



Hardware Management Commands

This chapter contains descriptions for the hardware management commands.

au-3

To configure a particular Administrative Unit type 3 (AU-3) of an E1 line that has been mapped to an AU-3, use the **au-3** command in controller configuration mode.

au-3 *au-3-number*

Syntax Description	<i>au-3-number</i>	Number in the range from 1 to 3.
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Defaults No default behavior or values

Command Modes Controller configuration

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

Usage Guidelines An administrative unit group (AUG) of an STM-1 can be derived from either AU-3s or an AU-4. Use the **aug mapping au-3** configuration controller command to map the AUG to an AU-3 with the following muxing/alignment/mapping:

C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> VC-3 <--> AU-3 <--> AUG

Configuring the **au-3** command enables you to enter configuration controller au3 command mode and creates a serial interface with the following name format:

slot/port-adapter/port.au-3-number/tug-2-number/e1-number

The **aug mapping au-3** and **au-3** commands are available only when SDH framing is configured.

Examples The following example shows how to configure AUG mapping to be derived from an AU-3 and selects AU-3 3 to configure as a serial interface:

```
Router(config)# controller sonet 2/0/0
Router(config-controller)# aug mapping au-3
Router(config-ctrlr-au3)# au-3 3
```

Related Commands	Command	Description
	au-4 tug-3	Specifies a TUG-3 for configuration.
	aug mapping	Configures the AUG mapping mode of the PA-MC-STM-1 to AU-3.

au-4 tug-3

To specify the Administrative Unit type 4 (AU-4) and Tributary Unit group type 3 (TUG-3) number of an E1 line that has been mapped to an AU-4, use the **au-4 tug-3** command in controller configuration mode.

```
au-4 au-4-number tug-3 tug-3-number
```

Syntax Description

<i>au-4-number</i>	Number in the range from 1 to N where N is the STM level. Default is 1.
<i>tug-3-number</i>	Number in the range from 1 to 3.

Defaults

Default *au-4-number* value for STM-1 card is 1.

Command Modes

Controller configuration

Command History

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

Usage Guidelines

An AUG of an STM-1 can be derived from either AU-3s or an AU-4. Use the **aug mapping au-4** configuration controller command to map the AUG to an TUG-3 with the following muxing/alignment/mapping:

```
C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> TUG-3 <--> VC-4 <--> AU-4 <--> AUG
```

Configuring the **au-4** command enables you to enter configuration controller **tug3** command mode and creates a serial interface with the following name format:

```
slot/port-adapter/port.au-4-number/tug-2-number/e1-number
```

The **aug mapping au-4** and **au-4 tug-3** commands are available only when SDH framing is configured.

Examples

The following example shows how to configure AUG mapping to be derived from a TUG-3 and selects TUG-3 1 of AU-4 1:

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

Related Commands

Command	Description
au-3	Specifies an AU-3 for configuration.
aug mapping	Configures the AUG mapping mode.

aug mapping

To configure administrative unit group (AUG) mapping when SDH framing is selected, use the **aug mapping** command in controller configuration mode.

aug mapping {au-3 | au-4}

Syntax Description

au-3	Specifies use of three paths—a path is known as an Administrative Unit (AU)—consisting of seven TUG-2s (Tributary Unit group type 2). Each TUG-2 consists of three virtual containers (VC-12s), which carry E1 lines resulting in 21 E1 lines within one AU-3 path.
au-4	Specifies use of one path consisting of three TUG-3 types. Each TUG-3 consists of seven TUG-2s, resulting in a total of 63 E1 lines within one AU-4 path. This is the default.

Defaults

au-4

Command Modes

Controller configuration

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.0(17)S	Support for the two-port STM-1/OC-3 channelized E1/T1 line card was added.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines

In SDH, there are two possible mapping/multiplexing schemes for most payload types: ANSI and ETSI.

In ANSI mapping, the Low Order payloads are aggregated into a VC-3 High Order Path. An AU pointer is added to the VC-3 to create an AU-3. Three such AU-3s are then synchronously multiplexed into an AUG. The multiplexing scheme is as follows:

```
... VC-3 <-> AU-3 (x3) <-> AUG <-> STM-1
```

SDH ANSI mapping is very similar to the SONET frame structure.

