntax Description

b1-tca	Enables Bit Error Rate (BER) threshold crossing alerts for B1.
b2-tca	Enables BER threshold crossing alerts for B2.
b3-tca	Enables BER threshold crossing alerts for B3. Configures path threshold.
sd-ber	Enables the threshold of the Signal Degrade (SD) BER that is used to trigger a signal degrade alarm.
sf-ber	Configures the threshold of the Signal Failure (SF) BER that is used to trigger a link state change.
bit-error-rate	Specifies the BER.

Command Default

None

Command Modes

Controller configuration

Command History

Release	Modification
XE 3.18 SP	Support for this command was introduced on NCS 4200 Series.

Usage Guidelines

This command is used to configure line, section, and path threshold.

Examples

The following example shows the configuration of line and section threshold:

```
enable
configure terminal
controller MediaType 0/5/0
mode sonet
controller sonet 0/5/0
sts-1 1
threshold b3-tca 3
end
```

Related Commands

Command	Description
controller sonet	Configures the SONET mode.
show controller sonet	Displays SONET controller configuration.

timeslot

To enable framed mode on a serial interface on a G.703 E1 port adapter, an FSIP, or an E1-G.703/G.704 serial port adapter, use the **timeslot** command in interface configuration mode. To restore the interface to unframed mode, use the **no** form of this command or set the start slot to 0.

timeslot *start-slot stop-slot*
no timeslot

Syntax Description

start-slot	First subframe in the major frame. Valid range is from 1 to 31 and must be less than or equal to the *stop-slot*value.
stop-slot	Last subframe in the major frame. Valid range is from 1 to 31 and must be greater than or equal to the *start-slot*value.

Command Default

The default G.703 E1 interface is not configured for framed mode.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
11.1 CA	This command was modified to include the E1-G.703/G.704 serial port adapter and Cisco 7200 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Framed mode allows you to specify a bandwidth for the interface by designating some of the 32 time slots for data and reserving the others for framing (timing). Unframed mode, also known as clear channel, does not reserve any time slots for framing.

This command applies to Cisco 4000, 7000, 7200, and 7500 series routers. G.703 E1 interfaces have two modes of operation, framed and unframed. When in framed mode, the range from *start-slot* to *stop-slot* gives the number of 64-kbps slots in use. There are thirty-two 64-kbps slots available.

In framed mode, timeslot 16 is not used for data. To use timeslot 16 for data, use the **ts16** interface configuration command.

Examples

The following example shows how to enable framed mode on a serial interface on a G.703 E1 port adapter or an E1-G.703/G.704 port adapter:

```
Router(config
)
# interface serial 3/0
Router(config
```

```
-if)
# timeslot 1-3
```

Related Commands

Command	Description
ts16	Controls the use of timeslot 16 for data on a G.703 E1 interface or on an E1-G703/G.704 serial port adapter.

time-properties persist

To configure the time-properties holdover time, use the **time-properties persist** command in PTP clock configuration mode.

time-properties persist *value*

Syntax Description

value	Time-properties holdover time. Valid values are from 0 to 10000 seconds. The default value is 300 seconds.

Command Default

By default holdover time is 300 seconds.

Command Modes

PTP clock configuration (config-ptp-clk)

Command History

Release	Modification
Cisco IOS XE 3.18.1SP	This command was introduced.

Usage Guidelines

When a master clock is lost, the time properties holdover timer starts. During this period, the time properties flags (currentUtcOffset, currentUtcOffsetValid, leap61, leap59) persist for the holdover timeout period. Once the holdover timer expires, currentUtcOffsetValid, leap59, and leap61 flags are set to false and the currentUtcOffset remains unchanged.

The following example shows how to configure the current UTC offset, leap second event date and offset value:

```
Device(config)# ptp clock boundary domain 0 hybrid
Router(config-ptp-clk)# time-properties persist 600
Router(config-ptp-clk)#utc-offset 45 leap-second "01-01-2017 00:00:00" offset 1
```

Related Commands

Command	Description
utc-offset leap-second offset	Configures the current UTC offset, leap second event date and Offset value (+1 or -1).

tod

To configure the time of day message format used by the 1PPS interface, use the **tod** command in PTP clock port configuration mode. To remove a time of day configuration, use the **no** form of this command.

