Interface Commands

This book describes the basic commands that can be used on different types of interfaces. These commands correspond to the interface configuration tasks included in the Cisco IOS configuration guides. Refer to the configuration guide indicated here for configuration guidelines:

For information about this type of interface . . .	Refer to this publication . . .
General interface	"Interface Configuration Overview" chapter in the *Cisco IOS Interface Configuration Guide*
LAN interface	"Configuring LAN Interfaces" chapter in the *Cisco IOS Interface Configuration Guide*
Serial interface	"Configuring Serial Interfaces" chapter in the *Cisco IOS Interface Configuration Guide*
Logical interface	"Configuring Logical Interfaces" chapter in the *Cisco IOS Interface Configuration Guide*
Cisco Mainframe Channel Connection (CMCC) adapters	"Configuring Cisco Mainframe Channel Connection Adapters" chapter in the *Cisco IOS Bridging and IBM Networking Configuration Guide*
Dialer interface and virtual-access interface	*Cisco IOS Dial Services Configuration Guide and Cisco IOS Dial Technologies Command Reference*
ISDN PRI interface	*Cisco IOS Dial Technologies Configuration Guide* and *Cisco IOS Dial Technologies Command Reference*

Other interface commands, specific to a particular technology area, are described in the technology specific configuration guides. For example, for hardware technical descriptions, and for information about installing the router or access server interfaces, refer to the hardware installation and maintenance publication for your particular product.

aps authenticate

To enable authentication and specify the string that must be present to accept any packet on the out-of-band (OOB) communications channel on a packet-over-SONET (POS) interface, use the **aps authenticate** command in interface configuration mode. To disable authentication, use the **no** form of this command.

    aps authenticate *string*

    no aps authenticate

Syntax Description	*string*	Text that must be present to accept the packet on a protected or working interface. A maximum of eight alphanumeric characters are accepted.

Defaults   Authentication is disabled.

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines   Use the **aps authenticate** command to ensure that only valid packets are accepted on the OOB communications channel.

The **aps authenticate** command must be configured on both the working and protect interfaces.

Examples   The following example enables authentication on POS interface 0 in slot 4:

```
Router# configure terminal
Router(config)# interface pos 4/0/0
Router(config-if)# aps working 1
Router(config-if)# aps authenticate sanjose
Router(config-if)# exit
Router(config)# exit
Router#
```

Related Commands

Command	Description
aps protect	Enables a POS interface as a protect interface.
aps working	Configures a POS interface as a working interface.

aps force

To manually switch the specified circuit to a protect interface, unless a request of equal or higher priority is in effect, use the **aps force** command in interface configuration mode. To cancel the switch, use the **no** form of this command.

aps force *circuit-number*

no aps force *circuit-number*

Syntax Description	*circuit-number*	Number of the circuit to switch to the protect interface.

Defaults   No circuit is switched.

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines   Use the **aps force** command to manually switch the interface to a protect interface when you are not using the **aps revert** command. For example, if you need to change the fiber connection, you can manually force the working interface to switch to the protect interface.

In a one-plus-one (1+1) configuration only, you can use the **aps force 0** command to force traffic from the protect interface back onto the working interface.

The **aps force** command has a higher priority than any of the signal failures or the **aps manual** command.

The **aps force** command is configured only on protect interfaces.

Examples   The following example forces the circuit on POS interface 0 in slot 3 (a protect interface) back onto a working interface:

```
Router# configure terminal
Router(config)# interface pos 3/0/0
Router(config-if)# aps protect 10/30/1/1
Router(config-if)# aps force 1
Router(config-if)# exit
Router(config)# exit
Router#
```

Related Commands

Command	Description
aps manual	Manually switches a circuit to a protect interface.
aps protect	Enables a POS interface as a protect interface.
aps working	Configures a POS interface as a working interface.

aps group

To allow more than one protect and working interface to be supported on a router, use the **aps group** command in interface configuration mode. To remove a group, use the **no** form of this command.

aps group *group-number*

no aps group *group-number*

Syntax Description

group-number	Number of the group.

Defaults

No groups exist.

✎

Note 0 is a valid group number.
The default *group-number* is 0.
The **aps group 0** command does not imply that no groups exist.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

Use the **aps group** command to specify more than one working and protect interfaces on a router, for example, working channel for group 0 and protect channel for group 1 on one router, and working channel for group 1 and protect channel for group 0 on another router.

The **aps group** command must be configured on both the protect and working interfaces.

Examples

The following example configures two working/protect interface pairs. Working interface (3/0/0) is configured in group 10 (the protect interface for this working interface is configured on another router), and protect interface (2/0/1) is configured in group 20:

```
Router# configure terminal
Router(config)# interface ethernet 0/0
Router(config-if)# ip address 10.7.7.6 255.255.255.0
Router(config-if)# exit
Router(config)# interface pos 3/0/0
Router(config-if)# aps group 10
Router(config-if)# aps working 1
Router(config-if)# exit
Router(config)# interface pos 2/0/1
Router(config-if)# aps group 20
Router(config-if)# aps protect 1 10.7.7.7
Router(config-if)# end
```

On the second router, protect interface (4/0/0) is configured in group 10, and working interface (5/0/0) is configured in group 20 (the protect interface for this working interface is configured on another router):

```
Router(config)# interface ethernet 0/0
Router(config-if)# ip address 7.7.7.7 255.255.255.0
Router(config-if)# exit
Router(config)# interface pos 4/0/0
Router(config-if)# aps group 10
Router(config-if)# aps protect 1 7.7.7.6
Router(config-if)# exit
Router(config)# interface pos 5/0/0
Router(config-if)# aps group 20
Router(config-if)# aps working 1
Router(config-if)# exit
Router(config)# end
Router#
```

Related Commands

Command	Description
aps protect	Enables a POS interface as a protect interface.
aps working	Configures a POS interface as a working interface.

aps lockout

To prevent a working interface from switching to a protect interface, use the **aps lockout** command in interface configuration mode. To remove the lockout, use the **no** form of this command.

aps lockout *circuit-number*

no aps lockout *circuit-number*

Syntax Description

circuit-number	Number of the circuit to lock out.

Defaults

No lockout exists.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

The **aps lockout** command is configured only on protect interfaces.

Examples

This example locks out POS interface 3/0/0 (that is, prevents the circuit from switching to a protect interface in the event that the working circuit becomes unavailable):

```
Router# configure terminal
Router(config)# interface pos 3/0/0
Router(config-if)# aps protect 1 10.7.7.7
Router(config-if)# aps lockout 1
Router(config-if)# end
Router#
```

Related Commands

Command	Description
aps protect	Enables a POS interface as a protect interface.
aps working	Configures a POS interface as a working interface.

aps manual

To manually switch a circuit to a protect interface, use the **aps manual** command in interface configuration mode. To cancel the switch, use the **no** form of this command.

> **aps manual** *circuit-number*

> **no aps manual** *circuit-number*

Syntax Description

circuit-number	Number of the circuit to switch to a protect interface.

Defaults No circuit is switched.

Command Modes Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines Use the **aps manual** command to manually switch the interface to a protect interface. For example, you can use this feature when you need to perform maintenance on the working channel. If a protection switch is already up, you can also use the **aps manual** command to revert the communication link back to the working interface before the wait to restore (WTR) time has expired. The WTR time period is set by the **aps revert** command.

In a one-plus-one (1+1) configuration only, you can use the **aps manual 0** command to force traffic from the protect interface back onto the working interface.

The **aps manual** command is a lower priority than any of the signal failures or the **aps force** command.

Examples The following example forces the circuit on POS interface 0 in slot 3 (a working interface) back onto the protect interface:

```
Router# configure terminal
Router(config)# interface pos 3/0/0
Router(config-if)# aps working 1
Router(config-if)# aps manual 1
Router(config-if)# end
Router#
```

Related Commands

Command	Description
aps force	Manually switches the specified circuit to a protect interface, unless a request of equal or higher priority is in effect.
aps protect	Enables a POS interface as a protect interface.

Command	Description
aps revert	Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.
aps working	Configures a POS interface as a working interface.

aps protect

To enable a POS interface as a protect interface, use the **aps protect** command in interface configuration mode. To remove the POS interface as a protect interface, use the **no** form of this command.

aps protect *circuit-number ip-address*

no aps protect *circuit-number ip-address*

Syntax Description

circuit-number	Number of the circuit to enable as a protect interface.
ip-address	IP address of the router that has the working POS interface.

Defaults   No circuit is protected.

Command Modes Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines Use the **aps protect** command to configure the POS interface used by a working interface if the working interface becomes unavailable because of a router failure, degradation or loss of channel signal, or manual intervention.

⚠

Caution Configure the working interface before configuring the protect interface to keep the protect interface from becoming the active circuit and disabling the working circuit when it is finally discovered.

Examples The following example configures circuit 1 on POS interface 5/0/0 as a protect interface for the working interface on the router with the IP address of 10.7.7.7. For information on how to configure the working interface, refer to the **aps working** command.

```
Router# configure terminal
Router(config)# interface pos 5/0/0
Router(config-if)# aps protect 1 10.7.7.7
Router(config-if)# end
Router#
```

Related Commands

Command	Description
aps working	Configures a POS interface as a working interface.

aps revert

To enable automatic switchover from the protect interface to the working interface after the working interface becomes available, use the **aps revert** command in interface configuration mode. To disable automatic switchover, use the **no** form of this command.

> **aps revert** *minutes*

> **no aps revert**

Syntax Description

minutes	Number of minutes until the circuit is switched back to the working interface after the working interface is available.

Defaults   Automatic switchover is disabled.

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines   Use the **aps revert** command to return the circuit to the working interface when it becomes available.

The **aps revert** command is configured only on protect interfaces.

Examples   The following example enables circuit 1 on POS interface 5/0/0 to revert to the working interface after the working interface has been available for 3 minutes:

```
Router# configure terminal
Router(config)# interface pos 5/0/0
Router(config-if)# aps protect 1 10.7.7.7
Router(config-if)# aps revert 3
Router(config-if)# end
Router#
```

Related Commands

Command	Description
aps protect	Enables a POS interface as a protect interface.

aps timers

To change the time between hello packets and the time before the protect interface process declares a working interface router to be down, use the **aps timers** command in interface configuration mode. To return to the default timers, use the **no** form of this command.

aps timers *seconds1 seconds2*

no aps timers

Syntax Description

seconds1	Number of seconds to wait before sending a hello packet (hello timer).
seconds2	Number of seconds to wait to receive a response from a hello packet before the interface is declared down (hold timer).

Defaults

Hello time is 1 second, and hold time is 3 seconds.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

Use the **aps timers** command to control the time between an automatic switchover from the protect interface to the working interface after the working interface becomes available.

Normally, the hold time is greater than or equal to three times the hello time.

The **aps timers** command is configured only on protect interfaces.

Examples

The following example specifies a hello time of 2 seconds and a hold time of 6 seconds on circuit 1 on POS interface 5/0/0:

```
Router# configure terminal
Router(config)# interface pos 5/0/0
Router(config-if)# aps working 1
Router(config-if)# aps timers 2 6
Router(config-if)# end
Router#
```

aps unidirectional

To configure a protect interface for unidirectional mode, use the **aps unidirectional** command in interface configuration mode. To return to the default, bidirectional mode, use the **no** form of this command.

aps unidirectional

no aps unidirectional

Syntax Description   This command has no arguments or keywords.

Defaults   Bidirectional mode

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines   Use the **aps unidirectional** command when you must interoperate with SONET network equipment, Add Drop Multiplexor(s) (ADMs) that supports unidirectional mode.

Note   We recommend bidirectional mode when it is supported by the interconnecting SONET equipment. When the protect interface is configured as unidirectional, the working and protect interfaces must cooperate to switch the transmit and receive SONET channel in a bidirectional fashion. This happens automatically when the SONET network equipment is in bidirectional mode.

The **aps unidirectional** command is configured only on protect interfaces.

Examples   The following example configures POS interface 3/0/0 for unidirectional mode:

```
Router# configure terminal
Router(config)# interface pos 3/0/0
Router(config-if)# aps unidirectional
Router(config-if)# aps protect 1 7.7.7.7
Router(config-if)# end
Router#
```

aps working

To configure a Packet over SONET (POS) interface as a working interface, use the **aps working** command in interface configuration mode. To remove the protect option from the POS interface, use the **no** form of this command.

aps working *circuit-number*

no aps working *circuit-number*

Syntax Description

circuit-number	Circuit number associated with this working interface.

Defaults

No circuit is configured as working.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.

