Multichannel STM-1 Port Adapter

This feature module describes the multichannel STM-1 port adapter (PA-MC-STM-1) in Cisco IOS Release 12.2(8)T.

The PA-MC-STM-1 is a high-speed, single-port multichannel STM-1 port adapter. You can configure the PA-MC-STM-1 as a multichannel E1/E0 STM-1 port. The PA-MC-STM-1 can be configured into 63 individual E1 links. Each E1 link can carry a single channel at full or fractional rates, or be broken down into multiple DS0 or nx64 Kbps rates. The PA-MC-STM-1 supports up to three TUG-3/AU-3 transport slots numbered 1 through 3. You can configure each TUG-3/AU-3 to carry 21 SDH TU-12s. Each SDH TU-12 is capable of carrying a channelized E1 frame, which can be unchannelized to nx64-Kbps time slots.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for Multichannel STM-1 Port Adapter" section on page 25.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required

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Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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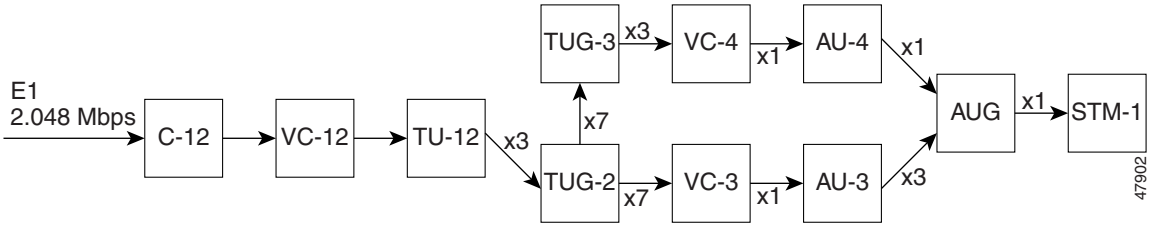
PA-MC-STM-1 Multiplexing Hierarchy

Figure 1 illustrates the synchronous digital hierarchy (SDH) multiplexing structure supported on the PA-MC-STM-1. The PA-MC-STM-1 multiplexing structure is a subset of that defined in ITU-T G.707. At the lowest level, containers (Cs) are input into virtual containers (VCs) with stuffing bits to create a uniform VC payload with a common bit-rate, ready for synchronous multiplexing. The VCs are then aligned into tributary units (TUs) where pointer processing operations are implemented. This allows the TUs to be multiplexed into TU groups (TUGs). Three TU-12s can be multiplexed into one TUG-2.

Figure 1 PA-STM-1 Multiplexing Structure



The TUGs are then multiplexed into higher-level VCs, which in turn are multiplexed into administrative units (AUs).The AUs are then multiplexed into an AU group (AUG), and the final payload from the AUG is then multiplexed into the Synchronous Transport Module (STM).

Benefits

The PA-MC-STM-1 port adapter provides the following benefits:

- High-density IP aggregation
- Reduction in provisioning costs
- Improved cable management
- Easier scaling of services
- Improved network availability

Restrictions

The PA-MC-STM-1 does not support the following:

- VIP2
- More than 256 logical channel groups per PA-MC-STM-1
- Channel-associated signaling (CAS) for voice channels
- E1 Facility Data Link (FDL)
- E3 and subrate E3

Related Features and Technologies

- PA-MC-T3
- PA-MC-E3

Related Documents

- Cisco IOS Wide-Area Networking Configuration Guide, Release 12.2
- Cisco IOS Wide-Area Networking Command Reference, Release 12.2
- Multichannel STM-1 Port Adapter Installation and Configuration
- Multichannel STM-1 Port Adapter for the Cisco 7500 Series Router

Supported Platforms

- Cisco 7200 series
- Cisco 7500 series

Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/fn. An account on Cisco.com is not required.

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

- CSA C22.2, No. 950
- ITU-T G.704
- ITU-T G.706

- ITU-TG.707
- ITU-T O.151
- ITU-T O.152
- ITU-T O.153
- FCC Part 15, class A
- FCC Part 68
- UL1950 3rd Edition

MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

- RFC 1406, *Definitions of Managed Objects for the DS1 and E1 Interface Types*
- RFC 1595, *Definitions of Managed Objects for the SONET/SDH Interface Type*

Note Because E1 FDL is not supported by the PA-MC-STM-1, the far-end statistics and control groups defined by RFC 1406 are not available.