tod *slot/bay* {**iso8601** | **ubx** | **nmea** | **cisco** | **ntp**} [**delay** *delay-amount*]
no tod *slot/bay* {**iso8601** | **ubx** | **nmea** | **cisco** | **ntp**} [**delay** *delay-amount*]

Syntax Description

slot	Slot of the 1PPS interface.
bay	Bay of the 1PPS interface.
iso8601	Specifies ISO 8601 time of day format.
ubx	Specifies UBX time of day format.
nmea	Specifies NMEA time of day format.
cisco	Specifies Cisco time of day format.
ntp	Specifies NTP time of day format.
delay	(Optional) Specifies a delay between the 1PPS message and the time of day message.
delay-amount	Amount of delay between the 1PPS message and the time of day message, in milliseconds. The range is from 1 to 999.

Command Default

The time of day message format is not configured.

Command Modes

PTP clock port configuration (config-ptp-clk)

Command History

Release	Modification
15.0(1)S	This command was introduced.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

This command applies only to platforms that have 1PPS ports.

Examples

The following example shows how to configure a time of day value:

```
Device> enable
Device# configure terminal
Device(config)# ptp clock ordinary domain 0
Device(config-ptp-clk)# tod 3/0 ntp
Device(config-ptp-clk)# end
```

This example sows the configuration of the time of (ToD) message format for a 1588V2 primary on a Cisco ASR 901 Series Aggregation Services Router:

```
Device> enable
Device# configure terminal
Device(config)# ptp clock ordinary domain 0
Device(config-ptp-clk)# tod 3/0 cisco
Device(config-ptp-clk)# input 1pps 3/3
Device(config-ptp-clk))# clock-port MASTER master
Device(config-ptp-clk)# transport ipv4 unicast interface Gi3/3/1 negotiation
Device(config-ptp-clk)# end
```

Related Commands

Command	Description
input	Enables PTP input clocking using the 1.544 Mhz, 2.048 Mhz, or 10 Mhz timing interface or phase using the 1PPS or RS-422 interface.
output	Enables output of time of day messages using the 1PPS interface.

transceiver type all

To enable the monitoring of all transceivers via the transceiver type configuration mode, use the **transceivertypeall** command in global configuration mode. This command does not have the **no** form.

transceiver type all

Syntax Description

This command has no arguments or keywords.

Command Default

Transceiver type configuration is disabled. If transceiver type configuration is enabled, the default monitoring interval is 600 seconds.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(18)SXE	This command was introduced.
12.2(33)SXH	This command was modified. The **interval** keyword was removed.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.2(2)SNI	This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

You can enter the transceiver type configuration mode using the **transceiver type all** command. You can then monitor the transceiver types and also set the monitoring interval using the **monitoring** command.

Examples

This example shows how to enter in to transceiver type configuration mode and then enable the monitoring for all transceiver types:

```
Router(config)# transceiver type all
Router(config-xcvr-type)# monitoring interval 500
```

Related Commands

Command	Description
monitoring	Enables to monitor the transceiver types and also set the monitoring interval.
snmp-server enable traps transceiver type all	Enables all supported SNMP transceiver traps for all transceiver types.

transmit-buffers backing-store

To buffer short-term traffic bursts that exceed the bandwidth of the output interface, use the **transmit-buffersbacking-store**command in interface configuration mode. To disable this function, use the **no** form of this command.

transmit-buffers backing-store
no transmit-buffers backing-store

Syntax Description

This command has no arguments or keywords.

Command Default

The default is off, unless weighted fair queueing is enabled on the interface. If weighted fair queueing is enabled on the interface, the **transmit-buffersbacking-store** command is enabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced on the Cisco 7500 series router.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If the **transmit-buffersbacking-store** command is enabled and a full hardware transmit queue is encountered, packets are swapped out of the original memory device (MEMD) into a system buffer in DRAM. If the **transmit-buffersbacking-store** command is not enabled and the output hold queue is full, packets are dropped instead of being copied if a full hardware transmit queue is encountered. In both cases, the original MEMD buffer is freed so that it can be reused for other input packets.

To preserve packet order, the router checks the output hold queue and outputs previously queued packets first.