In ETSI mapping, the Low Order payloads are aggregated into a VC-4 High Order Path. An AU pointer is added to the VC-4 to create an AU-4 (Administrative Unit type 4). One AU-4 is “multiplexed” into an AUG (AU group), which is to say, the AUG is, in fact, equivalent to an AU-4. The multiplexing scheme is as follows:

```
... TUG-3 (x3) <-> VC-4 <-> AU-4 (x1) <-> STM-1
```

This command is available only when SDH framing is configured.

This command does not have a **no** form because data must flow using one of the two mapping/multiplexing schemes.

Examples

The following example shows how to configure AU-3 mapping for the STM-1 trunk card:

```
Router(config)# controller sonet 1/0  
Router(config-controller)# aug mapping au-3
```

b2 sd-ber

To set the signal degrade bit-error rate (BER) threshold values, use the **b2 sd-ber** command in controller configuration mode. To return to the default setting, use the **no** form of this command.

b2 sd-ber *rate*

no b2 sd-ber

Syntax Description	<i>rate</i>	Bit-error rate from 3 to 9 (10-n). The value of 9 represents better quality, and the value of 3 represents lower quality. The default is 6.
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Defaults	<i>rate</i> : 6
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Command Modes	Controller configuration
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Command History	Release	Modification
	12.2(15)T	This command was introduced.

Usage Guidelines	Use this command to configure the threshold for degradation of quality of signal with b2 errors.
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Examples The following example shows how to configure a signal degrade BER threshold value of 7 on the SONET controller:

```
Router(config)# controller sonet 1/0
Router(config-controller)# b2 sd-ber 7
```

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

b2 sf-ber

To set the signal failure bit-error rate (BER) threshold values, use the **b2 sf-ber** command in controller configuration mode. To return to the default setting, use the **no** form of this command.

b2 sf-ber *rate*

no b2 sf-ber *rate*

Syntax Description	<i>rate</i>	Bit-error rate from 3 to 9 (10-n). The value of 9 represents better quality, and the value of 3 represents lower quality. The default is 3.
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Defaults	<i>rate</i> : 3
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Command Modes	Controller configuration
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Command History	Release	Modification
	12.2(15)T	This command was introduced.

Usage Guidelines	Use this command to configure the threshold for failure of quality of signal with b2 errors. The value of 9 represents better quality and the value of 3 represents lower quality.
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Examples	The following example shows how to configure a signal failure BER threshold value of 7 on the SONET controller:
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```
Router(config)# controller sonet 1/0
Router(config-controller)# b2 sf-ber 7
```

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

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 integrated 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 The following is sample output from 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 ....
```

The following is sample 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 (T1/E1)	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		
<i>type-controller</i>	(Optional) Type of controller being tested. Use either T1 or E1 depending on the type of facility.	
<i>last-controller</i>	(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.	
<i>number</i>	(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 tester (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.

E1 Controllers

The E1 controller cannot be set in loopback mode from the Cisco 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 53 describes the significant fields shown in the sample display for the **bert controller** command.

Table 53 *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. As the latest 15-minute accumulation period enters the buffer, the oldest 15-minute period is deleted. The accumulation period is from 1 to 900 seconds.
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 an 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 super frame (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 for which 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	A 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 is detected: one or more path code violations; one or more Out-of-Frame defects; one or more controlled slip events; an alarm indication signal (AIS) defect. For D4 and E1-non-CRC 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 AIS defects. Controlled slips are not included in this parameter.

Table 53 *bert controller Field Descriptions (continued)*

Severely Err Secs	<p>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.</p> <p>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.</p> <p>For E1-non-CRC signals, a second with 2048 or more line code violations.</p> <p>For D4 signals, a count of 1-second intervals with framing errors, or an Out-of-Frame defect, or 1544 line code violations.</p>
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 (T1/E1)	Sets up various bit error rate testing profiles.

bert pattern (T1/E1)

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}	Invokes a pseudorandom 0.151 test pattern that is 8,388,607 bits in length.	
2^{20}	Invokes a pseudorandom 0.153 test pattern that is 1,048,575 bits in length.	
2^{20} -QRSS	Invokes a pseudorandom quasi-random signal sequence (QRSS) 0.153 test pattern that is 1,048,575 bits in length.	
2^{15}	Invokes a pseudorandom 0.151 test pattern that is 32,768 bits in length.	
2^{11}	Invokes a pseudorandom test pattern that is 2,048 bits in length.	
1s	Invokes a repeating pattern of ones (...111...).	
0s	Invokes a repeating pattern of zeros (...000...).	
alt-0-1	Invokes a repeating pattern of alternating zeros and ones (...01010...).	
interval <i>time</i>	Specifies the duration (in minutes) of the BER test. The interval can be a value from 1 to 14,400. No default.	