Usage Guidelines

When a working interface becomes unavailable because of a router failure, degradation or loss of channel signal, or manual intervention, the circuit is switched to the protect interface to maintain the connection.

To enable the circuit on the protect interface to switch back to the working interface after the working interface becomes available again, use the **aps revert** command in interface configuration mode.

⚠
Caution Configure the working interface before configuring the protect interface to keep the protect interface from becoming the active circuit and disabling the working circuit when it is finally discovered.

Examples

The following example configures POS interface 0 in slot 4 as a working interface. For information on how to configure the protect interface, refer to the **aps protect** command.

```
Router# configure terminal
Router(config)# interface pos 4/0/0
Router(config-if)# aps working 1
Router(config-if)# end
Router#
```

Related Commands

Command	Description
aps protect	Enables a POS interface as a protect interface.
aps revert	Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.

atm sonet

To set the mode of operation and thus control the type of the ATM cell used for cell-rate decoupling on the SONET physical layer interface module (PLIM), use the **atm sonet** command in interface configuration mode. To restore the default Synchronous Transport Signal level 12, concatenated (STS-12c) operation, use the **no** form of this command.

atm sonet [**stm-4**]

no atm sonet [**stm-4**]

Syntax Description

stm-4	(Optional) Synchronous Digital Hierarchy/Synchronous Transport Signal level 4 (SDH/STM-4) operation (ITU-T specification).

Defaults　　　　STS-12c

Command Modes　　　　Interface configuration

Command History

Release	Modification
11.1 CC	This command was introduced.
11.2 GS	The **stm-4** keyword was added.

Usage Guidelines　　　　Use STM-4 in applications in which SDH framing is required.

Use the default (STS-12c) in applications in which the ATM switch requires "unassigned cells" for rate adaptation. An unassigned cell contains 32 zeros.

Examples　　　　The following example sets the mode of operation to SONET STM-4 on ATM interface 3/0:

```
Router(config)# interface atm 3/0
Router(config-if)# atm sonet stm-4
Router(config-if)# end
Router#
```

auto-polarity

To enable automatic receiver polarity reversal on a hub port connected to an Ethernet interface of a Cisco 2505 or Cisco 2507 router, use the **auto-polarity** command in hub configuration mode. To disable this feature, use the **no** form of this command.

auto-polarity

no auto-polarity

Syntax Description   This command has no arguments or keywords.

Defaults   Enabled

Command Modes   Hub configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines   This command applies to a port on an Ethernet hub only.

Examples   The following example enables automatic receiver polarity reversal on hub 0, ports 1 through 3:

```
Router(config)# hub ethernet 0 1 3
Router(config-hub)# auto-polarity
```

Related Commands

Command	Description
hub	Enables and configures a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router.

bandwidth (interface)

To set and communicate the current bandwidth value for an interface to higher-level protocols, use the **bandwidth** command in interface configuration mode. To restore the default values, use the **no** form of this command.

bandwidth *kilobits*

no bandwidth

Syntax Description		
kilobits	Intended bandwidth, in kilobits per second. For a full bandwidth DS3, enter the value 44736.	

Defaults

Default bandwidth values are set during startup and can be displayed with the **show interface** EXEC command.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Note The **bandwidth** command sets an informational parameter to communicateonly the current bandwidth to the higher-level protocols; you cannot adjust the actual bandwidth of an interface with this command.

For some media, such as Ethernet, the bandwidth is fixed; for other media, such as serial lines, you can change the actual bandwidth by adjusting hardware. For both classes of media, you can use the **bandwidth** configuration command to communicate the current bandwidth to the higher-level protocols.

Interior Gateway Routing Protocol (IGRP) uses the minimum path bandwidth to determine a routing metric. The TCP protocol adjusts initial retransmission parameters on the basis of the apparent bandwidth of the outgoing interface.

At higher bandwidths, the value you configure with the **bandwidth** command is not what is displayed by the **show interface** command. The value shown is that used in IGRP updates and also used in computing load.

Note This is a routing parameter only; it does not affect the physical interface.

Examples

The following example sets the full bandwidth for DS3 transmissions:

```
Router(config)# interface serial 0
Router(config-if)#  bandwidth 44736
```

Related Commands	Command	Description
	show interface	Displays statistics for all interfaces configured on the router.

bert abort

To end a bit error rate testing session, use the **bert abort** command in privileged EXEC mode.

bert abort

Syntax Description   This command has no arguments or keywords.

Command Modes   Privileged EXEC

Command History

Release	Modification
12.0(2)XD	This command was introduced.
12.0(3)T	This command was integrtaed into Cisco IOS Release 12.0(3) T.

Usage Guidelines   Use the **bert abort** command to cancel bit error rate testing on each port of the Cisco AS5300 router.

The bit error rate test (BERT) feature enables you to test the quality of the connected PRI links by direct comparison of a pseudorandom or repetitive test pattern with an identical locally generated test pattern.

Examples   This sample display shows output for the **bert abort** command when no bit error rate test is running:

```
Router# bert abort
Router#
17:53:33: There is no BERT Test running ....
```

This sample display shows output from the **bert abort** command when a bit error rate test is running:

```
Router# bert abort
Do you really want to abort the current BERT [confirm] Y

17:56:56: %BERT-6-BERT_RESULTS: Controller T1 0 Profile default : The Test was
aborted by User
```

Related Commands

Command	Description
bert controller	Starts a bit error rate test for a particular port.
bert pattern	Sets up various bit error rate testing profiles.

bert controller

To start a bit error rate test for a particular port, use the **bert controller** command in privileged EXEC mode.

bert controller [*type-controller*] {[*last-controller*] | **profile** [*number* | **default**]}

Syntax Description

type-controller	(Optional) Use either T1 or E1 depending on the type of facility.
last-controller	(Optional) Last controller number. The valid range is 0 to 7.
profile	Sets the profile numbers for the bit error rate test. The default is 0.
number	(Optional) Numbers of the test profiles to use. The valid range is 0 to 15.
default	(Optional) Executes the default bit error rate test (0).

Defaults   The default **profile** number is 0.

Command Modes   Privileged EXEC

Command History

Release	Modification
12.0(2)XD	This command was introduced.
12.0(3)T	This command was integrated into Cisco IOS Release 12.0(3)T.

Usage Guidelines   Use the **bert controller** command to start a bit error rate test for a particular port on a Cisco AS5300 router.

Quality Testing

The bit error rate test (BERT) feature enables you to test the quality of the connected PRI links by direct comparison of a pseudo-random or repetitive test pattern with an identical locally generated test pattern.

E1 Controllers

The E1 controller cannot be set in loopback mode from the AS5300. For the bert controller command to work correctly with the E1 controller, the controller must be configured as a channel-group or CAS and the line must be configured as a remote loop from the switch side of the link.

Examples   This sample display shows output from the **bert controller** command:

```
Router# bert controller T1 0 profile 0
Press <Return> to start the BERT [confirm] Y

17:55:34: %BERT-6-BERT_START: Starting BERT on Interface 0 with Profile default
Data in current interval (10 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
```

```
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
```

Table 3 describes the significant fields shown in the sample display for the **bert controller** command.

Table 3 **bert controller Field Descriptions**

Field	Description
Data in Current Interval	Shows the current accumulation period, which rolls into the 24 hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15 minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	For alternate mark inversion (AMI)-coded signals, a line code violation is a bipolar violation (BPV) occurrence. Indicates the occurrence of either a BPV or excessive zeros (EXZ) error event.
Path Code Violations	When super frame (SF) (D4) framing is used, a path code violation is a framing error. When Extended Superframe (ESF) framing is used, a path code violation is a CRC-6 error. Indicates a frame-synchronization bit error in the D4 and E1-non-CRC formats, or a CRC error in the ESF and E1-CRC formats.
Slip Secs	Indicates the replication or deletion of the payload bits of a DS1 frame. A slip may be indicated when there is a difference between the timing of a synchronous receiving terminal and the received signal.
Fr Loss Secs	Seconds during which the framing pattern has been lost. Indicates the number of seconds an Out-of-Frame error is detected.
Line Err Secs	A line error second (LES) is a second in which one or more line code violation (LCV or CV-L) errors are detected.
Degraded Mins	Degraded minute is one in which the estimated error rate exceeds 1^{-6} but does not exceed 1^{-3}.
Errored Secs	In ESF and E1-CRC links, an errored second is a second in which one of the following are detected: one or more path code violations; one or more Out-of-Frame defects; one or more controlled slip events; a detected alarm indication signal defect. For D4 and E1-noCRC links, the presence of bipolar violations also triggers an errored second.
Bursty Err Secs	Second with fewer than 320 and more than 1 path coding violation error, no severely errored frame defects, and no detected incoming alarm indication signals (AIS) defects. Controlled slips are not included in this parameter.

Table 3   bert controller Field Descriptions (continued)

Severely Err Secs	For ESF signals, a second with one of the following errors: 320 or more path code violation errors; one or more Out-of-Frame defects; a detected AIS defect.
	For E1-CRC signals, a second with one of the following errors: 832 or more path code violation errors; one or more Out-of-Frame defects.
	For E1-non-CRC signals, a second with 2048 or more line code violations.
	For D4 signals, a count of 1-second intervals with framing errors, or an Out-of-Frame defect, or 1544 line code violations.
Unavail Secs	Count for every second in which an unavailable signal state occurs. This term is used by new standards in place of failed seconds (FS).

Related Commands

Command	Description
bert abort	Aborts a bit error rate testing session.
bert pattern	Sets up various bit error rate testing profiles.

bert pattern

To enable a bit error rate (BER) test pattern on a T1 or E1 line, use the **bert pattern** command in controller configuration mode. To disable a BER test pattern, use the **no** form of this command.

bert pattern {**2^23** | **2^20** | **2^20-QRSS** | **2^15** | **2^11** | **1s** | **0s** | **alt-0-1**} **interval** *time*

no bert pattern {**2^23** | **2^20** | **2^20-QRSS** | **2^15** | **2^11** | **1s** | **0s** | **alt-0-1**} **interval** *time*

Syntax Description

{ **2^23**	**2^20-QRSS**	**2^15**	**2^11**	**1s**	**0s**	**alt-0-1**}	Specifies the length of the repeating BER test pattern. Values are:
	• **2^23**—Pseudorandom 0.151 test pattern that is 8,388,607 bits in length.
	• **2^20**—Pseudo-andom 0.153 test pattern that is 1,048,575 bits in length.
	• **2^20-QRSS**—Pseudorandom quasi-random signal sequence (QRSS) 0.151 test pattern that is 1,048,575 bits in length.
	• **2^15**—Pseudorandom 0.151 test pattern that is 32,768 bits in length.
	• **2^11**—Pseudorandom test pattern that is 2,048 bits in length.
	• **1s**—Repeating pattern of ones (...111...).
	• **0s**—Repeating pattern of zeros (...000...).
	• **alt-0-1**—Repeating pattern of alternating zeros and ones (...01010...).
interval *time*	Specifies the duration of the BER test. The interval can be a value from 1 to 1440 minutes.

Defaults   Disabled

Command Modes   Controller configuration

Command History

Release	Modification
11.1CC	The command was introduced.
12.0(5)XE	The command was enhanced as an ATM interface configuration command.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines   BER testing is supported on each of the T1 or E1 links and is done only over an unframed T1 or E1 signal, run on only one port at a time.

To view the BER test results, use the **show controllers atm** EXEC command. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BER test
- Total bit errors
- Total bits received

When the T1 or E1 line has a BER test running, the line state is DOWN and the status field shows the current/last result of the test.

The **bert pattern** command is not written to NVRAM. This command is only used to test the T1 or E1 line for a short predefined interval and to avoid accidentally saving the command, which could cause the interface not to come up the next time the router reboots.

Examples

In the following example on a Cisco 7200 series router, a BER test pattern of all zeros is run for 30 minutes on T1 line 0 on the port adapter in slot 9:

```
interface atm 9/0
 bert pattern 0s interval 30
```

Related Commands

Command	Description
show controllers atm *slot*/*port*	Displays information about T1/E1 links in Cisco 7100 series routers and Cisco 7200 series routers.
show controllers atm *slot*/*port-adapter*/*port*	Displays information about the T1/E1 links in Cisco 7500 series routers.

bert profile

To set up various bit error rate testing profiles, use the **bert profile** command in privileged EXEC mode. To disable the particular bit error rate test (BERT) profile indicated by profile number, use the **no** form of this command.