Examples

The following example shows how to enable the **transmit-buffersbacking-store** command on a FDDI interface:

```
Router(config
)
# interface fddi 3/0
Router(config
-if)
# transmit-buffers backing-store
```

Related Commands

Command	Description
fair-queue (WFQ)	Enables WFQ for an interface.

transmit-clock-internal

To enable the internally generated clock on a serial interface on a Cisco 7200 series or Cisco 7500 series router when a DTE does not return a transmit clock, use the**transmit-clock-internal** command in interface configuration mode. To disable the internally generated clock, use the **no** form of this command.

transmit-clock-internal
no transmit-clock-internal

Syntax Description

This command has no arguments or keywords.

Command Default

The internally generated clock is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The following example shows how to enable the internally generated clock on serial interface 3/0 on a Cisco 7200 series or Cisco 7500 series router:

```
Router(config
)
# interface serial 3/0
Router(config
-if)
# transmit-clock-internal
```

transmit-interface

To assign a transmit interface to a receive-only interface, use the **transmit-interface** command in interface configuration mode. To return to normal duplex Ethernet interfaces, use the **no** form of this command.

trtransmit-interface commandansmit-interface *type number*
no transmit-interface

Syntax Description

type	Transmit interface type to be linked with the (current) receive-only interface.
number	Transmit interface number to be linked with the (current) receive-only interface.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Receive-only interfaces are used commonly with microwave Ethernet links.

Examples

The following example specifies Ethernet interface 0 as a simplex Ethernet interface:

```
interface ethernet 1
 ip address 128.9.1.2
 transmit-interface ethernet 0
```

transmitter-delay

To specify a minimum dead-time after transmitting a packet, use the **transmitter-delay**command in interface configuration mode. To restore the default, use the**no**form of this command.

transmitter-delay *delay*
no transmitter-delay

Syntax Description

delay	On the FSIP, high-speed serial interface (HSSI, and) on the IGS router, the minimum number of High-Level Data Link Control (HDLC) flags to be sent between successive packets. On all other serial interfaces and routers, approximate number of microseconds of minimum delay after transmitting a packet. The valid range is from 0 to 131071. Default is 0. For all interfaces using chipset CD2430 , the default is 2.

Command Default

0 flags or microseconds 2 for all interfaces using chipset CD2430

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command is especially useful for serial interfaces that can send back-to-back data packets over serial interfaces faster than some hosts can receive them.

The transmitter delay feature is implemented for the following Token Ring cards: CSC-R16, CSC-R16M, CSC-1R, CSC-2R, and CSC-CTR. For the first four cards, the command syntax is the same as the existing command and specifies the number of microseconds to delay between sending frames that are generated by the router. Transmitter delay for the CSC-CTR uses the same syntax, but specifies a relative time interval to delay between transmission of all frames.

Examples

The following example shows how to specify a delay of 300 microseconds on serial interface 0:

```
Router(config
)
# interface serial 0
Router(config
-if)
# transmitter-delay 300
```

transport-mode

To configure a transport mode, use the **transport-mode**command in interface configuration mode. To return to the default state, use the **no** form of this command.

transport-mode {**lan** | **wan** | **otn bit-transparent** {**opu1e** | **opu2e**}}
no transport-mode {**lan** | **wan** | **otn bit-transparent** {**opu1e** | **opu2e**}}
transport-mode otn *otu4 100G*

Syntax Description

lan	10GBASE-R LAN pass-through mode (10.3125 Gb/s)
wan	10GBASE-W WAN (SONET/SDH) mode (9.95328 Gb/s)
otn	Optical Transport Network (G.709). The following modes are supported under interface OTN: • bit-transparent--XAUI transparently mapped into OTU-2 (11.096 or 11.049 Gb/s) • opu1e--Over OPU1e (11.0491 Gb/s) • opu2e--Over OPU2e (11.0957 Gb/s)
otu4	The encapsulation type

Command Default

LAN

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(33)SRD1	This command was introduced on the Cisco 7600 series router.

Examples

The following example shows how to configure a LAN transport mode:

```
Router(config-if)# transport-mode lan
```

Examples

The following example shows how to configure a LAN transport mode:

```
Router(config-if)# transport-mode otn otu4 100G
```

Related Commands

Command	Description
controller dwdm	Configures a DWDM controller.
g709 fec	Configures the FEC for the DWDM controller.
g709 odu threshold	Configures thresholds for selected ODU BER alarms.
g709 otu threshold	Configures thresholds for selected OTU BER alarms.