Prerequisites

The PA-MC-STM-1 requires a VIP4-80 installed in a Cisco 7500 series router.

Configuration Tasks

See the following sections for configuration tasks for the PA-MC-STM-1. Each task in the list indicates if the task is optional or required.

- Configuring the SONET Controller (required)
- Configuring an AU-3 (required)
- Configuring a TUG-3 (required)
- Configuring a Channel Group on an E1 of an AU-3 (required)
- Configuring a Channel Group on an E1 of a TUG-3 (required)
- Configuring an E1 Line Mapped to an AU-3 (required)
- Configuring an E1 Line Mapped to a TUG-3 (required)
- Verifying the Configuration (optional)

Configuring the SONET Controller

To configure the SONET controller, use the following commands beginning in privileged EXEC mode:

	Command	Purpose
Step 1	`Router# configure terminal`	Enters configuration mode and specifies that the console terminal is the source of the configuration subcommands.

Step 2	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Selects a port of a PA-MC-STM-1 and enters controller configuration mode.

Step 3	`Router(config-controller)# framing {sonet | sdh}`	Configures the framing mode of the PA-MC-STM-1 to SONET or SDH. **sdh**—Selects SDH framing. SDH is the ITU standards equivalent of SONET. **sonet**—Selects SONET framing. SONET is the default.
Step 4	`Router(config-controller)# clock source {internal | line}`	Configures the clock source used by the SONET controller. • **internal**—The clocking source is obtained from the port adapter line. • **line**—The clocking source is obtained from the network. Network clocking source is the default.
Step 5	`Router(config-controller)# loopback {local | network}`	Enables loopback mode on a SONET controller. • **local**—Data is looped from the transmit path to the receive path allowing diagnostics to send data to itself without relying on any external connections. • **network**—Data is looped from the external port to the transmit port and back out the external port. No loopback enabled is the default.
Step 6	`Router(config-controller)# description string`	Specifies up to 80 characters of text describing the SONET controller. No description is the default.

Configuring an AU-3

Each of the administrative unit group (AUGs) and tributary unit group (TUGs) of a PA-MC-STM-1 can be configured to carry a set of E1 links that are mapped into TU-12s. To configure the AUG mapping to AU-3, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# framing sdh`	Configures the framing mode to SDH.
Step 3	`Router(config-controller)# aug mapping au-3`	Maps the AUG to AU-3 with the following muxing, alignment, and mapping: C-12 <-->VC-12 <--> TU-12<--> TUG-2 <--> VC-3 <--> AU-3 <--> AUG
Step 4	`Router(config-controller)# au-3 au-3-number`	Specifies the AU-3 number to configure:. • *au-3-number*—A number in the range of 1 to 3.
Step 5	`Router(config-ctrlr-au3)# mode c-12`	Specifies the mode of operation of the AU-3. • **c-12**—The AU-3 is divided into 21 TU-12s, each carrying an E1.
Step 6	`Router(config-ctrlr-au3)# idle pattern pattern`	Configures the idle pattern that is to be transmitted for unused time slots on all E1 lines of an AU-3. • *pattern*—Number in the range 0x0 to 0xFF (hexadecimal) or 0 to 225 (decimal).

Configuring a TUG-3

Each of the administrative unit groups (AUGs) and tributary unit groups (TUGs) of a PA-MC-STM-1 can be configured to carry a set of E1 links that are mapped into TU-12s. To configure the AUG mapping to AU-4, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# framing sdh`	Configures the framing mode to SDH.
Step 3	`Router(config-controller)# aug mapping au-4`	Maps the AUG to AU-4 with the following muxing, alignment, and mapping: C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> TUG-3 <--> VC-4 <--> AU-4 <--> AUG

	Command	Purpose
Step 4	`Router(config-controller)# au-4 au-4-number tug-3 tug-3-number`	Specifies the TUG-3 number to configure: • *au-4-number*—A number in the range of 1 to *n* where *n* is the STM level. (For the PA-MC-STM-1, *n* is always 1.) • *tug-3-number*—A number in the range of 1 to 3.
Step 5	`Router(config-ctrlr-tug3)# mode c-12`	Specifies the mode of operation of a TUG-3: • **c-12**—The TUG-3 is divided into 21 TU-12s each carrying an E1.
Step 6	`Router(config-ctrlr-tug3)# idle pattern pattern`	Configures the idle pattern that is to be transmitted for unused time slots on all E1 lines of an AU-4. • *pattern*—Number in the range 0x0 to 0xFF (hexadecimal) or 0 to 225 (decimal).