Defaults No bert pattern is in effect.

Command Modes Controller configuration

Command History	Release	Modification
	11.1CC	This command was introduced.
	12.0(5)XE	This command was enhanced as an ATM interface configuration command.
	12.0(7)XE1	This command was implemented on Cisco 7100 series routers.
	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, is done only over an unframed T1 or E1 signal, and is 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 <i>slot/port</i>	Displays information about T1/E1 links in Cisco 7100 series routers and Cisco 7200 series routers.
show controllers atm <i>slot/port-adapter/port</i>	Displays information about the T1/E1 links in Cisco 7500 series routers.

bert pattern (T3/E3)

To enable a bit error rate (BER) test pattern on a T3 or E3 controller, 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^{15} | **1s** | **0s** | **alt-0-1** } **interval** *time*

no bert pattern

Syntax Description		
	2^{23}	Invokes a pseudorandom 0.151 test pattern that is 8,388,607 bits in length.
	2^{20}	Invokes a pseudorandom 0.153 test pattern that is 1,048,575 bits in length.
	2^{15}	Invokes a pseudorandom 0.151 test pattern that is 32,768 bits in length.
	1s	Invokes a repeating pattern of ones (...111...).
	0s	Invokes a repeating pattern of zeros (...000...).
	alt-0-1	Invokes a repeating pattern of alternating zeros and ones (...01010...).
	interval <i>time</i>	Specifies the duration (in minutes) of the BER test. The interval can be a value from 1 to 14,400. No default.

Defaults Disabled

Command Modes Controller configuration

Command History	Release	Modification
	11.1 CC	This command was introduced.
	12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines BER testing is supported on T3/E3 links and is done only over framed T3 or E3 signals, unless E3 framing is in bypass mode.

To display the BER test results, use the **show controllers t3** or **show controllers e3 EXEC** command. The BER test 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 T3 or E3 line has a BER test running, the line state is **DOWN** and the status field shows the current or last result of the test.

The **bert pattern (T3/E3)** command is not written to NVRAM. This command is used only to test the T3 or E3 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, a BER test pattern of all zeros is run for 30 minutes on the T3 controller in slot 1:

```
controller t3 1/0
 bert pattern 0s interval 30
```

Related Commands

Command	Description
show controllers e3	Displays information about E3 controllers.
show controllers t3	Displays information about T3 controllers.

bert profile

To set up various bit error rate testing profiles, use the **bert profile** command in global configuration 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

<i>number</i>	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.
<i>pattern</i>	<p>0s—repetitive pattern, all zeroes</p> <p>1_in_16—<i>n</i> repetitive pattern, 1 in 16</p> <p>1s—<i>n</i> repetitive pattern, all ones</p> <p>211-O.152—<i>n</i> pseudo-random pattern, $2^{11} - 1$ O.152</p> <p>215-O.15—<i>n</i> pseudo-random pattern, $2^{15} - 1$ O.151</p> <p>220-O.151QRSS—<i>n</i> pseudo-random pattern, $2^{20} - 1$ O.151 QRSS (This is the default)</p> <p>220-O.153—<i>n</i> pseudo-random pattern, $2^{20} - 1$ O.153</p> <p>3_in_24—<i>n</i> repetitive pattern, 3 in 24</p>
threshold	Test failure (error) threshold that determines if the BERT on this line passed.
<i>threshold</i>	<p>10^-2—bit error rate of 10^{-2}</p> <p>10^-3—bit error rate of 10^{-3}</p> <p>10^-4—bit error rate of 10^{-4}</p> <p>10^-5—bit error rate of 10^{-5}</p> <p>10^-6—bit error rate of 10^{-6} (This is the default)</p> <p>10^-7—bit error rate of 10^{-7}</p> <p>10^-8—bit error rate of 10^{-8}</p>
error-injection	Error injection rate for bit errors injected into the BERT pattern generated by the chip. The default is none.
<i>err_inj</i>	<p>10^-1—Error injection of 10^{-1}</p> <p>10^-2—Error injection of 10^{-2}</p> <p>10^-3—Error injection of 10^{-3}</p> <p>10^-4—Error injection of 10^{-4}</p> <p>10^-5—Error injection of 10^{-5}</p> <p>10^-6—Error injection of 10^{-6}</p> <p>10^-7—Error injection of 10^{-7}</p> <p>none—No error injection in the data pattern.</p>
duration	Duration, in minutes, for which BERT is to be executed.
<i>time</i>	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 NVRAM:

```
bert profile number pattern 220-0151QRSS threshold 10^-6 error-injection none duration 10
```