Command	Description
no g709 odu report	Disables the logging of selected ODU alarms.
no g709 otu report	Disables the logging of selected OTU alarms.
show controller dwdm	Displays ITU-T G.709 alarms, alerts, and counters.

transport ipv4

To specify IPv4 transport source mode and the transport source interface, use the **transportipv4** command in L3 VPN encapsulation configuration mode. To remove the transport source, use the **no** form of this command.

transport ipv4 [**source** *interface-type interface-number*]
no transport [**ipv4**]

Syntax Description

source	Specifies the IPv4 transport source.
interface-type	(Optional) The source interface type.
interface-number	(Optional) The source interface number.

Command Default

The IPV4 transport source mode and interface are not defined.

Command Modes

L3VPN Encapsulation Configuration (config-l3vpn-encap-ip)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.

Usage Guidelines

The **transportipv4** command specifies IPv4 transport source mode and defines the transport source interface while configuring the L3VPN encapsulation profile. When you use this command, make sure that the specified source address is used as the nexthop in BGP updates advertised by the PE.

Examples

The following example shows how to specify IPv4 transport source mode and the transport source interface:

```
Router(config-l3vpn-encap-ip)# transport ipv4 source loopback 0
```

Related Commands

Command	Description
l3vpn encapsulation ip	Configures the L3VPN encapsulation profile.
protocol gre	Specifies GRE as the tunnel mode and sets the GRE key.
show l3vpn encapsulation ip	Displays the profile health and the underlying tunnel interface.

transport ipv4 (PTP)

To specify the IP version, transmission mode, and interface that a Precision Time Protocol clock port uses to exchange timing packets, use the **transport ipv4** command in PTP clock port configuration mode. To remove a transport configuration, use the **no** form of this command.

transport ipv4 {**unicast** | **multicast** | **multicast-mix**} **interface** *interface-type interface-number* [**negotiation**]
no transport ipv4 {**unicast** | **multicast** | **multicast-mix**} **interface** *interface-type interface-number* [**negotiation**]

Syntax Description

unicast	Configures the clock port to exchange timing packets in unicast mode.
multicast	Configures the clock port to exchange timing packets in multicast mode.
multicast-mix	Configures the clock port to exchange timing packets in multicast-unicast communication mode. In multicast-unicast mode, the clock port sends initial Announce and Sync messages as multicast; if a subordinate device responds with a unicast message, the clock port sends the Delay-Resp message as unicast.
interface	Specifies an interface on the device.
interface-type	The type of the interface.
interface-number	The number of the interface.
negotiation	(Optional) Enables dynamic discovery of subordinate devices and their preferred format for sync interval and announce interval messages.

Command Default

The IP version, transmission mode, and interface are not specified for exchanging timing packets.

Command Modes

PTP clock port configuration (config-ptp-clk)

Command History

Release	Modification
15.0(1)S	This command was introduced.
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

You can configure different transport values for each PTP clock port.

Examples

The following example shows how to use the **transportipv4** command:

```
Device> enable
Device# configure terminal
Device(config)# ptp clock ordinary domain 0
Device(config-ptp-clk)# clock-port masterport master
Device(config-ptp-clk)# transport ipv4 unicast interface top5/2/2
Device(config-ptp-clk)# end
```

Related Commands

Command	Description
clock-port	Specifies the mode of a PTP clock port.

ts16

To control the use of time slot 16 for data on a G.703 E1 interface or on an E1-G.703/G.704 serial port adapter, use the **ts16** command in interface configuration mode. To restore the default, use the **no** form of this command.

ts16
no ts16

Syntax Description

This command has no arguments or keywords.

Command Default

Time slot 16 is used for signaling.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
11.1CA	This command was implemented on the E1-G.703/G.704 serial port adapter and Cisco 7200 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command applies to Cisco 4000, 7000, 7200, and 7500 series routers. By default, time slot 16 is used for signaling. Use this command to configure time slot 16 to be used for data. When in framed mode, in order to get all possible subframes or time slots, you must use the **ts16** command.