> **bert profile** *number* **pattern** *pattern* **threshold** *threshold* **error-injection** *err_inj* **duration** *time*

> **no bert profile** *number* **pattern** *pattern* **threshold** *threshold* **error-injection** *err_inj* **duration** *time*

Syntax Description		
number		BERT profile number. The valid range is 1 to 15. This is the number assigned to a particular set of parameters. If no such profile of the same number exists in the system, a new profile is created with that number; otherwise, an existing set of parameters with that profile number is overwritten by the new profile.
pattern		Pattern that BERT will generate on the line.
pattern		0s—repetitive pattern, all zeroes 1_in_16—*n* repetitive pattern, 1 in 16 1s—*n* repetitive pattern, all ones 211-O.152—*n* pseudo-random pattern, 2^{11} -1 O.152 215-O.15—*n* pseudo-random pattern, 2^{15} -1 O.151 220-O.151QRSS—*n* pseudo-random pattern, 2^{20} -1 O.151 QRSS (This is the default) 220-O.153—*n* pseudo-random pattern, 2^{20} -1 O.153 3_in_24—*n* repetitive pattern, 3 in 24
threshold		Test failure (error) threshold that determines if the BERT on this line passed.
threshold		10^-2—bit error rate of 10^{-2} 10^-3—bit error rate of 10^{-3} 10^-4—bit error rate of 10^{-4} 10^-5—bit error rate of 10^{-5} 10^-6—bit error rate of 10^{-6} (This is the default) 10^-7—bit error rate of 10^{-7} 10^-8—bit error rate of 10^{-8}
error-injection		Error injection rate for bit errors injected into the BERT pattern generated by the chip. The default is none.
err_inj		10^-1—Error injection of 10^{-1} 10^-2—Error injection of 10^{-2} 10^-3—Error injection of 10^{-3} 10^-4—Error injection of 10^{-4} 10^-5—Error injection of 10^{-5} 10^-6—Error injection of 10^{-6} 10^-7—Error injection of 10^{-7} none—No error injection in the data pattern.
duration		Duration, in minutes, for which BERT is to be executed.
time		Duration of BERT, in minutes. The valid range is 1 to 1440. The default is 10.

Defaults   The default profile created internally by the system has parameters that cannot be changed. This profile has been defined so that you can execute BERT on a line without having to configure a new profile. The default profile is displayed when the running configuration is displayed and is not stored in non-volatile random access memory (NVRAM):

bert profile *default* **pattern** *220-0151QRSS* **threshold** *10^-6* **error-injection** *none* **duration** *10*

Command Modes   Privileged EXEC

Command History

Release	Modification
12.0(2)XD	This command was introduced.
12.0(3)T	This command was implemented in Cisco IOS Release 12.0 T.

Usage Guidelines   Use the **bert profile** command to set up bit error rate testing profiles for the Cisco AS5300 router.

The bit error rate test (BERT) feature enables you to test the quality of the connected PRI links by direct comparison of a pseudorandom or repetitive test pattern with an identical locally generated test pattern. A BERT profile is a set of parameters related to a BERT test and is stored as part of the configuration in the NVRAM. You can define up to 15 BERT profiles on the system. By setting up the BERT profiles in this way, you do not have to enter the parameters each time you want to run a BERT—just select the number of the BERT profile you want to run.

Examples   The following example shows a configured BERT profile number 1 to have a 0s test pattern, with a 10^{-2} threshold, no error injection, and a duration of 125 minutes:

```
Router(config)# bert ?
  profile  Profile Number for this BERT configuration
Router(config)# bert profile ?
  <1-15>  BERT Profile Number
Router(config)# bert profile 1 pattern 0s threshold 10^-2 error-injection none duration
125
```

Related Commands

Command	Description
bert abort	Aborts a bit error rate testing session.
bert controller	Starts a bit error rate test for a particular port.

cablelength

To specify the distance of the cable from the routers to the network equipment, use the **cablelength** command in controller configuration mode. To restore the default cable length, use the **no** form of this command.

cablelength *feet*

no cablelength

Syntax Description

feet	Number of feet in the range of 0 to 450. The default values are:

- 224 feet for Channelized T3 Interface Processor (CT3IP)
- 49 feet for PA-T3 and PA-2T3 port adapters

Defaults

224 feet for CT3IP interface processor

49 feet for PA-T3 and PA-2T3 port adapters

Command Modes

Controller configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

The default cable length of 224 feet is used by the CT3IP interface processor.

The default cable length of 49 feet is used by the PA-T3 and PA-2T3port adapters.

Note Although you can specify a cable length from 0 to 450 feet, the hardware only recognizes two ranges: 0 to 49 and 50 to 450. For example, entering 35 feet uses the 0 to 49 range. If you later change the cable length to 40 feet, there is no change because 40 is within the 0 to 49 range. However, if you change the cable length to 50, the 50 to 450 range is used. The actual number you enter is stored in the configuration file.

Examples

The following example sets the cable length for the router to 300 feet:

```
Router(config)# controller t3 9/0/0
Router(config-controller)#  cablelength 300
```

cablelength long

To increase the pulse of a signal at the receiver and decrease the pulse from the transmitter using pulse equalization and line build-out for a T1 cable, use the **cablelength long** command in controller configuration or interface configuration mode. To return the pulse equalization and line build-out values to their default settings, use the **no** form of this command.

cablelength long *dbgain-value dbloss-value*

no cablelength long

Syntax Description		
dbgain-value	Number of decibels (dB) by which the receiver signal is increased. Use one of the following values: • gain26 • gain36 The default is 26 dB.	
dbloss-value	Number of decibels by which the transmit signal is decreased. Use one of the following values: • 0db • -7.5db • -15db • -22.5db The default is 0 dB.	

Defaults Receiver gain of 26 dB and transmitter loss of 0 dB.

Command Modes Controller configuration for the Cisco AS5200 universal access server, Cisco AS5800 universal access server, and Cisco MC3810 multiservice access concentrator.

Interface configuration for the Cisco 2600 and Cisco 3600 series routers.

Command History

Release	Modification
11.2	This command was introduced.
11.3	The following choices were added: **gain26**, **gain36**, **0db**, **-7.5db**, **-15db**, **-22.5db**.
12.0(5)T and 12.0(5)XK	This command was modified to include support as an ATM interface configuration command for the Cisco 2600 and 3600 series routers and as a controller configuration command for the Cisco AS5800 universal access server.

Usage Guidelines

Cisco AS5200 Access Server, Cisco AS5800 Universal Access Server, and Cisco MC3810 Multiservice Access Concentrator

Use this command for configuring the controller T1 interface on the Cisco AS5200 access server, on the Cisco AS5800 universal access server, or on the Cisco MC3810 multiservice access concentrator. The **cablelength long** command is used to configure DS1 links (meaning, to build CSU/DSU links) when the cable length is no longer than 655 feet.

On the Cisco MC3810, this command is supported on T1 controllers only and applies to Voice-over-Frame Relay, Voice-over-ATM, and Voice-over-HDLC.

Note On the Cisco MC3810, you cannot use the **cablelength long** command on a DSX-1 interface only. The **cablelength long** command can be only used on CSU interfaces.

A pulse equalizer regenerates a signal that has been attenuated and filtered by a cable loss. Pulse equalization does not produce a simple gain, but it filters the signal to compensate for complex cable loss. A **gain26** receiver gain compensates for a long cable length equivalent to 26 dB of loss, while a **gain36** compensates for 36 dB of loss.

The lengthening or *building out* of a line is used to control far-end crosstalk. Line build-out attenuates the stronger signal from the customer installation transmitter so that the transmitting and receiving signals have similar amplitudes. A signal difference of less than 7.5 dB is ideal. Line build-out does not produce simple flat loss (also known as *resistive* flat loss). Instead, it simulates a cable loss of 7.5 dB, 15 dB, or 22.5 dB so that the resulting signal is handled properly by the receiving equalizer at the other end.

Cisco 2600 and Cisco 3600 Series Routers

This command is supported on T1 long-haul links only. If you enter the **cablelength long** command on a DSX-1 (short haul) interface, the command is rejected.

The transmit attenuation value is best obtained by experimentation. If the signal received by the far-end equipment is too strong, reduce the transmit level by entering additional attenuation.

Examples

Cisco AS5200 Access Server, Cisco AS5800 Universal Access Server, and Cisco MC3810 Multiservice Access Concentrator

The following example increases the receiver gain by 26 decibels and decreases the transmitting pulse by 7.5 decibels for a long cable on a Cisco AS5200:

```
AS5200(config)# controller t1 0
AS5200(config-controller)# cablelength long gain26 -7.5db
```

The following example increases the receiver gain by 36 decibels and decreases the transmitting pulse by 15 decibels for a long cable on a Cisco AS5800:

```
AS5800(config)# controller t1 0
AS5800(config-controller)# cablelength long gain36 -15db
```

The following example configures the cable length for controller T1 0 on a Cisco MC3810 to a decibel pulse gain of 36 decibels and a decibel pulse rate of –22.5 decibels:

```
MC3810(config)# controller t1 0
MC3810(config-controller)# cablelength long gain36 -22.5db
```

Cisco 2600 and Cisco 3600 Series Routers

On a Cisco 2600 or 3600 series router, the following example specifies a pulse gain of 36 decibels and a decibel pulse rate of -7.5 decibels:

```
Router(config)# interface atm 0/2
Router(config-controller)#  cablelength long gain36 -7.5db
```

Related Commands	Command	Description
	cablelength short	Sets a cable length 655 feet or shorter for a DS1 link.

cablelength short

To set a cable length 655 feet or shorter for a DS1 link on the Cisco MC3810 or Cisco 2600 and 3600 series routers, use the **cablelength short** command in controller configuration or interface configuration mode. This command is supported on T1 controllers only. To delete the **cablelength short** value, use the **no** form of this command. To set cable lengths longer than 655 feet, use the **cablelength long** command.

> **cablelength short** *length*

> **no cablelength short**

Syntax Description	*length*	Specifies a cable length. Use one of the following values to specify this value:

- 133—Specifies a cable length from 0 to 133 feet.
- 266—Specifies a cable length from 134 to 266 feet.
- 399—Specifies a cable length from 267 to 399 feet.
- 533—Specifies a cable length from 400 to 533 feet.
- 655—Specifies a cable length from 534 to 655 feet.

Defaults

The default is 133 feet for the Cisco AS5200 access server, Cisco AS5800 universal access server, and Cisco MC3810 multiservice access concentrator.

There is no default value or behavior for the Cisco 2600 and Cisco 3600 series routers.

Command Modes

Controller configuration for the Cisco AS5200 access server, Cisco AS5800 universal access server, and Cisco MC3810 multiservice access concentrator.

Interface configuration for the Cisco 2600 and Cisco 3600 series routers.

Command History

Release	Modification
11.3(2)AA	This command was introduced.
12.0(5)T and 12.0(5)XK	This command was modified to include support as an ATM interface command for the Cisco 2600 and 3600 series routers and as a controller configuration command for the Cisco AS5800 universal access server.

Usage Guidelines

Cisco AS5200 Access Server, Cisco AS5800 Universal Access Server, and Cisco MC3810 Multiservice Access Concentrator

On the Cisco MC3810, the **cablelength short** command is used to configure DSX-1 links when the cable length is 655 feet or less than 655 feet. On the Cisco MC3810, this command is supported on T1 controllers only.

Note On the Cisco MC3810, you cannot enter the **cablelength short** command on a CSU interface. The **cablelength short** command can be used only on DSX-1 interfaces.

Cisco 2600 and Cisco 3600 Series Routers

This command is supported on T1 short-haul links only. If you enter the **cablelength short** command on a long-haul interface, the command is rejected.

Examples   **Cisco AS5200 Access Server, Cisco AS5800 Universal Access Server, and Cisco MC3810 Multiservice Access Concentrator**

In the following example, the cable length is set to 266 for the T1 controller in slot 0 on dial shelf 0:

```
Router# configure terminal
Router(config)# controller t1 1/1/0
Router(config-controller)# cablelength short 266
router (config-controller)# exit
Router(config)# exit
Router#
```

Cisco 2600 and Cisco 3600 Series Routers

On a Cisco 2600 or 3600 series router, the following example specifies a cable length from 0 to 133 feet:

```
Router(config)# interface atm 0/2
Router(config-if)# cablelength short 133
```

Related Commands

Command	Description
cablelength long	Increases the pulse of a signal at the receiver and decreases the pulse from the sender using pulse equalization and line build-out.

carrier-delay

To set the carrier delay on a serial interface, use the **carrier-delay** command in interface configuration mode. To return to the default carrier delay value, use the **no** form of this command.

carrier-delay [*seconds* |**msec** *milliseconds*]

no carrier-delay [*seconds* | **msec** *milliseconds*]

Syntax Description

seconds	(Optional) Time, in seconds, to wait for the system to change states. Enter an integer in the range 0 to 60. The default is 2 seconds.
msec *milliseconds*	(Optional) msec keyword followed by time in milliseconds.