Command Modes

Global configuration

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 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	<i>feet</i>	Number of feet in the range of 0 to 450. The default values are as follows: <ul style="list-style-type: none"> 224 feet for a Channelized T3 Interface Processor (CT3IP) and Clear Channel T3/E3 network module 49 feet for PA-T3 and PA-2T3 port adapters
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Defaults	224 feet for a CT3IP interface processor and Clear Channel T3/E3 network module 49 feet for PA-T3 and PA-2T3 port adapters
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Command Modes	Controller configuration
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Command History	Release	Modification
	11.1 CA	This command was introduced.
	12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers. Support for the Clear Channel T3/E3 network module was added.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines The default cable length of 224 feet is used by the CT3IP interface processor and the Clear Channel T3/E3 network module.

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



Note

Although you can specify a cable length from 0 to 450 feet, the hardware recognizes only 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 still 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 to 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 *db-gain-value db-loss-value*

no cablelength long

Syntax Description	
<i>db-gain-value</i>	Number of decibels (dB) by which the receiver signal is increased. Use one of the following values: <ul style="list-style-type: none"> • gain26 • gain36 The default is 26 dB.
<i>db-loss-value</i>	Number of decibels by which the transmit signal is decreased. Use one of the following values: <ul style="list-style-type: none"> • 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 AS5800 and Cisco MC3810.
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)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 AS5800 and Cisco MC3810**

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 used only 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 AS5800 and Cisco MC3810**

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 Cisco 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-if)# cablelength long gain36 -7.5db
```

■ cablelength long

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.

cablelength short *length*

no cablelength short

Syntax Description

<i>length</i>	Specifies a cable length. Use one of the following values to specify this value: <ul style="list-style-type: none"> 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)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.

To set cable lengths longer than 655 feet, use the **cablelength long** command.

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.

channelized

To configure the T3 controller for channelized mode, use the **channelized** command in configuration controller mode. To configure the T3 controller for unchannelized mode, use the **no channelized** form of this command.

channelized

no channelized

Syntax Description

This command has no arguments or keywords.

Defaults

Channelized: maximum transmission unit (MTU) size is set to 1500.
Unchannelized: MTU size is set to 4470

Command Modes

Configuration controller

Command History

Release	Modification
12.0(14)S	This command was introduced.
12.1(5a)E	This command was integrated into Cisco IOS Release 12.1(5a)E.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Use the **no channelized** configuration controller command to configure the T3 controller for unchannelized mode. When you configure the PA-MC-2T3+ port adapter on a Cisco 7500 series router with the **no channelized** command, the MTU size is set to 4470. In channelized mode, the default MTU size is 1500. The change in MTU sizes will cause a memory recarve and CBus complex to occur, disrupting all traffic on the router for several minutes.

The following message will be displayed when switching between channelized and unchannelized modes on a Cisco 7500 series router:

```
Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y
```

Type **Y** for “yes” at the end of the warning. At the prompt, type **^Z** to exit. You will exit configuration mode and enter unchannelized mode.

Examples

The following example configures unchannelized mode on a PA-MC-2T3+ port adapter in slot 1 of a Versatile Interface Processor version 2 (VIP2) or VIP4 in a Cisco 7500 series router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller T3 1/1/0
Router(config-controller)# no channelized
Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y
^Z
```

clear controller

To reset the T1 or E1 controller, use the **clear controller** command in user EXEC and privileged 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.
<i>slot/port</i>		Backplane slot number and port number on the interface. See your hardware installation manual for the specific slot and port numbers.
<i>number</i>		Network interface module (NIM) number, in the range 0 through 2.