Examples

The following example shows how to configure time slot 16 to be used for data on a G.703 E1 interface or an E1-G.703/G.704 serial port adapter:

```
Router(config
-if)
# ts16
```

Related Commands

Command	Description
timeslot	Enables framed mode serial interface on a G.703 E1 port adapter, an FSIP, or an E1-G.703/G.704 serial port adapter.

ttb

To send a trace trail buffer in E3 g832 framing mode, use the **ttb** command in interface configuration mode. To disable the trace, use the **no** form of this command.

ttb {**country** | **rnode** | **serial** | **snode** | **soperator** | **x**} *line*
no ttb {**country** | **rnode** | **serial** | **snode** | **soperator** | **x**} *line*

Syntax Description

country *line*	Two-character country code.
rnode *line*	Receive node code.
serial *line*	M.1400 Serial
snode *line*	Sending Town/Node ID code.
soperator *line*	Sending Operator code.
x *line*	XO

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
12.2S	This command was introduced.
12.2(25)S3	This command was integrated into Cisco IOS Release 12.2(25)S3 to support SPAs on the Cisco 7304 routers.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE to support SPAs on the Cisco 7600 series routers and Catalyst 6500 series switches.
12.0(31)S	This command was integrated into Cisco IOS Release 12.0(31)S to support SPAs on the Cisco 12000 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Use the **ttb** command to attach a header that contains fields to send to a remote device.

Examples

The following example starts a TTB message on the first port on slot 5.

```
Router# configure terminal
Router(config)# int serial 5/0/0
Router(config-if)# ttb country us
Router(config-if)# ttb snode 123
Router(config-if)# ttb rnode rn
Router(config-if)# ttb x 9
Router(config-if)# ttb serial 432
```

Related Commands

Command	Description
show controller serial	Displays controller statistics.

ttl

Use this command to configure static pseudowire OAM class configuration .

ttl *value*

Syntax Description

Syntax Description:

value	TTL value for multi-segment pseudowire OAM data

Command Default

Default value is 1

Command Modes

Global configuration

Command History

Release	Modification
Cisco IOS XE Everest 16.5.1	This command was introduced into the Cisco ASR 920 Routers.

Examples

The following example shows how to configure static pseudowire OAM:

```
enable
configure terminal
pseudowire-static-oam class oam-class1
timeout refresh send 20
ttl 3
end
```

tu-ais

To enable the SDH device to detect the PDH AIS alarm TU-AIS alarms are generated and detected when the TDM circuits go down on the access layer of the network topology or a failure occurs in MPLS domain due to which SAToP connectivity goes down, use the tu-ais command in SONET configuration mode. To disable the TU-AIS alarms, use the no form of this command..

tu-ais

no tu-ais

Syntax Description

Syntax Description

This command has no keywords or arguments.

Command Default

This command is disabled by default; no TU-AIS alarm is sent.

Command Modes

SONET configuration

Command History

Release	Modification
IOS XE Everest 16.6.1	Support for this command was introduced on the Cisco ASR 900 Routers.

Usage Guidelines

The TU-AIS alarms are supported on the OC3 IM in Cisco ASR 903 RSP1 and RSP2 modules according to TU-12 section as defined in ITU-G. 707 (8.3.2). TU-AIS means that all TU-12 (i.e. all 144B) carries all "1" according to ITU-T G.707 (6.2.4.1.3).

Examples

The following example shows the configuration of AIS SHUT:

```
enable
configure terminal
controller sonet 0/5/0
tu-ais
end
```

Related Commands

Command	Description
controller sonet	Configures the SONET mode.
show controller sonet	Displays SONET controller configuration.
show run | se	Displays the TU-AIS alarm configuration.

tug-2

Use this command to configure mode Tributary Unit group type 2 (TUG-2) number that has been mapped to an AU-4.

tug-2 *tug-2 number* **payload** [*VC11* | *VC12*]

Syntax Description

Syntax Description

tug-2 number	The range is from 1 to 7.
payload	Specifies VC11 or VC12 payload.
VC11	TUG-2 payload VC-11 can be configured as VC or T1 and the range is 1 to 4.
VC12	TUG-2 payload VC-12 can be configured as VC or E1 and the range is 1 to 3.

Command Default

None

Command Modes

Controller configuration

Command History

Release	Modification
XE Everest 16.6.1	This command was integrated into the Cisco NCS 4200 Series and Cisco ASR 900 Series.

Usage Guidelines

When you configure mode VC-1x, seven TUG-2 payloads are created. TUG-2 payloads can be of two types, VC-11 and VC-12. Default for TUG-2 payload mode is VC-11.