Configuring a Channel Group on an E1 of an AU-3

To configure a channel group on an E1 of an AU-3, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# framing sdh`	Configures the framing mode to SDH.
Step 3	`Router(config-controller)# aug mapping au-3`	Maps the AUG to an AU-3 with the following muxing, alignment, and mapping: C-12 <-->VC-12 <--> TU-12 <--> TUG-2 <--> VC-3 <--> AU-3 <--> AUG
Step 4	`Router(config-controller)# au-3 au-3-number`	Specifies the AU-3 number to configure. • *au-3-number*—A number in the range of 1 to 3.
Step 5	`Router(config-ctrlr-au3)# mode c-12`	Specifies the mode of operation of the AU-3. • **c-12**—The AU-3 is divided into 21 TU-12s each carrying an E1.

	Command	Purpose
Step 6	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number channel-group channel-group-number timeslots list-of-timeslots`	Creates a logical channel group on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **channel-group**—Defines a logical channel group to be a channelized E1 line. • *channel-group-number*—A number in the range of 0 to 30. • *list-of-timeslots*—A number in the range of 1 to 31 or a combination of subranges within 1 to 31. (Each subrange is a list of time slots that makes up the E1 line.)
	or	Use the **no** form of this command to remove a logical channel group. The default is no channel group configured on an E1 line.
	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number unframed`	Creates an unframed (clear channel) logical channel group on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3.
Step 7	`Router(config-ctrlr-au3)# exit` `Router(config-controller)# exit`	Returns to configuration mode.

Step 8	**Cisco 7200 series**
	`Router(config)# interface serial slot/port.au-3-number/tug-2-number/ e1-number:channel-group-number`
	Cisco 7500 series
	`Router(config)# interface serial slot/port-adapter/port.au-3-number/tug-2-number/ e1-number:channel-group-number`
		Selects the channel group interface to configure.
		Note When an unframed (clear channel) logical channel group is configured on an E1 line, the *channel-group-number* is always 0.

Step 9	`Router(config-if)# ip address 1.1.1.10 255.255.255.255`	Enables IP on the channel group interface.
Step 10	`Router(config-if)# encapsulation ppp`	Enables PPP on the channel group interface.

Configuring a Channel Group on an E1 of a TUG-3

To configure a channel group on an E1 of a TUG-3, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# framing sdh`	Configures the framing mode to SDH.
Step 3	`Router(config-controller)# aug mapping au-4`	Maps the AUG to AU-4 with the following muxing, alignment, and mapping: C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> TUG-3 <--> VC-4 <--> AU-4 <--> AUG
Step 4	`Router(config-controller)# au-4 au-4-number tug-3 tug-3-number`	Specifies the AU-4 and TUG-3 number to configure: • *au-4-number*—A number in the range of 1 to *n* where *n* is the STM level. (For the PA-MC-STM-1, *n* is always 1.) • *tug-3-number*—A number in the range of 1 to 3.
Step 5	`Router(config-ctrlr-tug3)# mode c-12`	Specifies the mode of operation of an AU-4. • **c-12**—The TUG-3 is divided into 21 TU-12s each carrying an E1.

	Command	Purpose
Step 6	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number channel-group channel-group-number timeslots list-of-timeslots`	Creates a logical channel group on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **channel-group**—Defines a logical channel group to be a channelized E1 line. • *channel-group-number*—A number in the range of 0 to 30. • *list-of-timeslots*—A number in the range of 1 to 31 or a combination of subranges within 1 to 31. (Each subrange is a list of time slots that makes up the E1 line.)
	or	Use the **no** form of this command to remove a logical channel group. The default is no channel group configured on an E1 line.
	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number unframed`	Creates an unframed (clear channel) logical channel group on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3.
Step 7	`Router(config-ctrlr-tug3)# exit` `Router(config-controller)# exit`	Returns to configuration mode.

Step 8	**Cisco 7200 series**
	`Router(config)# interface serial slot/port.au-4-number/tug-3-number/tug-2-number/ e1-number:channel-group-number`
	Cisco 7500 series
	`Router(config)# interface serial slot/port-adapter/port.au-4-number/tug-3-number/tug-2-number/ e1-number:channel-group-number`
		Selects the channel group interface to configure.
		Note When an unframed (clear channel) logical channel group is configured on an E1 line, the *channel-group-number* is always 0.