Defaults

The default carrier delay is 2 seconds; default in milliseconds is 50 milliseconds.

Command Modes

Interface configuration

Command History

Release	Modification
10.1	This command was introduced.

Usage Guidelines

If a link goes down and comes back up before the carrier delay timer expires, the down state is effectively filtered, and the rest of the software on the switch is not aware that a link-down event occurred. Therefore, a large carrier delay timer results in fewer link-up/link-down events being detected. On the other hand, setting the carrier delay time to 0 means that *every* link-up/link-down event is detected.

In most environments a lower carrier delay is better than a higher one. The exact value you choose depends on the nature of the link outages you expect to see in your network and how long you expect those outages to last.

If your data links are subject to short outages, especially if those outages last less than the time it takes for your IP routing to converge, you should set a relatively long carrier delay value to prevent these short outages from causing unnecessary churn in your routing tables.

However, if your outages tend to be longer, you might want to set a shorter carrier delay so that the outages are detected sooner, and the IP route convergence begins and ends sooner.

Examples

The following example changes the carrier delay to 5 seconds:

```
Router(config)# interface serial 0
Router(config-if)# carrier-delay 5
```

channel-group (Fast EtherChannel)

To assign a Fast Ethernet interface to a Fast EtherChannel group, use the **channel-group** command in interface configuration mode. To remove a Fast Ethernet interface from a Fast EtherChannel group, use the **no** form of this command.

channel-group *channel-number*

no channel-group *channel-number*

Syntax Description

channel-number	Port-channel number previously assigned to the port-channel interface when using the **interface port-channel** global configuration command. The range is 1 to 4.

Defaults   No channel group is configured.

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines   Before you assign a Fast Ethernet interface to a Fast EtherChannel group, you must first create a port-channel interface. To create a port-channel interface, use the **interface port-channel** global configuration command.

If the Fast Ethernet interface has an IP address assigned, you must disable it before adding the Fast Ethernet interface to the Fast EtherChannel. To disable an existing IP address on the Fast Ethernet interface, use the **no ip address** command in interface configuration mode.

The Fast EtherChannel feature allows multiple Fast Ethernet point-to-point links to be bundled into one logical link to provide bidirectional bandwidth of up to 800 Mbps. Fast EtherChannel can be configured between Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) or between a Cisco 7500 series router or a Cisco 7000 series router with the RSP7000 and RSP700CI and a Catalyst 5000 switch.

A maximum of four Fast Ethernet interfaces can be added to a Fast EtherChannel group.

⚠
Caution   The port-channel interface is the routed interface. Do not enable Layer 3 addresses on the physical Fast Ethernet interfaces. Do not assign bridge groups on the physical Fast Ethernet interfaces because it creates loops. Also, you must disable spanning tree.

To display information about the Fast EtherChannel, use the **show interfaces port-channel** EXEC command.

Examples   The following example adds Fast Ethernet 1/0 to the Fast EtherChannel group specified by port-channel 1:

```
Router(config)# interface port-channel 1
Router(config-if)# ip address 1.1.1.10 255.255.255.0
Router(config)# interface fastethernet 1/0/0
```

Related Commands

Command	Description
interface port-channel	Specifies a Fast EtherChannel and enters interface configuration mode.
show interfaces port-channel	Displays the information about the Fast EtherChannel on Cisco 7500 series routers and Cisco 7000 series routers with the RSP7000 and RSP7000CI.

clear aim

To clear the data compression Advanced Interface Module (AIM) daughter card registers and reset the hardware, use the **clear aim** command in privileged EXEC mode.

clear aim *element-number*

Syntax Description	*element-number* Number of AIM slot. AIM slots begin with 0.

Command Modes   Privileged EXEC

Command History

Release	Modification
12.0(1)T	This command was introduced.

Usage Guidelines   The **clear aim** command is used to reset the data compression AIM hardware. This command is used if the compression Advanced Interface Module (CAIM) hardware becomes "stuck" or hangs for some reason. The CAIM registers are cleared, and the hardware is reset upon execution. All compression history is lost when the CAIM is reset.

This command is supported only on Cisco 2600 series routers.

Examples   The following example shows how to use the **clear aim** command. This command will reset the hardware, flushing the buffers and history for all compression tasks currently under operation:

```
Router# clear aim 0
Router#
1w0d: %CAIM-6-SHUTDOWN: CompressionAim0 shutting down
1w0d: %CAIM-6-STARTUP: CompressionAim0 starting up
```

Related Commands

Command	Description
show pci aim	Displays the IDPROM contents for each AIM board in the Cisco 2600 series routers.
test aim eeprom	Tests the data compression AIM after it is installed in a Cisco 2600 series router.

clear controller

To reset the T1 or E1 controller, use the **clear controller** command in EXEC mode.

Cisco 7200 Series and Cisco 7500 Series Routers

> **clear controller** {**t1** | **e1**} *slot*/*port*

Cisco AS5200 Series and Cisco AS5300 Series Routers

> **clear controller** {**t1** | **e1**} *number*

Syntax Description		
t1	T1 controller.	
e1	E1 controller.	
slot/*port*	Backplane slot number and port number on the interface. See your hardware installation manual for the specific slot and port numbers.	
number	Network interface module (NIM) number, in the range 0 through 2.	

Command Modes   EXEC

Command History	Release	Modification
	10.1	This command was introduced.

Examples   The following example resets the T1 controller at slot 4, port 0 on a Cisco 7500 series router:

```
Router# clear controller t1 4/0
```

The following example resets the E1 controller at NIM 0:

```
Router# clear controller e1 0
```

Related Commands	Command	Description
	controller	Configures a T1 or E1 controller and enters controller configuration mode.

clear controller lex

To reboot the LAN Extender chassis and restart its operating software, use the **clear controller lex** command in privileged EXEC mode.

clear controller lex *number* [**prom**]

Cisco 7500 Series

clear controller lex *slot*/*port* [**prom**]

Cisco 7200 Series and 7500 Series with a Packet over SONET Interface Processor

clear controller lex [*type*] *slot*/*port*

Cisco 7500 Series with Ports on VIP Cards

clear controller lex [*type*] *slot*/*port-adapter*/*port*

Syntax Description

number	Number of the LAN Extender interface corresponding to the LAN Extender to be rebooted.
prom	(Optional) Forces a reload of the PROM image, regardless of any Flash image.
slot	Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
port	Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
type	(Optional) Specifies the interface type. See Table 4 under the **clear counters** command for keywords.
port-adapter	Number of the port adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.

Command Modes   Privileged EXEC

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines   The **clear controller lex** command halts operation of the LAN Extender and performs a cold restart.

Without the **prom** keyword, if an image exists in Flash memory, and that image has a newer software version than the PROM image, and that image has a valid checksum, then this command runs the Flash image. If any one of these three conditions is not met, this command reloads the PROM image.

With the **prom** keyword, this command reloads the PROM image, regardless of any Flash image.

Examples   The following example halts operation of the LAN Extender bound to LAN Extender interface 2 and causes the LAN Extender to perform a cold restart from Flash memory:

```
Router# clear controller lex 2
reload remote lex controller? [confirm] yes
```

The following example halts operation of the LAN Extender bound to LAN Extender interface 2 and causes the LAN Extender to perform a cold restart from PROM:

```
Router# clear controller lex 2 prom
reload remote lex controller? [confirm] yes
```

clear counters

To clear the interface counters, use the **clear counters** command in user EXEC mode.

clear counters [*type number*]

Cisco 4000 Series or Cisco 7500 Series with a LAN Extender Interface

clear counters [*type slot*/*port*] [**ethernet** | **serial**]

Cisco 7200 Series and 7500 Series with a Packet over SONET Interface Processor

clear counters [*type*] *slot*/*port*

Cisco 7500 Series with Ports on VIP Cards

clear counters [*type*] *slot*/*port-adapter*/*port*

Syntax Description		
	type	(Optional) Specifies the interface type; one of the keywords listed in Table 4.
	number	(Optional) Specifies the interface counter displayed with the **show interfaces** command.
	ethernet	(Optional) If the *type* is **lex**, you can clear the interface counters on the Ethernet interface.
	serial	(Optional) If the *type* is **lex**, you can clear the interface counters on the serial interface.
	slot	Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
	port	Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
	port-adapter	Number of the port adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.

Command Modes EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	11.2 F	The **virtual-access** keyword was added.
	11.3	The following keywords were added or modified:
		• **vg-anylan**
		• **posi** keyword changed to **pos**

Usage Guidelines   This command clears all the current interface counters from the interface unless the optional arguments
type and *number* are specified to clear only a specific interface type (serial, Ethernet, Token Ring, and
so on). Table 4 lists the command keywords and their descriptions.

> **Note**   This command does not clear counters retrieved using Simple Network Management Protocol
> (SNMP), but only those seen with the **show interface** EXEC command.

Table 4   clear counters Interface Type Keywords

Keyword	Interface Type
async	Asynchronous interface
bri	ISDN BRI
dialer	Dialer interface
ethernet	Ethernet interface
fast-ethernet	Fast Ethernet interface
fddi	FDDI
hssi	High-Speed Serial Interface (HSSI)
lex	LAN Extender interface
line	Terminal line
loopback	Loopback interface
null	Null interface
port-channel	Port channel interface
pos	Packet OC-3 interface
serial	Synchronous serial interface
switch	Switch interface
tokenring	Token Ring interface
tunnel	Tunnel interface (IEEE 02.5)
vg-anylan	100VG-AnyLAN port adapter
virtual-access	Virtual-access interface (See Cisco IOS Dial Technologies Command Referece for details on virtual templates.)
virtual-template	Virtual-template interface (See Cisco IOS Dial Technologies Command Referece for details on virtual templates.)
virtual-tokenring	Virtual token ring interface

Examples   The following example clears all interface counters:

```
Router# clear counters
```

The following example clears the Packet OC-3 interface counters on a POSIP card in slot 1 on a
Cisco 7500 series router:

```
Router# clear counters pos 1/0
```

The following example clears the interface counters on a Fast EtherChannel interface.

```
Router# clear counter port-channel 1
Clear "show interface" counters on all interfaces [confirm] Y
%CLEAR-5-COUNTERS: Clear counter on all interfaces by console 1
```

Related Commands	**Command**	**Description**
	show interfaces	Displays the statistical information specific to a serial interface.
	show interfaces port-channel	Displays the information about the Fast EtherChannel on Cisco 7500 series routers and Cisco 7000 series routers with the RSP7000 and RSP7000CI.

clear hub

To reset and reinitialize the hub hardware connected to an interface of a Cisco 2505 or Cisco 2507 router, use the **clear hub** command in EXEC mode.

clear hub ethernet *number*

Syntax Description

ethernet	Hub in front of an Ethernet interface.
number	Hub number to clear, starting with 0. Because there is only one hub, this number is 0.

Command Modes   EXEC

Command History

Release	Modification
10.3	This command was introduced.

Examples   The following example clears hub 0:

```
Router# clear hub ethernet 0
```

Related Commands

Command	Description
hub	Enables and configures a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router.

clear hub counters

To set to zero the hub counters on an interface of a Cisco 2505 or Cisco 2507 router, use the **clear hub counters** command in EXEC mode.

clear hub counters [**ether** *number* [*port* [*end-port*]]]

Syntax Descriptionn		
ether	(Optional) Hub in front of an Ethernet interface.	
number	(Optional) Hub number for which to clear counters. Because there is currently only one hub, this number is 0. If you specify the keyword **ether**, you must specify the *number*.	
port	(Optional) Port number on the hub. On the Cisco 2505 router, port numbers range from 1 to 8. On the Cisco 2507 router, port numbers range from 1 to 16. If a second port number follows, this port number indicates the beginning of a port range. If you do not specify a port number, counters for all ports are cleared.	
end-port	(Optional) Ending port number of a range.	

Command Modes EXEC

Command History

Release	Modification
10.3	This command was introduced.

Examples

The following example clears the counters displayed in a **show hub** command for all ports on hub 0:

```
Router# clear hub counters ether 0
```

Related Commands

Command	Description
show hub	Displays information about the hub (repeater) on an Ethernet interface of a Cisco 2505 or Cisco 2507 router.

clear interface

To reset the hardware logic on an interface, use the **clear interface** command in EXEC mode.