Command Modes	
	User EXEC Privileged 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, E1, or J1 controller and enters controller configuration mode.

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

<i>number</i>	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	<p><i>bps</i> 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.</p> <p>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.</p>
---------------------------	---

Defaults	No clock rate is configured.
-----------------	------------------------------

Command Modes	Interface configuration
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Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>This command was introduced.</td> </tr> <tr> <td>11.3</td> <td>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.</td> </tr> </tbody> </table>	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.
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	<p>Cable Length</p> <p>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.</p>
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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
%Clockrate 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
%Clockrate 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
  clockrate 1151526
!
```

clock rate line

To configure the line clock rate for serial ports 0 or 1 in DTE mode, use the **clock rate line** command in interface configuration mode. To cancel the clock rate line value, use the **no** form of this command.

clock rate line *rate*

no clock rate line *rate*

Syntax Description	<i>rate</i>	Network clock line rate, in bits per second. The range is from 56 kbps to 2048 kbps. The value entered should be a multiple of 8000 of the value set for the network-clock base-rate command. There is no default rate.
Defaults	No clock rate is set.	
Command Modes	Interface configuration	
Command History	Release	Modification
	11.3(1)MA	This command was introduced on the Cisco MC3810 multiservice access concentrator.
Usage Guidelines	<p>This command specifies the rate of the incoming clock so that the appropriate internal clock scaling can be performed.</p> <p>To configure the clock rate for a serial port in DTE mode, use the clock rate network-clock command.</p>	
Examples	<p>The following configures the clock rate on serial 1 in DTE mode:</p> <pre>interface serial 1 clock rate line 2048</pre>	
Related Commands	Command	Description
	clock rate network-clock	Configures the network clock speed for serial ports 0 or 1 in DCE mode.
	clock source	Specifies the clock source of a DS1 link on the Cisco MC3810 multiservice access concentrator.
	network-clock base-rate	Configures the network clock base rate for universal I/O serial ports 0 and 1 on the Cisco MC3810 multiservice access concentrator.

clock rate network-clock

To configure the network clock rate (speed) for serial ports 0 or 1 in DCE mode, use the **clock rate network-clock** command in interface configuration mode. To cancel the network clock speed value, use the **no** form of this command.

clock rate network-clock *rate*

no clock rate network-clock *rate*

Syntax Description

<i>rate</i>	Network clock rate, in bits per second. The range is from 56 kbps to 2048 kbps. The value entered should be a multiple of the value set for the network-clock base-rate command. There is no default rate.
-------------	---

Defaults

No clock rate is set.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(1)MA	This command was introduced on the Cisco MC3810 multiservice access concentrator.

Usage Guidelines

This command uses a synchronized clock on the serial port. The use of this command allows the clock on the serial port to be synchronized with the clock source of controller T1 0.

To configure the clock rate for a serial port in DTE mode, use the **clock rate line** command.

Examples

The following example configures the clock rate on serial port 1 in DCE mode:

```
interface serial 1
  clock rate network-clock 2048
```

Related Commands

Command	Description
clock rate line	Configures the line clock rate for serial ports 0 or 1 in DTE mode.
clock source (MC3810)	Specifies the clock source of a DS1 link on the Cisco MC3810 multiservice access concentrator.
network-clock base-rate	Configures the network clock base rate for universal I/O serial ports 0 and 1 on the Cisco MC3810 multiservice concentrator.

clock source

To configure the clock source of a DS1 link, enter the **clock source** command in interface 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

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)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:

```
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 (controller J1)

To configure the clock source for a J1 controller, 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}

no clock source

Syntax Description

line	The controller recovers external clock from the line and provides the recovered clock to the internal (system) clock generator. The line value is the default clock source.
internal	The controller synchronizes itself to the internal (system) clock.

Defaults

Clock source is line for the J1 controller.

Command Modes

Controller configuration

Command History

Release	Modification
11.1 T	This command was introduced.
12.2(8)T	The command was introduced as a J1 controller configuration for the Cisco 2600 and Cisco 3600 series.

Usage Guidelines

If multiple network modules are present in the router, then each J1 controller must be given a separate priority by configuration of the **network-clock-select** command. The controller having the highest priority will drive the internal clock.