Examples

```
enable
configure terminal
controller sdh 0/5/0
rate stm4
au-4 1
mode tug-3
tug-3 1
mode vc1x
cem-group 100 unframed
end
```

Related Commands

Command	Description
show running configuration	Verifies TUG-3 configuration.

tug-2 e1

To create E1 controllers for a specified path under the Tributary Unit group type 2 (TUG-2), use the **tug-2e1**command in controller configuration mode.

tug-2 *tug-2-number* **e1** *e1-number*

Syntax Description

tug-2-number	Number, or range of numbers, from 1 to 7. To specify a range of TUG-2 numbers use a dash between the values, for example 1-5. An individual TUG-2 can be specified using a comma between values, for example 2,4. Default is 1.
e-1-number	Number, or range of numbers, from 1 to 3. To specify a range of E1 numbers use a dash between the values, for example 1-3. An individual E1 can be specified using a comma between values, for example 2,3.

Command Default

Default *tug-2-number* value for STM-1 card is 1.

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.

Usage Guidelines

Use the **tug-2e1** command to create an E1 controller with the following name format:

slot/port.path/tug-2-number/e1-number

Up to 21 controllers can be created for one path. Only one path can be selected at a time.

Examples

The following example shows how to configure 15 E1 controllers on the second path of an STM-1 in physical slot number 2 of a Cisco AS5850 chassis:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-4
Router(config-ctrlr-tug3)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 5 e1 3
```

Related Commands

Command	Description
show controller sonet	Displays information about SONET controllers.

tug-2 e1 bert pattern

To send a BER test pattern on an E1 line that has been mapped to a TUG-3, use the **tug-2e1bertpattern**command in configuration controller tug3 mode.

To send a BER test pattern on an E1 line that has been mapped to an AU-3, use the **tug-2e1bertpattern**command in configuration controller au3 mode.

To stop the BER test, use the **no** form of this command.

tug-2 *tug-2 number* **e1** *e1-number* [**bert pattern** *pattern* **interval** *time*]
[**no**] **tug-2** *tug-2 number* **e1** *e1-number* [**bert pattern** *pattern* **interval** *time*]

Syntax Description

tug-2 number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
pattern	• 2^11, pseudorandom test pattern (2048 bits long). • 2^15, pseudorandom O.151 test pattern (32,768 bits long). • 2^20-O153, 2^20-1 O.153 test pattern. • 2^20-QRSS, pseudorandom QRSS O.151 test pattern (1,048,575 bits long).
time	An interval in the range of 1 to14,400 minutes.

Command Default

No BER test is configured.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	Support for this command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 bert pattern command in configuration controller tug3 command mode to send a BERT test on an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 bert pattern command in configuration controller au3 command mode to send a BERT test on an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

To view the test results of a BER test pattern, use the show controller sonet command.

Examples

The following example sends a BER 2^11 pseudorandom pattern through E1 line 1, that has been mapped to a TUG-3 on a Cisco 7500 series router, for five minutes:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 bert pattern 2^11 interval 5
```

The following example sends a BER 2^15 pseudorandom pattern through E1 line 1, that has been mapped to an AU-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch, for ten minutes:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 bert pattern 2^15 interval 10
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-2 e1 channel-group timeslots

To create a logical channel group on an E1 line that has been mapped to a TUG-3 or AU-3, use the **tug-2e1channel-grouptimeslots** command in the appropriate configuration mode. To remove a logical channel group, use no the form of this command.

tug-2 *tug-2-number* **e1** *e1-number* [[**channel-group** *channel-group-number*] [**timeslots** *list-of-timeslots*]]
no tug-2 *tug-2-number* **e1** *e1-number* [[**channel-group** *channel-group-number*] [**timeslots** *list-of-timeslots*]]

Syntax Description

tug-2-number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
channel-group	Defines a logical channel group to be a channelized E1 line.
channel-group-number	(Optional) A number in the range of 0 to 30.
timeslots	(Optional) Creates the time slots that make up the E1 line.
list-of-timeslots	(Optional) A number in the range of 1 to 31 or a combination of subranges within 1 to 31.