> **clear interface** *type number* [*name-tag*]

Cisco 7200 Series and Cisco 7500 Series with a Packet OC-3 Interface Processor

> **clear interface** *type slot*/*port*

Cisco 7500 Series with Ports on VIP Cards

> **clear interface** *type slot*/*port-adapter*/*port*

Cisco 7500 Series

> **clear interface** *type slot*/*port* [**:***channel-group*]

Cisco 7500 Series with a CT3IP

> **clear interface** *type slot*/*port-adapter*/*port* [**:***t1-channel*]

Syntax Description

type	Interface type; it is one of the keywords listed in Table 5.
number	Port, connector, or interface card number.
name-tag	(Optional) Logic name to identify the server configuration so that multiple entries of server configuration can be entered.
	This optional argument is for use with the RLM feature.
slot	Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
port	Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
port-adapter	Number of the port adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.
:_channel-group_	(Optional) On Cisco 7500 series routers supporting channelized T1, specifies the channel from 0 to 23. This number is preceded by a colon.
:_t1-channel_	(Optional) For the CT3IP, the T1 channel is a number between 1 and 28.
	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.

Command Modes   EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	11.3	The following keywords were added or modified: • **vg-anylan** • **posi** keyword changed to **pos**
	12.0(3)T	The following optional argument was added for the RLM feature: • *name-tag*

Usage Guidelines Under normal circumstances, you do not need to clear the hardware logic on interfaces.

This command clears all the current interface hardware logic unless the optional arguments *type* and *number* are specified to clear only a specific interface type (serial, Ethernet, Token Ring, and so on). Table 5 lists the command keywords and their descriptions.

Table 5 clear interface Type Keywords

Keyword	Interface Type
async	Async interface
atm	ATM interface
bri	ISDN BRI
ethernet	Ethernet interface
fddi	FDDI
hssi	High-Speed Serial Interface (HSSI)
loopback	Loopback interface
null	Null interface
port-channel	Port channel interface
pos	Packet OC-3 Interface Processor
serial	Synchronous serial interface
switch	Switch interface
tokenring	Token Ring interface
tunnel	Tunnel interface
vg-anylan	100VG-AnyLAN port adapter

Examples The following example resets the interface logic on HSSI interface 1:

```
Router# clear interface hssi 1
```

The following example resets the interface logic on Packet OC-3 interface 0 on the POSIP in slot 1:

```
Router# clear interface pos 1/0
```

The following example resets the interface logic on T1 0 on the CT3IP in slot 9:

```
Router# clear interface serial 9/0/0:0
```

The following example resets the interface logic on Fast Etherchannel interface 1:

```
Router# clear interface port-channel 1
```

The following example demonstrates the use of the **clear interface** command with the RLM feature:

```
Router# clear interface loopback 1

Router#
02:48:52: rlm 1: [State_Up, rx ACTIVE_LINK_BROKEN] over link [10.1.1.1(Loopback1),
10.1.4.1]
02:48:52: rlm 1: link [10.1.1.2(Loopback2), 10.1.4.2] requests activation
02:48:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.4.1] is deactivated
02:48:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.4.1] = socket[10.1.1.1, 10.1.4.1]
02:48:52: rlm 1: [State_Recover, rx USER_SOCKET_OPENED] over link [10.1.1.1(Loopback1),
10.1.4.1] for user RLM_MGR
02:48:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.4.1] is opened
02:48:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.5.1] = socket[10.1.1.1, 10.1.5.1]
02:48:52: rlm 1: [State_Recover, rx USER_SOCKET_OPENED] over link [10.1.1.1(Loopback1),
10.1.5.1] for user RLM_MGR
02:48:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.5.1] is opened
02:48:52: rlm 1: [State_Recover, rx START_ACK] over link [10.1.1.2(Loopback2), 10.1.4.2]
02:48:52: rlm 1: link [10.1.1.2(Loopback2), 10.1.4.2] is activated
02:48:52: rlm 1: [State_Up, rx LINK_OPENED] over link [10.1.1.1(Loopback1), 10.1.4.1]

Router# show rlm group 1 status
RLM Group 1 Status
 User/Port: RLM_MGR/3000
 Link State: Up          Last Link Status Reported: Up_Recovered
 Next tx TID: 4          Last rx TID: 0
 Server Link Group[r1-server]:
  link [10.1.1.1(Loopback1), 10.1.4.1] = socket[standby, 10.1.1.1, 10.1.4.1]
  link [10.1.1.2(Loopback2), 10.1.4.2] = socket[active, 10.1.1.2, 10.1.4.2]
 Server Link Group[r2-server]:
  link [10.1.1.1(Loopback1), 10.1.5.1] = socket[opening, 10.1.1.1, 10.1.5.1]
  link [10.1.1.2(Loopback2), 10.1.5.2] = socket[opening, 10.1.1.2, 10.1.5.2]

Router#
Router#
02:49:52: rlm 1: [State_Up, rx UP_RECOVERED_MIN_TIMEOUT]
02:49:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.4.1] requests activation
02:49:52: rlm 1: [State_Switch, rx SWITCH_ACK] over link [10.1.1.1(Loopback1), 10.1.4.1]
02:49:52: rlm 1: link [10.1.1.2(Loopback2), 10.1.4.2] is deactivated
02:49:52: rlm 1: link [10.1.1.1(Loopback1), 10.1.4.1] is activated
```

Related Commands	Command	Description
	interface	Defines the IP addresses of the server, configures an interface type, and enters interface configuration mode.
	shutdown (RLM)	Shuts down all of the links under the RLM group.
	show rlm group	Displays the status of the RLM group

clear interface fastethernet

To reset the controller for a specified Fast Ethernet interface, use the **clear interface fastethernet** command in privileged EXEC mode.

Cisco 4500 and 4700 series

> **clear interface fastethernet** *number*

Cisco 7200 and 7500 series

> **clear interface fastethernet** *slot*/*port*

Cisco 7500 series

> **clear interface fastethernet** *slot*/*port-adapter*/*port*

Syntax Description		
	number	Port, connector, or interface card number. On a Cisco 4500 or Cisco 4700 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.
	slot	Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
	port	Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
	port-adapter	Number of the port-adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.

Command Modes   Privileged EXEC

Command History	Release	Modification
	11.2	This command was introduced.

Examples   The following example resets the controller for the Fast Ethernet 0 interface on a Cisco 4500:

```
Router# clear interface fastethernet 0
```

The following example resets the controller for the Fast Ethernet interface located in slot 1 port 0 on a Cisco 7200 series routers or Cisco 7500 series routers:

```
Router# clear interface fastethernet 1/0
```

The following example resets the controller for the Fast Ethernet interface located in slot 1 port adapter 0 port 0 on a Cisco 7500 series routers:

```
Router# clear interface fastethernet 1/0/0
```

clear interface serial

To reset the statistical information specific to a serial interface, use the **clear interface serial** command in user EXEC mode.

clear interface serial *dial-shelf*/*slot*/*t3-port***:***t1-num***:***chan-group*

Syntax Description

dial-shelf	Dial shelf chassis in the Cisco AS5800 access server containing the CT3 interface card.
slot	Location of the CT3 interface card in the dial shelf chassis.
t3-port	T3 port number. The only valid value is 0.
:*t1-num*	T1 timeslot in the T3 line. The value can be from 1 to 28.
:*chan-group*	Channel group identifier.

Command Modes   EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines   The **clear interface serial** command clears the interface hardware. To reset the counters for an interface, use the **clear counters** command with the **serial** keyword specified. To confirm at the prompt, use the **show interfaces serial** command.

Examples   The following example clears the interface hardware, disconnecting any active lines:

```
Router# clear interface serial 1/4/0:2:23
Router#
```

Related Commands

Command	Description
clear counters	Clears the interface counters.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show interfaces serial	Displays information about a serial interface.

clear service-module serial

To reset an integrated CSU/DSU, use the **clear service-module serial** command in privileged EXEC configuration mode.

>**clear service-module serial** *number*

Syntax Description

number	Number of the serial interface.

Command Modes   Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines   Use this command only in severe circumstances (for example, when the router is not responding to a CSU/DSU configuration command).

This command terminates all DTE and line loopbacks that are locally or remotely configured. It also interrupts data transmission through the router for up to 15 seconds. The software performs an automatic software reset in case of two consecutive configuration failures.

The CSU/DSU module is not reset with the **clear interface** command.

⚠
Caution   If you experience technical difficulties with your router and intend to contact customer support, refrain from using this command. This command erases the router's past CSU/DSU performance statistics. To clear only the CSU/DSU performance statistics, issue the **clear counters** command.

Examples   The following example resets the CSU/DSU on a router:

```
Router# clear service-module serial 0
Router#
```

Related Commands

Command	Description
clear counters	Clears the interface counters.
test service-module	Performs self-tests on an integrated CSU/DSU serial interface module, such as a 4-wire, 56/64-kbps CSU/DSU.

clock rate

To configure the clock rate for the hardware connections on serial interfaces such as network interface modules (NIMs) and interface processors to an acceptable bit rate, use the **clock rate** command in interface configuration mode. To remove the clock rate if you change the interface from a DCE to a DTE device, use the **no** form of this command. Using the **no** form of this command on a DCE interface sets the clock rate to the hardware-dependent default value.

clock rate *bps*

no clock rate

Syntax Description	*bps*	Desired clock rate in bits per second: 1200, 2400, 4800, 9600, 19200, 38400, 56000, 64000, 72000, 125000, 148000, 250000, 500000, 800000, 1000000, 1300000, 2000000, 4000000, or 8000000.
		For the synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+), a nonstandard clock rate can be used. You can enter any value from 300 to 8000000 bps. The clock rate you enter is rounded (adjusted), if necessary, to the nearest value your hardware can support except for the following standard rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 64000, 128000, or 2015232.
		The default is no clock rate configured.

Defaults   No clock rate is configured.

Command Modes   Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.
	11.3	This command was modified to include nonstandard clock rates for the PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+ synchronous serial port adapters.

Usage Guidelines   **Cable Length**

Be aware that the fastest speeds might not work if your cable is too long, and that speeds faster than 148,000 bits per second are too fast for EIA/TIA-232 signaling. It is recommended that you only use the synchronous serial EIA/TIA-232 signal at speeds up to 64,000 bits per second. To permit a faster speed, use EIA/TIA-449 or V.35.

Synchronous Serial Port Adapters

For the synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) on Cisco 7200 series routers, and on second-generation Versatile Interface Processors (VIP2s) in Cisco 7500 series routers, the clock rate you enter is rounded (if needed) to the nearest value that your hardware can support. To display the clock rate value for the port adapter, use the **more system:running-config** command.

If you plan to netboot your router over a synchronous serial port adapter interface and have a boot image prior to Cisco IOS Release 11.1(9)CA that does not support nonstandard (rounded) clock rates for the port adapters, you must use one of the following standard clock rates:

- 1200
- 2400
- 4800
- 9600
- 19200
- 38400
- 56000
- 64000

Examples   The following example sets the clock rate on the first serial interface to 64,000 bits per second:

```
Router(config)# interface serial 0
Router(config-if)# clock rate 64000
```

The following example sets the clock rate on a synchronous serial port adapter in slot 5, port 0 to 1234567. In this example, the clock rate is adjusted to 1151526 bps.

```
Router(config)# interface serial 5/0
Router(config-if)# clock rate 1234567
%clock rate rounded to nearest value that your hardware can support.
%Use Exec Command 'more system:running-config' to see the value rounded to.
```

The following example configures serial interface 5/0 with a clock rate that is rounded to the nearest value that is supported by the hardware:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 5/0
Router(config-if)# clock rate 1234567
%clock rate rounded to nearest value that your hardware can support.
%Use Exec Command 'more system:running-config' to see the value rounded to.
Router(config-if)# exit
Router(config)#
```

The following example shows how to determine the exact clock rate that the serial interface was rounded to using the **more system:running-config** command. This example shows only the relevant information displayed by the **more system:running-config** command; other information was omitted.