Step 9	`Router(config-if)# ip address 1.1.1.10 255.255.255.255`	Enables IP on the channel group interface.
Step 10	`Router(config-if)# encapsulation ppp`	Enables PPP on the channel group interface.

Configuring an E1 Line Mapped to an AU-3

To configure an E1 line mapped to an AU-3, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# aug mapping au-3`	Maps the AUG to an AU-3 with the following muxing, alignment, and mapping: C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> VC-3 <--> AU-3 <--> AUG
Step 3	`Router(config-controller)# au-3 au-3-number`	Specifies the AU-3 number to configure. • *au-3-number*—A number in the range of 1 to 3.
Step 4	`Router(config-ctrlr-au3)# mode c-12`	Specifies the mode of operation of the AU-3. • **c-12**—The AU-3 is divided into 21 TU-12s each carrying an E1.
Step 5	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number framing {crc4 | no crc4}`	Specifies the type of framing used by an E1 line. • tug-2-number—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **crc4**—4-bit cyclic redundancy check. • **no crc4**—Basic framing. The default is CRC4.
Step 6	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number clock source {internal | line}`	Specifies the clock source to be used by the E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • internal—Specifies the PA-MC-STM-1 as the clock source. • **line**—Specifies the E1 line as the clock source. The default is E1 line clock source.
Step 7	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number national bits pattern`	Configures the national reserved bits for the E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • *pattern*—The national reserved bit pattern is a hexadecimal value in the range 0x0 to 0x1F (hexadecimal) or 0 to 31 (decimal). The default setting is 0x1F.

	Command	Purpose
Step 8	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number bert pattern pattern interval time`	Sends a BERT pattern on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • pattern – 2^11, pseudorandom test pattern (2048 bits long) – 2^15, pseudorandom O.151 test pattern (32,768 bits long) – 2^20-O153, 2^20-1 O.153 test pattern – 2^20-QRSS, pseudorandom QRSS O.151 test pattern (1,048,575 bits long) • *time*—An interval in the range of 1 to14,400 minutes. The default is no BER test configured.
Step 9	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number loopback [local | network {line | payload}]`	Specifies a loopback for an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **local**—Loops transmitted E1 output back to the router via the internal E1 framer and loops E1 output to the network via the internal E1 framer. • **network**—Loops E1 input back to the network.
Step 10	`Router(config-ctrlr-au3)# tug-2 tug-2-number e1 e1-number shutdown`	Shuts down an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3.

Configuring an E1 Line Mapped to a TUG-3

To configure an E1 line mapped to a TUG-3, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	**Cisco 7200 series**
	`Router(config)# controller sonet slot/port`
	
	Cisco 7500 series
	`Router(config)# controller sonet slot/port-adapter/port`
		Enters SONET controller configuration mode.

Step 2	`Router(config-controller)# aug mapping au-4`	Maps the AUG to AU-4 with the following muxing, alignment, and mapping: C-12 <--> VC-12 <--> TU-12 <--> TUG-2 <--> TUG-3 <--> VC-4 <--> AU-4 <--> AUG

	Command	Purpose
Step 3	`Router(config-controller)# au-4 au-4-number tug-3 tug-3-number`	Specifies the AU-4 and TUG-3 number to configure: • *au-4-number*—A number in the range of 1 to *n* where *n* is the STM level. (For the PA-MC-STM-1 *n* is always 1.) • *tug-3-number*—A number in the range of 1 to 3.
Step 4	`Router(config-ctrlr-tug3)# mode c-12`	Specifies the mode of operation of a TUG-3. • **c-12**—The TUG-3 is divided into 21 TU-12s, each carrying an E1.
Step 5	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number framing {crc4 | no crc4}`	Specifies the type of framing used an by an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **crc4**—4-bit cyclic redundancy check. • **no crc4**—Basic framing. The default is CRC4.
Step 6	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number clock source {internal | line}`	Specifies the clock source to be used by the E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **internal**—Specifies the PA-MC-STM-1 as the clock source. • **line**—Specifies the E1 line as the clock source. The default is E1 line clock source.
Step 7	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number national bits pattern`	Configures the national reserved bits for the E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • *pattern*—The national reserved bit pattern is a hexadecimal value in the range 0x0 to 0x1F (hexadecimal) or 0 to 31 (decimal). The default setting is 0x1F.