Command Default

No channel groups are configured on an E1 line.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	Support for this command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command is supported on the C 10000 router. It is used with the Cisco channelized STM-1 card. Use the tug-2 e1 channel-group timeslots command in configuration controller tug3 command mode to configure a logical channel group on an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 channel-group timeslots command in configuration controller au3 command mode to configure a logical channel group on an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

Examples

The following example configures logical channel group 15 on E1 1, that is mapped to a TUG-3, and assigns channelized time slots 1 to 5 and 20 to 23 on a Cisco 7500 series router:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 channel group 15 timeslots 1-5, 20-23
```

The following example configures logical channel group 10 on E1 1, that is mapped to an AU-3, and assigns channelized time slots 1 to 5 and 20 to 23 on a Cisco 7200 VXR router or a Catalyst 6000 family switch:

```
Router(config)# controller sonet 2/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 channel group 10 timeslots 1-5, 20-23
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.
tug-2 e1 unframed	Creates an unframed (clear channel) logical channel group on an E1 line.
tug-2 e1 framing	Specifies the type of framing used by the E1 lines.

tug-2 e1 clock source

To set the clock source on an E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1clocksource**command in the appropriate configuration mode.

tug-2 *tug-2-number* **e1** *e1-number* **clock source** {**internal** | **line**}

Syntax Description

tug-2-number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
internal	Specifies the PA-MC-STM-1 as the clock source.
line	Specifies the E1 line as the clock source.

Command Default

Clock source is configured from the E1 line.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 clock source command in configuration controller tug3 command mode to configure the clock source of an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 clock source command in configuration controller au3 command mode to configure the clock source of an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

Examples

The following example configures E1 line 1, that has been mapped to an AU-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch, to be the clock source:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 clock source line
```

The following example configures E1 line 1, that has been mapped to a TUG-3 on a Cisco 7500 series router to use the PA-MC-STM-1, as the clock source:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 clock source internal
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-2 e1 framing

To set the type of framing used by an E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1framing**command in appropriate configuration mode. To disable the framing mode, user the no form of this command.

tug-2 *tug-2-number* **e1** *e1-number* **framing** {**crc4** | **no-crc4**}
no tug-2 *tug-2-number* **e1** *e1-number* **framing** {**crc4** | **no-crc4**}

Syntax Description

tug-2-number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
crc4	Specifies 4-bit cyclic redundancy check framing.
no-crc4	Specifies basic framing.

Command Default

Framing format is crc4.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 framing command in configuration controller tug3 command mode to configure the type of framing used by an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 framing command in configuration controller au3 command mode to configure the type of framing used by an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

Examples

The following example configures E1 line 1, that has been mapped to a TUG-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch, to use crc4 framing:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-4
```

```
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 framing crc4
```

The following example configures E1 line 1, that has been mapped to an AU-3 on a Cisco 7500 series router, to use basic framing:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 framing no-crc4
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.
tug-2 e1 unframed	Creates an unframed (clear channel) logical channel group on an E1 line.

tug-2 e1 loopback

To specify a loopback on an E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1loopback**command in appropriate configuration mode. To disable the loopback, use the **no** form of this command.

tug-2 *tug-2-number* **e1** *e1-number* **loopback** {**local** | **network** {**line** | **payload**}}
[**no**] **tug-2** *tug-2-number* **e1** *e1-number* **loopback** {**local** | **network** {**line** | **payload**}}

Syntax Description

tug-2-number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
local	Loops transmitted E1 output back to the router via the internal E1 framer.
network {**line**| **payload**	Sets the loopback toward the network before going through the framer (**line**) or after going through the framer (payload).

Command Default

No loopbacks are set on an E1 line.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR erouters and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

TUG-3 Command Mode

Use the tug-2 e1 loopback command in configuration controller tug3 command mode to specify a loopback for an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

AU-3Command Mode

Use the tug-2 e1 loopback command in configuration controller au3 command mode to specify a loopback for an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

tug-2 e1 loopback network line|path Command

If you configure a loopback to an e1 interface, it will be be looped as configured. However, if a channel group is configured while the loopback interface is still in configuration, the interface driver will ignore the loopback command in the configuration and the serial interface will be activated.

Examples

E1 Line Mapped to an AU-3 Interface

The following example sets E1 line 1 that has been mapped to an AU-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch, into network line loopback:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 loopback network line
```

E1 Line Mapped to a TUG-3 Interface

The following example sets E1 line 1, that has been mapped to a TUG-3 on a Cisco 7500 series router, into local loopback:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 loopback local
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-2 e1 national bits

To set the national reserved bits on an E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1nationalbits**command in appropriate configuration mode.

tug-2 *tug-2-number* **e1** *e1-number* **national bits** *pattern*

Syntax Description

tug-2 -umber	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.
pattern	The national reserved bit pattern is a hexadecimal value in the range 0x0 to 0x1F (hexadecimal) or 0 to 31 (decimal).

Command Default

0x1F

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 national bits command in configuration controller tug3 command mode to configure the national reserved bits for an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 national bits command in configuration controller au3 command mode to configure the national reserved bits for an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

Examples

The following example configures the national reserved bits for E1 line 1, that has been mapped to a TUG-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch, into a 0x0 hexadecimal pattern:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 national bits 0x0
```