```
Router# more system:running-config
Building configuration...
...
!
interface Serial5/0
 no ip address
 clock rate 1151526
!
...
```

clock source

To configure the clock source of a DS1 link, enter the **clock source** command in interface configuration, controller configuration, or ATM interface configuration mode. To restore the default **line** setting, use the **no** form of this command.

clock source {**line** | **internal** | **loop-timed**}

no clock source

Syntax Description	

line	Specifies that the T1/E1 link uses the recovered clock from the line. This is the default.
internal	Specifies that the T1/E1 link uses the internal clock from the interface.
loop-timed	Specifies that the T1/E1 interface takes the clock from the Rx (line) and uses it for Tx.

Defaults   The default value is **line**.

Command Modes   Interface configuration

Controller configuration for the Cisco MC3810 multiservice access concentrator.

ATM interface configuration for the Cisco 2600 and 3600 series routers.

Command History

Release	Modification
10.3	This command was introduced.
11.1 CA	This command was modified to support the E1-G.703/G.704 serial port adapter, PA-E3 serial port adapters, and Cisco 7200 series routers.
11.3 MA	This command was introduced as a controller configuration command for the Cisco MC3810.
12.0(5)T and 12.0(5)XK	The command was introduced as an ATM interface configuration command for the Cisco 2600 and 3600 series routers.

Usage Guidelines   This command sets clocking for individual T1/E1 links.

Make sure that you specify the clock source correctly for each link, even if you are planning to specify that a certain link will provide clocking for all the links in an IMA group. Because links may be taken in and out of service, requiring that the system select another link for common clocking, any link in an IMA group may provide the common clock.

If the ATM interface is part of an IMA group, you can use the **loop-timed** keyword to specify that the clock source is the same as the IMA group clock source.

Examples   On a Cisco 2600 or 3600 series router, the following example specifies an internal clock source for the link:

IR-54

```
Router(config)# interface atm 0/2
Router(config-if)# clock source internal
```

Related Commands	Command	Description
	ima clock-mode	Sets the transmit clock mode for an ATM IMA group.

clock source (AS5200)

To select the clock source for the time-division multiplexing (TDM) bus in a Cisco AS5200 access server, use the **clock source** command in interface configuration mode. To restore the clock source to its default setting, use the **no** form of this command.

clock source {**line** {**primary** | **secondary**} | **internal**}

no clock source line {**primary** | **secondary**}

Syntax Description

line	Clock source on the active line.
primary	Primary TDM clock source.
secondary	Secondary TDM clock source.
internal	Selects the free running clock (also known as internal clock) as the clock source.

Defaults

The primary TDM clock source is from the T1 0 controller.

The secondary TDM clock source is from the T1 1 controller.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

To use the clocking coming in from a T1 line, configure the **clock source line primary** command on the T1 interface that has the most reliable clocking. Configure the **clock source line secondary** command on the T1 interface that has the next best known clocking. With this configuration, the primary line clocking is backed up to the secondary line if the primary clocking shuts down.

Examples

The following example configures the Cisco AS5200 access server to use T1 controller 0 as the primary clock source and T1 controller 1 as the secondary clock source:

```
Router(config)# controller t1 0
Router(config-controller)# clock source line primary
Router(config)# controller t1 1
Router(config-controller)# clock source line secondary
```

clock source (controller)

To set the T1-line clock source for the Multichannel Interface Processor (MIP) in the Cisco 7200 series and Cisco 7500 series, the NPM in the Cisco 4000 series, a T3 interface, or a PA-T3 serial port adapter, use the **clock source** command in controller configuration mode. To restore the clock source to its default setting, use the **no** form of this command.

clock source {**line** {**primary** | **secondary**} | **internal**}

no clock source

Syntax Description

line	Specifies that the interface will clock its transmitted data from a clock recovered from the line's receive data stream. This is the default.
primary	Specifies the source of primary line clocking. The default primary TDM clock source is from the T0 controller.
secondary	Specifies the source of secondary line clocking. The default secondary TDM clock source is from the T1 controller.
internal	Specifies that the interface will clock its transmitted data from its internal clock.

Defaults

The default primary TDM clock source is from the T0 controller.

The default secondary TDM clock source is from the T1 controller.

The default clock for the interface's transmitted data is from a clock recovered from the line's receive data stream from the PA-T3 serial port adapter.

Command Modes

Controller configuration

Command History

Release	Modification
10.3	This command was introduced.
11.1 CA	This command was modified to include the T3 serial port adapter and PA-T3 serial port adapter.

Usage Guidelines

This command applies to a Cisco 4000, Cisco 7000 series, Cisco 7200 series, or Cisco 7500 series router. A T3 interface on a PA-T3 serial port adapter can clock its transmitted data either from its internal clock or from a clock recovered from the line's receive data stream.

To use the clocking coming in from a T1 line, configure the **clock source line primary** command on the controller that has the most reliable clocking. Configure the **clock source line secondary** command on the controller that has the next best known clocking. With this configuration, the primary line clocking is backed up to the secondary line if the primary clocking shuts down.

Examples

The following example configures the Cisco AS5200 to use the T0 controller as the primary clocking source and the T1 controller as the secondary clocking source:

```
AS5200(config)# controller t1 0
AS5200(config-if)# clock source line primary
AS5200(config-if)# exit
AS5200(config)# controller t1 1
AS5200(config-if)# clock source line secondary
```

The following example specifies the T3 interface to clock its transmitted data from its internal clock:

```
Router(config)# interface serial 1/0
Router(config-if)# clock source internal
```

Related Commands	Command	Description
	framing	Selects the frame type for the T1 or E1 data line.
	linecode	Selects the linecode type for T1 or E1 line.

clock source (CT3IP)

To specify where the clock source is obtained for use by the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **clock source** command in controller configuration mode. To restore the default clock source, use the **no** form of this command.

clock source {**internal** | **line** | **loop-timed**}

no clock source

Syntax Description

internal	Specifies that the internal clock source is used. This is the default.
line	Specifies that the network clock source is used.
loop-timed	Decouples the controller clock from the system-wide clock set with the **network-clock-select** command. The loop-timed clock enables the Digital Voice Module (DVM) to connect to a PBX and to connect the multiflex trunk module (MFT) to a central office when both the PBX and the central office function as DCE clock sources. This situation assumes that the PBX also takes the clocking from the central office, thereby synchronizing the clocks on the DVM and the MFT.

Defaults

The internal clock source is used.

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

If you do not specify the **clock source** command, the default internal clock source is used by the CT3IP.

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

Note This command replaces the **pos internal-clock** command.

Examples

The following example sets the clock source for the CT3IP to line:

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

Related Commands	Command	Description
	t1 clock source	Specifies where the clock source is obtained for use by each T1 channel on the CT3IP in Cisco 7500 series routers.
	network-clock-select	Specifies selection priority for the clock sources.

clock source (interface)

To control the clock from which a G.703-E1 interface, an E1-G.703/G.704 serial port adapter, or a PA-E3 serial port adapter clocks its transmitted data, use the **clock source** command in interface configuration mode. To restore the default clock source, use the **no** form of this command.

Cisco 4000, 7000, 7200, and 7500 Series

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

    no clock source

Cisco AS5200 and AS5300 Access Servers

    clock source {**line** {**primary** | **secondary**} | **internal**}

    no clock source line {**primary** | **secondary**}

Syntax Description		
line		Specifies that the interface will clock its transmitted data from a clock recovered from the line's receive data stream. This is the default.
internal		Specifies that the interface will clock its transmitted data from its internal clock.
primary		Primary time-division multiplexing (TDM) clock source.
secondary		Secondary TDM clock source.

Defaults

Cisco 4000, 7000, 7200, and 7500 Series

The clock source is the line's receive data stream.

Cisco AS5200 and AS5300 Access Servers

The primary TDM clock source is from the T0 controller.

The secondary TDM clock source is from the T1 controller.

Command Modes   Interface configuration

Command History

Release	Modification
10.3	This command was introduced for the Cisco 4000 series, Cisco 7000 series with RSP7000, and Cisco 7500 series routers with the G.703 E1 interface.
11.1 CA	This command was introduced for the TDM bus in a Cisco AS5200 or Cisco AS5300 access server.
11.1 CA	This command was modified to include the E1-G.703/G.704 serial port adapter, PA-E3 serial port adapters, and Cisco 7200 series routers.

Usage Guidelines

Cisco 4000, 7000, 7200, and 7500 Series

A G.703-E1 interface, E1-G.703/G.704 serial port adapter, or a PA-E3 serial port adapter can clock its transmitted data from either its internal clock or from a clock recovered from the line's receive data stream.

Cisco AS5200 and AS5300 Access Servers

To use the clocking coming in from a T1 line, configure the **clock source line primary** command on the controller that has the most reliable clocking. Configure the **clock source line secondary** command on the controller that has the next best known clocking. With this configuration, the primary line clocking is backed up to the secondary line if the primary clocking shuts down.

Examples

Cisco 4000, 7000, 7200, and 7500 Series

The following example specifies the G.703-E1 interface to clock its transmitted data from its internal clock:

```
Router(config)# interface serial 0/1
Router(config-if)# clock source internal
```

Cisco AS5200 and AS5300 Access Servers

The following example configures the Cisco AS5200 to use the T0 controller as the primary clocking source and the T1 controller as the secondary clocking source:

```
AS5200(config)# controller t1 0
AS5200(config-if)# clock source line primary
AS5200(config-if)# exit
AS5200(config)# controller t1 1
AS5200(config-if)# clock source line secondary
```

clock source (MC3810)

To specify the clock source of a DS1 link on the Cisco MC3810 multiservice access concentrator, use the **clock source** command in controller configuration mode. To restore the clock source to its default setting, use the **no** form of this command.

clock source {**line** | **internal** | **loop-timed**}

no clock source

Syntax Description		
line	Specifies that the DS1 link uses the recovered clock. The line value is the default clock source used when the Multiflex Trunk (MFT) is installed.	
internal	Specifies that the DS1 link uses the internal clock. The internal value is the default clock source used when the Digital Voice Module (DVM) is installed.	
loop-timed	Specifies that the T1/E1 controller will take the clock from the Rx (line) and use it for Tx. This setting decouples the controller clock from the system-wide clock set with the **network-clock-select** command. The loop-timed clock enables the DVM to connect to a PBX and to connect the MFT to a central office when both the PBX and the central office function as DCE clock sources. This situation assumes that the PBX also takes the clocking from the central office, thereby synchronizing the clocks on the DVM and the MFT.	

Defaults

Line (when the MFT is installed)
Internal (when the DVM is installed)

Command Modes

Controller configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

This command applies to Voice-over-Frame Relay, Voice-over-ATM, and Voice-over-HDLC on the Cisco MC3810.

Note You cannot configure the clock source to the line setting for both T1/E1 controllers at the same time.

Examples

The following example configures the clock source for the MFT to internal, and the clock source for the DVM line on a Cisco MC3810 multiservice access concentrator:

```
Router(config)# controller T1 0
Router(config-controller)# clock source internal

Router(config)# controller T1 1
Router(config-controller)# clock source line
```

cmt connect

To start the processes that perform the connection management (CMT) function and allow the ring on one fiber to be started, use the **cmt connect** command in EXEC mode.

cmt connect [fddi [_port_ | _slot_/_port_**] [phy-a | phy-b]]**

Syntax Description

fddi	(Optional) Identifies this as a FDDI interface.
port	(Optional) Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
slot	(Optional) Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
phy-a	(Optional) Selects Physical Sublayer A.
phy-b	(Optional) Selects Physical Sublayer B.

Command Modes   EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines   In normal operation, the FDDI interface is operational once the interface is connected and configured. The **cmt connect** command allows the operator to start the processes that perform the CMT function.

The **cmt connect** command is not needed in the normal operation of FDDI; this command is used mainly in interoperability tests.

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

Examples   The following examples demonstrate use of the **cmt connect** command for starting the CMT processes on the FDDI ring.

The following command starts all FDDI interfaces:

```
Router# cmt connect
```

The following command starts both fibers on FDDI interface unit 0:

```
Router# cmt connect fddi 0
```

The following command on the Cisco 7200 series or Cisco 7500 series starts both fibers on FDDI interface unit 0:

```
Router# cmt connect fddi 1/0
```

The following command starts only Physical Sublayer A on FDDI interface unit 0:

```
Router# cmt connect fddi 0 phy-a
```

The following command on Cisco 7500 series routers starts only Physical Sublayer A on FDDI interface unit 0:

```
Router# cmt connect fddi 1/0 phy-a
```

cmt disconnect

To stop the processes that perform the connection management (CMT) function and allow the ring on one fiber to be stopped, use the **cmt disconnect** command in EXEC mode.

cmt disconnect [fddi [*port*** | ***slot***/***port***] [phy-a | phy-b]]**

Syntax Description

fddi	(Optional) Identifies this as a FDDI interface.
port	(Optional) Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
slot	(Optional) Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.
phy-a	(Optional) Selects Physical Sublayer A.
phy-b	(Optional) Selects Physical Sublayer B.

Command Modes   EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines   In normal operation, the FDDI interface is operational once the interface is connected and configured, and is turned off using the **shutdown** command in interface configuration mode. The **cmt disconnect** command allows the operator to stop the processes that perform the CMT function and allow the ring on one fiber to be stopped.

The **cmt disconnect** command is not needed in the normal operation of FDDI; this command is used mainly in interoperability tests.

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

Examples   The following examples demonstrate use of the **cmt disconnect** command for stopping the CMT processes on the FDDI ring.

The following command stops all FDDI interfaces:

```
Router# cmt disconnect
```

The following command stops both fibers on FDDI interface unit 0:

```
Router# cmt disconnect fddi 0
```

The following command on the Cisco 7200 series or Cisco 7500 series stops both fibers on FDDI interface unit 0:

```
Router# cmt disconnect fddi 1/0
```

The following command stops only Physical Sublayer A on the FDDI interface unit 0. This command causes the FDDI media to go into a wrapped state so that the ring will be broken.

Cisco IOS Interface Command Reference

```
Router# cmt disconnect fddi 0 phy-a
```

The following command on the Cisco 7500 series stops only Physical Sublayer A on FDDI interface unit 0 in slot 1. This command causes the FDDI media to go into a wrapped state so that the ring will be broken.