Examples

The following example configures the clock source for line:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller j1 3/0
Router(config-controller)# clock source line
```

Related Commands

Command	Description
network-clock-select	Sets the selection priority for a clock source.

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	line	loop-timed
	Specifies that the internal clock source is used. This is the default.	Specifies that the network clock source is used.	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
```

clock source (SONET controller)

To specify the clock source of a SONET controller, 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 { **internal** | **line** | **loop** }

no clock source

Syntax Description	internal	line	loop
	Specifies that the clock source uses the internal clock provided by the Route Switch Controller (RSC). This is the default.	Specifies that the clock source uses the primary system clock from the optical line and the recovered clock will go through the RSC phased locked loop (PLL) circuitry. Can be used when one or more STM-1 cards are installed.	Specifies that the clock source uses the primary system clock from the optical line and the same recovered clock is used in the transmit (tx) direction without going through the RSC PLL circuitry. Can be used when only one STM-1 card is installed.

Defaults Internal

Command Modes Controller configuration

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

Examples The following example shows how to specify line timing as the clock source on a SONET controller of an STM-1 card in physical slot number 2 on a Cisco AS5850:

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

clock source (T1/E1 controller)

To set clocking for individual T1 or E1 links, use the **clock source** command in controller configuration mode. To return to the default, use the **no** form of this command.

clock source { **line** [**primary**] | **internal** | **free-running** }

no clock source

Syntax Description	line	primary	internal	free-running
	Specifies that the phase-locked loop (PLL) on this port derives its clocking from the external source to which the port is connected, which is generally the telephone company central office (CO). This is the default.	(Optional) Specifies that the PLL on this port derives its clocking from the external source to which the port is connected. This option also puts a second port, which is generally connected to the PBX, into looped-time mode. Both ports are configured with line , but only the port connected to the external source is configured with primary .	Specifies that the clock is generated from the T1 or E1 controller's internal PLL.	Specifies a free-running clock derived from the oscillator on the motherboard, which is used only for testing and back-to-back connections.

Defaults line.

Command Modes Controller configuration

Command History	Release	Modification
	12.2(2)XB	This command was introduced on Cisco 2600 series and Cisco 3660 routers.
	12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
	12.2(15)T	This command was implemented on the Cisco 2691 and the Cisco 3700 series.

Usage Guidelines For a detailed discussion of clock sources on individual ports, see “Clock Sources on Digital T1/E1 Voice Ports” in the “[Configuring Voice Ports](#)” chapter in the *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2.

Examples

The following example shows the router providing clock source to two controllers:

```
controller E1 1/0
  framing crc4
  linecoding hdb3
  clock source internal
ds0-group timeslots 1-15 type e&m-wink-start
!
controller E1 1/1
  framing esf
  linecoding b8zs
  clock source internal
ds0-group timeslots 1-15 type e&m-wink-start
```

The following example shows the digital voice hardware receiving clocking for the PLL from E1 1/0 and using this clock as a reference to clock E1 1/1. If controller E1 1/0 fails, the PLL internally generates the clock reference to drive E1 1/1.

```
controller E1 1/0
  framing crc4
  linecoding hdb3
  clock source line
ds0-group timeslots 1-15 type e&m-wink-start
!
controller E1 1/1
  framing crc4
  linecoding hdb3
  clock source internal
ds0-group timeslots 1-15 type e&m-wink-start
```

Related Commands

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

clock source (T3/E3 controller)

To specify where the clock source is obtained for use by a T3 or E3 controller, 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** }

no clock source

Syntax Description

internal	Specifies that the internal clock source is used. This is the default for T3.
line	Specifies that the network clock source is used. This is the default for E3.

Defaults

The internal clock source is used for T3 controllers. The line clock source is used for E3 controllers.

Command Modes

Controller configuration

Command History

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

Usage Guidelines

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

Configure the **clock source line** command if your telephone company or the remote data service unit provides the master clock of the T3 or E3 connection.

Configure the **clock source internal** command if your router provides the master clock of the T3 or E3 connection.



Note

For a back-to-back connection between two T3 or E3 network modules, one controller must be configured for internal clocking while the other controller must be configured for line clocking.

Examples

The following example shows the clock source set to line:

```
Router(config)# controller t3 1/0
Router(config-controller)# clock source line
```

Related Commands

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