The following example configures the national reserved bits for E1 line 1, that has been mapped to an AU-3 on a Cisco 7500 series router, into decimal pattern 0:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 national bits 0
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-2 e1 shutdown

To shut down an individual E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1shutdown**command in appropriate configuration mode. To enable an individual E1 line, use the **no** form of this command.

tug-2 *tug-2-number* **e1** *e1-number* **shutdown**
[**no**] **tug-2** *tug-2 number* **e1** *e1-number* **shutdown**

Syntax Description

tug-2-number	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.

Command Default

E1 lines are not shut down.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 shutdown command in configuration controller tug3 command mode to shut down an individual E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 shutdown command in configuration controller au3 command mode to shut down an individual E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

Examples

The following example shuts down E1 line 1 that has been mapped to an AU-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 shutdown
```

The following example shuts down E1 line 1, that has been mapped to a TUG-3 on a Cisco 7500 series router:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 shutdown
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-2 e1 unframed

To create an E1 unframed (clear channel) logical channel group on an E1 line that has been mapped to a TUG-3 or an AU-3, use the **tug-2e1unframed**command in appropriate configuration mode. To remove a logical channel group, use the **no** form of this command.

tug-2 *tug-2-number* **e1** *e1-number* **unframed**
[**no**] **tug-2** *tug-2-number* **e1** *e1-number* **unframed**

Syntax Description

tug-2 -umber	A number in the range of 1 to 7.
e1-number	A number in the range of 1 to 3.

Command Default

No default behavior or values.

Command Modes

Configuration controller tug3 (for an E1 line mapped to a TUG-3) Configuration controller au3 (for an E1 line mapped to an AU-3)

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(7)E	This command was integrated into Cisco IOS Release 12.1(7)E. Support for this command was added for Cisco 7200 VXR routers and Catalyst 6000 family switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the tug-2 e1 unframed command in configuration controller tug3 command mode to create an unframed (clear channel) logical channel group on an E1 line that has been mapped to a TUG-3 via the aug mapping au-4 command.

Use the tug-2 e1 unframed command in configuration controller au3 command mode to create an unframed (clear channel) logical channel group on an E1 line that has been mapped to an AU-3 via the aug mapping au-3 command.

The channel group number for unframed E1 lines is always 0.

Examples

The following example configures an unframed logical channel group on E1 line 1 that has been mapped to a TUG-3 on a Cisco 7200 VXR router or a Catalyst 6000 family switch:

```
Router(config)# controller sonet 2/0
Router(config-controller)# aug mapping au-4
```

```
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 unframed
```

The following example configures an unframed logical channel group on E1 line 1 that has been mapped to an AU-3 on a Cisco 7500 series router:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-3
Router(config-controller)# au-3 1
Router(config-ctrlr-au3)# tug-2 4 e1 1 unframed
```

Related Commands

Command	Description
aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1.
au-3	Configures a particular AU-3 of an E1 line that has been mapped to an AU-3.
au-4 tug-3	Specifies the AU-4 and TUG-3 number of an E1 line that has been mapped to an AU-4.

tug-3

Use this command to configure mode Tributary Unit group type 3 (TUG-3) number that has been mapped to an AU-4.

tug-3 *tug-3 number*

Syntax Description

Syntax Description

tug-3 number	The range is from 1 to 3.

Command Default

None

Command Modes

Controller configuration

Command History

Release	Modification
XE Everest 16.6.1	This command was integrated into the Cisco NCS 4200 Series and Cisco ASR 900 Series.

Usage Guidelines

An AUG of an STM-1 can be derived from either AU-3s or an AU-4. Use the **aug mapping au-4** configuration controller command to map the AUG to a TUG-3. Configuring the **au-4** command enables you to enter configuration controller tug3 command mode and creates a serial interface.

Examples

```
enable
configure terminal
controller sdh 0/5/0
rate stm4
au-4 1
mode tug-3
tug-3 1
mode t3
cem-group 100 unframed
end
```

Related Commands

Command	Description
show running configuration	Verifies TUG-3 configuration.