```
Router# cmt disconnect fddi 1/0 phy-a
```

compress

To configure software compression for Link Access Procedure, Balanced (LAPB), PPP, and High-Level Data Link Control (HDLC) encapsulations, use the **compress** command in interface configuration mode. On Cisco 7200 series routers and Cisco 7500 series routers, hardware compression on the compression service adapter (CSA) is supported for PPP links. To disable compression, use the **no** form of this command.

compress {**predictor** | **stac**}

no compress {**predictor** | **stac**}

Cisco VIP2 Cards

compress {**predictor** | **stac** [**distributed** | **software**]}

Cisco 7200 Series and Cisco 7500 Series

compress {**predictor** | **stac** [**csa** *slot* | **software**]}

PPP Encapsulation

compress [**predictor** | **stac** | **mppc** [**ignore-pfc**]]

Syntax Description		
predictor	Specifies that a predictor (RAND) compression algorithm will be used on LAPB and PPP encapsulation. Compression is implemented in the software installed in the router's main processor.	
stac	Specifies that a Stacker (LZS) compression algorithm will be used on LAPB, HDLC, and PPP encapsulation. For all platforms except Cisco 7200 series and platforms that support the VIP2, compression is implemented in the software installed in the router's main processor.	
	On Cisco 7200 series, and on VIP2s in Cisco 7500 series, specifying the **compress stac** command with no options causes the router to use the fastest available compression method for PPP encapsulation only:	
	• If the router contains a compression service adapter (CSA), compression is performed in the CSA hardware (hardware compression).	
	• If the CSA is not available, compression is performed in the software installed on the VIP2 (distributed compression).	
	• If the VIP2 is not available, compression is performed in the router's main processor (software compression).	
distributed	(Optional) Specifies that compression is implemented in the software that is installed in a VIP2. If the VIP2 is not available, compression is performed in the router's main processor (software compression).	
software	(Optional) Specifies that compression is implemented in the Cisco IOS software installed in the router's main processor.	
csa *slot*	(Optional) Specifies the CSA to use for a particular interface. This option applies only to Cisco 7200 series routers.	

mppc	(Optional) Specifies that the MPPC compression algorithm will be used.
ignore-pfc	(Optional) Specifies that the protocol field compression flag negotiated through LCP will be ignored.

Defaults   Compression is disabled.

Command Modes   Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
11.3 P	The following keywords were added: • **distributed** • **software** • **csa** *slot*
11.3 T	The following keywords were added: • **mppc** • **ignore-pfc**

Note   This command replaces the **compress predictor** command.

Usage Guidelines   Compression reduces the size of frames via lossless data compression. You can configure point-to-point software compression for all LAPB, PPP, and HDLC encapsulations. HDLC encapsulations supports the Stacker compression algorithm. PPP and LAPB encapsulations support both predictor and Stacker compression algorithms.

MPPC Compression

The compress command using the **mppc** and **ignore-pfc** options support compression between Cisco routers and access servers and Microsoft clients, such as Windows 95 and Windows NT. MPPC implements an LZ based compression algorithm that uses a compression dictionary to compress PPP packets. The **ignore-pfc** keyword instructs the router to ignore the protocol field compression flag negotiated by LCP. For example, the uncompressed standard protocol field value for IP is 0x0021 and 0x21 when compression is enabled. When the **ignore-pfc** option is enabled, the router will continue to use the uncompressed value (0x0021). Using the **ignore-pfc** option is helpful for some asynchronous driver devices which use an uncompressed protocol field (0x0021), even though the pfc is negotiated between peers. If protocol rejects are displayed when the **debug ppp negotiation** command is enabled, setting the **ignore-pfc** option may remedy the problem.

Point-to-Point Compression

You can configure point-to-point software compression for all LAPB, PPP, and HDLC encapsulations. Compression reduces the size of frames via lossless data compression. The compression algorithm used is a predictor algorithm (the RAND compression algorithm), which uses a compression dictionary to predict what the next character in the frame will be.

End-point devices must be configured to use the same compression method (predictor, Stacker or MPPC).

HDLC Encapsulations

For HDLC encapsulations, you can specify a Stacker compression algorithm by using the **stac** keyword. PPP and LAPB encapsulations support both predictor and Stacker compression algorithms.

Public Data Network Connections

Compression requires that both ends of the serial link be configured to use compression. You should never enable compression for connections to a public data network.

Cisco 7200 and 7500 Series

Using CSA hardware compression on Cisco 7200 series routers and Cisco 7500 series routers removes the compression and decompression responsibilities from the VIP2 or the main processor installed in the router. By using the **compress stac** command, the router determines the fastest compression method available on the router.

When using hardware compression on Cisco 7200 series routers with multiple CSAs, you can optionally specify which CSA is used by the interface to perform compression. If no CSA is specified, the router determines which CSA is used. On Cisco 7500 series routers, the router uses the CSA on the same VIP2 as the interface.

System Performance

⚠️
Caution   When compression is performed in software installed in the router's main processor, it might significantly affect system performance. We recommend that you disable compression if the CPU load exceeds 40 percent. To display the CPU load, use the **show process cpu** EXEC command.

If the majority of your traffic is already compressed files, we recommend that you not use compression. If the files are already compressed, the additional processing time spent in attempting unsuccessfully to compress them again will slow system performance.

Table 6 provides general guidelines for deciding which compression type to select.

Table 6   Compression Guidelines

Situation	Compression Type to Use
Bottleneck is caused by the load on the router.	Predictor
Bottleneck is the result of line bandwidth or hardware compression on the CSA is available.	Stacker
Most files are already compressed.	None

Software compression makes heavy demands on the router's processor. The maximum compressed serial line rate depends on the type of Cisco router you are using and which compression algorithm you specify. Table 7 shows a summary of the compressed serial line rates for software compression. The maximums shown in Table 7 apply to the "combined" serial compressed load on the router. For example, a Cisco 4000 series router could handle four 64-kbps lines using Stacker or one 256-kbps line. These maximums also assume there is very little processor load on the router aside from compression. Lower these numbers when the router is required to do other processor-intensive tasks.

Table 7   Combined Compressed Serial-Line Rates (Software Compression)

Compression Method	Cisco 1000 Series	Cisco 3000 Series	Cisco 4000 Series	Cisco 4500 Series	Cisco 4700 Series	Cisco 7000 Family
Stacker (kbps)	128	128	256	500	T1	256
Predictor (kbps)	256	256	500	T1	2xT1	500

Hardware compression can support a combined line rate of 16 Mbps.

Cisco recommends that you do not adjust the maximum transmission unit (MTU) for the serial interface and the LAPB maximum bits per frame (N1) parameter.

> **Note**   The best performance data compression algorithms adjust their compression methodology as they identify patterns in the data. To prevent data loss and support this adjustment process, the compression algorithm is run over LAPB to ensure that everything is sent in order, with no missing data and no duplicate data.

> **Note**   For information on configuring Frame Relay compression, refer to the "Configuring Frame Relay" chapter in the *Cisco IOS Wide-Area Networking Configuration Guide*.

Examples   The following example enables hardware compression and PPP encapsulation on serial interface 3/1/0.

```
Router(config)# interface serial 3/1/0
Router(config-if)# encapsulate ppp
Router(config-if)# compress stac
```

The following example enables predictor compression on serial interface 0 for a LAPB link:

```
Router(config)# interface serial 0
Router(config-if)# encapsulation lapb
Router(config-if)# compress predictor
Router(config-if)# mtu 1509
Router(config-if)# lapb n1 12072
```

The following example enables Stacker compression on serial interface 0 for a LAPB link. This example does not set the MTU size and the maximum bits per frame (N1); we recommend that you do not change those LAPB parameters for Stacker compression:

```
Router(config)# interface serial 0
Router(config-if)# encapsulation lapb
Router(config-if)# compress predictor
```

The following example configures BRI interface 0 to perform MPPC:

```
Router(config)# interface BRI0
Router(config-if)# ip unnumbered ethernet0
Router(config-if)# encapsulation ppp
Router(config-if)# isdn spid1 5551234
Router(config-if)# dialer map ip 172.21.71.74 5551234
Router(config-if)# dialer-group 1
Router(config-if)# compress mppc
```

The following example configures asynchronous interface 1 to implement MPPC and ignore the protocol field compression flag negotiated by LCP:

```
Router(config)# interface async1
Router(config-if)# ip unnumbered ethernet0
Router(config-if)# encapsulation ppp
Router(config-if)# async default routing
Router(config-if)# async dynamic routing
Router(config-if)# async mode interactive
Router(config-if)# peer default ip address 172.21.71.74
Router(config-if)# compress mppc ignore-pfc
```

Related Commands	Command	Description
	encapsulation	Sets encapsulation method used by the interface.
	encapsulation x25	Specifies operation of a serial interface as an X.25 device.
	exec	Allows an EXEC process on a line.
	show compress	Displays compression statistics.
	show processes	Displays information about the active processes.
	show process cpu	

compress mppc

To configure compression using the Microsoft PPC (MPPC) compression algorithm on your data compression Advanced Interface Module (AIM) for the Cisco 2600 series router, use the **compress mppc** command in interface configuration mode. The MPPC compression algorithm is used to exchange compressed information with a Microsoft NT remote access server. To disable compression, use the **no** form of this command.

compress mppc

no compress

Syntax Description   This command has no keywords or arguments.

Defaults   Disabled

Command Modes   Interface configuration

Command History

Release	Modification
12.0(1)T	This command was introduced.

Usage Guidelines   When configuring PPP on a serial interface, you can use hardware compression on the data compression AIM daughtercard for MPPC if one is installed; otherwise you can use software compression.

Examples   The following example shows how to configure the data compression AIM daughtercard for MPPC:

```
Router(config-if)# encapsulate ppp
Router(config-if)# compress mppc
```

Related Commands

Command	Description
clear aim	Clears data compression AIM registers and resets the hardware.
compress stac caim	Specifies the exact hardware compression resource preferred.
encapsulation	Sets the encapsulation method used by the interface.
show compress	Displays compression statistics.
show pas caim	Displays debug information about the data compression AIM daughtercard.
show processes	Displays information about the active processes.

compress predictor

The **compress predictor** command is replaced by the **compress** command. See the description of the compress command in this chapter for more information.

compress stac caim

To specify the exact hardware compression resource preferred, enter the **compress stac caim** command in interface configuration mode. To disable compression, use the **no** form of this command.

    compress stac caim *element-number*

    no compress stac caim *element-number*

Syntax Description

element-number	Enables compression for this interface. AIM interfaces begin with 0.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.0(1)T	This command was introduced.

Usage Guidelines

Specifying the **compress stac** command with no options causes the router to use the fastest available compression method.

Hardware Compression

If the router contains a data compression Advanced Interface Module (CAIM), compression is performed in the CAIM hardware.

Using hardware compression in the AIM frees the main processor of the router for other tasks. You can also configure the router to use the Compression Port Module to perform compression by using the distributed option, or to use the router's main processor by using the software option. If the Compression Port Module compression is performed in the main processor of the router.

Software Compression

If the CAIM is not available, compression is performed in the main processor of the router.

When compression is performed in software installed in the router's main memory, it might significantly affect system performance. It is recommended that you disable compression in the main processor if the router CPU load exceeds 40 percent. To display the CPU load, use the **show process cpu** command in EXEC mode.

Examples

The following example specifies that hardware compression should be activated for CAIM element 0:

```
Router(config-if)# encapsulation ppp
Router(config-if)# compress stac caim 0
Router(config)# Ctrl-Z
Router# show compress
```

```
Router(config)# interface serial 3/1
Router(config-if)#  encapsulation ppp
Router(config-if)#  compress stac
```

Related Commands

Command	Description
clear aim	Clears data compression AIM registers and resets the hardware.
encapsulation	Sets the encapsulation method used by the interface.
show compress	Displays compression statistics.
show pas caim	Displays debug information about the data compression AIM daughtercard.

controller

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

Cisco 7200 Series and Cisco 7500 Series Routers

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

Cisco AS5200 and AS5300 Access Servers and Cisco 4000 Series Routers

controller {**t1** | **e1**} *number*

Cisco AS5800 Access Servers

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

Cisco AS5800 Access Servers with Channelized T3 Interface Processor (CT3IP)

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

Cisco 7500 Series Cisco 7500 Series Routers with Channelized T3 Interface Processor (CT3IP)

controller t3 *slot*/*port-adapter*/*port*

Syntax Description

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

Defaults No T1, E1, or T3 controller is configured.

Command Modes Global configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The **e1** keyword was added.
11.3(5)AAA	Support was added for dial shelves on Cisco 7500 series routers.
12.0(3)T	Support was added for dial shelves on Cisco AS5800 access servers.

Usage Guidelines

T1 or E1 Fractional Data Lines

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

CT3IP Channel Interface Cards

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

Examples

Cisco 7500 Series Router as a T1 Controller

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

```
controller t1 4/0
```

Cisco 4000 Series Router

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

```
controller t1 0
```

Cisco AS5800 Access Server with Dial Shelf

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

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

Cisco 7500 Series

The following example configures the CT3IP in slot 3:

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

Cisco AS5800 Access Server

The following example shows the status of the T1 controllers connected to the Cisco AS5800:

```
Router# show controller T1

T1 1/0/0:1 is up.
 No alarms detected.
 Framing is ESF, Line Code is AMI, Clock Source is Line.
 Data in current interval (770 seconds elapsed):
     5 Line Code Violations, 8 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 7 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 7 Unavail Secs
 Total Data (last 81 15 minute intervals):
     7 Line Code Violations, 4 Path Code Violations,
     6 Slip Secs, 20 Fr Loss Secs, 2 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 2 Unavail Secs
T1 1/0/1:5 is down.
 Transmitter is sending remote alarm.
 Receiver has loss of frame.
 Framing is SF, Line Code is AMI, Clock Source is Line.
 Data in current interval (770 seconds elapsed):
     50 Line Code Violations, 5 Path Code Violations
     0 Slip Secs, 7 Fr Loss Secs, 7 Line Err Secs, 0 Degraded Mins
```

```
        0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 7 Unavail Secs
 Total Data (last 81 15 minute intervals):
     27 Line Code Violations, 22 Path Code Violations,
     0 Slip Secs, 13 Fr Loss Secs, 13 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 13 Unavail Secs
Router#
```

Table 8 describes the fields shown in the display.

Table 8   show controller t1 Field Descriptions

Field	Description
T1 ... is up	Status of T1 line.
No alarms detected	Access server received no alarms.
Framing is ...	Standard T1 framing type. In this example, the framing is Extended Super Frame (ESF).
Line Code is ...	Standard T1 line-coding format. In this example, the line-coding format is Alternate Mark Inversion (AMI).
Clock Source is ...	Source of the synchronization signal (clock). In this example, the line is providing the clock signal.
Data in current interval	Summary statistics for T1 signal quality for the current time interval of 900 seconds. In this example, the statistics are for current partial interval (770 seconds of 900 seconds).
Line Code Violations	Number of T1 line code violations for the current interval.
Path Code Violations	Number of T1 path code violations for the current interval.
Slip Secs	Number of seconds in this interval during which a frame misalignment occurred.
Fr Loss Secs	Number of seconds in this interval during which frame loss occurred.
Line Err Secs	Number of seconds in this interval during which line errors occurred.
Degraded Mins	Number of minutes in this interval during which the signal quality was degraded.
Errored Secs	Number of seconds in this interval during which an error was reported.
Bursty Err Secs	Number of bursty error seconds in this interval.
Severely Err Secs	Number of severely errored seconds in this interval.
Unavail Secs	Number of unavailable seconds in this interval.
Total Data (last ... 15 minute intervals)	Summary statistics for T1 signal quality for 15 minute intervals. Every 24 hours (96 intervals), the counters in this data block clear.

Related Commands

Command	Description
channel-group (Fast EtherChannel)	Defines the time slots that belong to each T1 or E1 circuit.
clear controller	Resets the T1 or E1 controller.
clock source line	Sets the E1 line clock source for the Cisco AS5200.

Command	Description
controller t3	Configures the Channelized T3 Interface Processor.
framing	Selects the frame type for the T1 or E1 data line.
linecode	Selects the linecode type for T1 or E1 line.
show controllers e1	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
show controllers t1 call-counters	Displays the total number of calls and call durations on a T1 controller.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).

controller t3

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

Cisco 7500 Series

> **controller t3** *slot*/*port-adapter*/*port*

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

Cisco AS5800 Access Server

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

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

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

Defaults

Cisco 7500 Series

No T3 controller is configured.

Cisco AS5800 Access Server

No default behavior or values.

Command Modes Global configuration

Command History

Release	Modification
11.3	This command was introduced.
12.0(3)T	This command was implemented on the Cisco AS5800 access server.

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

Examples **Cisco 7500 Series**

The following example configures the CT3IP in slot 3:

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

Cisco AS5800 Access Server

The following example configures the T3 controller in shelf 3, slot 0, port 0 and T1 time slot 1:

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

Related Commands

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

copy flash lex

To download an executable image from Flash memory on the core router to a LAN Extender, use the **copy flash lex** command in privileged EXEC mode.

copy flash lex *number*

Syntax Description

number	Number of the LAN Extender interface to which to download an image from Flash memory.

Command Modes   Privileged EXEC

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines   If you attempt to download a version of the software older than what is currently running on the LAN Extender, a warning message is displayed.

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

Examples   The following example copies the executable image *namexx* to LAN Extender interface 0:

```
Router# copy flash lex 0
Name of file to copy? namexx
Address of remote host [255.255.255.255] <cr>
writing namexx !!!!!!!!!!!!!!!!!!!!!!!!!!copy complete
```

Related Commands

Command	Description
copy tftp lex	Downloads an executable image from a TFTP server to a LAN Extender.

copy tftp lex

To download an executable image from a TFTP server to the LAN Extender, use the **copy tftp lex** command privileged EXEC mode.

   copy tftp lex *number*

Syntax Description	*number* Number of the LAN Extender interface to which to download an image.

Command Modes   Privileged EXEC

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines   If you attempt to download a version of the software older than what is currently running on the LAN Extender, a warning message is displayed.

This command does not have a not form.

Examples   The following example copies the file *namexx* from the TFTP server:

```
Router# copy tftp lex 0
Address or name of remote host (255.255.255.255]? 10.108.1.111
Name of file to copy? namexx
OK to overwrite software version 1.0 with 1.1 ?[confirm] Y
Loading namexx from 10.108.13.111!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 127825/131072 bytes]

Successful download to LAN Extender
```

crc

To set the length of the cyclic redundancy check (CRC) on a Fast Serial Interface Processor (FSIP) or HSSI Interface Processor (HIP) of the Cisco 7500 series routers or on a 4-port serial adapter of the Cisco 7200 series routers, use the **crc** command in interface configuration mode. To set the CRC length to 16 bits, use the **no** form of this command.

crc *size*

no crc

Syntax Description

size	CRC size (16 or 32 bits). The default is 16 bits.

Defaults

16 bits

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

All interfaces use a 16-bit CRC by default, but also support a 32-bit CRC. CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.

CRC-16, the most widely used throughout the United States and Europe, is used extensively with WANs. CRC-32 is specified by IEEE 802 and as an option by some point-to-point transmission standards. It is often used on Switched Multimegabit Data Service (SMDS) networks and LANs.

Examples

The following example enables the 32-bit CRC on serial interface 3/0:

```
Router(config)# interface serial 3/0
Router(config-if)# crc 32
```

crc4

To enable generation of CRC4 (per ITU Recommendation G.704 and G.703) to improve data integrity, use the **crc4** command in interface configuration mode. To disable this feature, use the **no** form of this command.

crc4

no crc4

Syntax Description   This command has no arguments or keywords.

Defaults   Disabled

Command Modes   Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
11.1 CA	This command was modified to include the Cisco 7200 series router and the E1-G.703/G.704 serial port adapter

Usage Guidelines   This command applies to a Cisco 4000 router and to Cisco 7200 series, Cisco 7000 series, and Cisco 7500 series routers. This command is supported on the Fast Serial Interface Processor (FSIP) and the E1-G.703/G.704 serial port adapter.

This command is useful for checking data integrity while operating in framed mode. CRC4 provides additional protection for a frame alignment signal under noisy conditions. For data transmission at E1 (2.048 Mbps), the G.704 standard suggests 4 bits CRC. Refer to CCITT Recommendation G.704 for a definition of CRC4.

You can also use the **crc** command to set the CRC size for the High-Level Data Link Control (HDLC) controllers.

Examples   The following example enables CRC4 generation on the E1-G.703/G.704 serial port adapter and also sets the CRC size to 32 bits:

```
Router(config)# interface serial 0/0
Router(config-if)# crc 32
Router(config-if)# crc4
```

crc bits 5

To enable generation of CRC5 (per ITU Recommendation G.704 and G.703) to improve data integrity, use the **crc bits 5** command in interface configuration mode. To disable this feature, use the **no** form of this command.

crc bits 5

no crc bits 5

Syntax Description   This command has no arguments or keywords.

Defaults   The default is no CRC5 checking.

Command Modes   Interface configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines   This command is available for the JT2 6.3-MHz serial port adapter (PA-2JT2) on the second-generation Versatile Interface Processor (VIP2), in Cisco 7500 series routers, and in Cisco 7000 series routers with the Cisco 7000 series Route Switch Processor (RSP7000) and the Cisco 7000 series Chassis Interface (RSP7000CI).

This command is useful for checking data integrity while operating in framed mode. CRC5 provides additional protection for a frame alignment signal under noisy conditions. For data transmission at JT2 (6.312 Mbps), the G.704 standard suggests 5 bits CRC. Refer to ITU Recommendation G.704 for a definition of CRC5.

You can also use the **crc** command to set the CRC size for the High-Level Data Link Control (HDLC) controllers.

Examples   The following example enables CRC 5 generation on the PA-2JT2 port adapter and also sets the CRC size to 32 bits:

```
Router(config)# interface serial 0/0
Router(config-if)# crc 32
Router(config-if)# crc bits 5
```

Related Commands	Command	Description
	clns routing	Enables routing of CLNS packets.
	debug ctunnel	Displays debug messages for the IP over a CLNS Tunnel feature.
	interface ctunnel	Creates a virtual interface to transport IP over a CLNS tunnel.
	ip address	Sets a primary or secondary IP address for an interface.
	ip routing	Enables IP routing.
	show interfaces ctunnel	Displays information about an IP over CTunnel

cut-through

To configure the interfaces on the PA-12E/2FE port adapter to use cut-through switching technology between interfaces within the same bridge group, use the **cut-through** command in interface configuration mode. To return each interface to store-and-forward switching, use the **no** form of this command.

cut-through [**receive** | **transmit**]

no cut-through

Syntax Description

receive	(Optional) Selects cut-through switching technology on received data.
transmit	(Optional) Selects cut-through switching technology on transmitted data.

Defaults   Store-and-forward switching technology (that is, no cut-through)

Command Modes   Interface configuration

Command History

Release	Modification
11.2 P	This command was introduced.

Usage Guidelines   Cut-through mode allows switched packets to be transmitted after 64 bytes are received. The transmission of the packets can start before the end of the packet arrives. This reduces the time spent in the switch, but allows packets to be transmitted with bad cyclical redundancy check (CRCs), because the transmission is initiated before the CRC is received or checked. Store-and-forward mode waits for the entire packet to be received before that packet is forwarded, but will check the CRC before starting transmission.

The PA-12E/2FE port adapter offloads Layer 2 switching from the host CPU by using store-and-forward or cut-through switching technology between interfaces within the same virtual LAN (VLAN) on the PA-12E/2FE port adapter. The PA-12E/2FE port adapter supports up to four VLANs (bridge groups).

Examples   The following example configures interface 3/0 for cut-through switching:

```
Router(config)# interface fastethernet 3/0
Router(config-if)# bridge-group 10
Router(config-if)# cut-through
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)#
```

Related Commands

Command	Description
more	Displays a specified file.