	Command	Purpose
Step 8	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number bert pattern pattern interval time`	Sends a BERT pattern on an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • pattern – 2^11, pseudorandom test pattern (2048 bits long) – 2^15, pseudorandom O.151 test pattern (32,768 bits long) – 2^20-O153, 2^20-1 O.153 test pattern – 2^20-QRSS, pseudorandom QRSS O.151 test pattern (1,048,575 bits long) • **interval**— An interval in the range of 1 to 14400 minutes. The default is no BER test configured.
Step 9	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number loopback [local | network {line | payload}]`	Specifies a loopback for an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3. • **local**—Loops transmitted E1 output back to the router via the internal E1 framer and loops E1 output to the network via the internal E1 framer. • **network**—Loops E1 input back to the network.
Step 10	`Router(config-ctrlr-tug3)# tug-2 tug-2-number e1 e1-number shutdown`	Shuts down an E1 line. • *tug-2-number*—A number in the range of 1 to 7. • *e1-number*—A number in the range of 1 to 3.

Verifying the Configuration

You can verify the configuration and status of the controller by using the **show controller** commands as detailed below.

When AUG mapping is AU-4, view information about the SONET controller on a Cisco 7200 series router using the **sonet controller sonet** *slot/port* [**brief | tabular**] command. Use the **sonet controller sonet** *slot/port-adapter/port* [**brief | tabular**] command for a Cisco 7500 series router.

The following examples show sample output for a Cisco 7500 series router:

```
Router# show controller sonet 2/0/0
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU4.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM
```

```
Regenerator Section Status:
  No alarms detected.

Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects

Lower Order Path Status:
  VC-12 1/1/1/1 has no defects
  VC-12 1/1/1/2 has no defects
  VC-12 1/1/1/3 has no defects
  VC-12 1/1/2/1 has no defects
  VC-12 1/1/2/2 has no defects
  VC-12 1/1/2/3 has no defects

[display text omitted]

Data in current interval (137 seconds elapsed):
   Regenerator Section:
     0 CVs, 0 ESs, 0 SESs, 0 SEFSs
   Multiplex Section:
     0 CVs, 0 ESs, 0 SESs, 0 UASs
   Higher Order Path:
     Path# 1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
   Lower Order Path:
     VC-12 1/1/1/1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/1/1/2: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/1/1/3: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/1/2/1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
[display text omitted]

SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (137 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
SONET 2/0/0   E1   1/1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (137 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
[display text omitted]

Router# show controller sonet 2/0/0 brief
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU4.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM

Regenerator Section Status:
  No alarms detected.
```

```
Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects

Lower Order Path Status:
  VC-12 1/1/1/1 has no defects
  VC-12 1/1/1/2 has no defects
  VC-12 1/1/1/3 has no defects
  VC-12 1/1/2/1 has no defects
  VC-12 1/1/2/2 has no defects
  VC-12 1/1/2/3 has no defects
[display text omitted]

SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
SONET 2/0/0   E1   1/1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
SONET 2/0/0   E1   1/1/1/3 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
[display text omitted]

Router# show controller sonet 2/0/0 tabular
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU4.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM

Regenerator Section Status:
  No alarms detected.

Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects

Lower Order Path Status:
  VC-12 1/1/1/1 has no defects
  VC-12 1/1/1/2 has no defects
  VC-12 1/1/1/3 has no defects
  VC-12 1/1/2/1 has no defects
[display text omitted]

Regenerator Section:
  INTERVAL       CV    ES   SES  SEFS
  20:47-20:50     0     0     0     0

Multiplex Section:
  INTERVAL       CV    ES   SES   UAS
  20:47-20:50     0     0     0     0

Higher Order Path:
  Path# 1:
```

```
  INTERVAL       CV    ES   SES   UAS
  20:47-20:50     0     0     0     0

Lower Order Path:
  AU-4# 1, TUG-3# 1, TUG-2# 1 VC-12# 1:
  INTERVAL       CV    ES   SES   UAS
  20:47-20:50     0     0     0     0

  AU-4# 1, TUG-3# 1, TUG-2# 1 VC-12# 2:
  INTERVAL       CV    ES   SES   UAS
  20:47-20:50     0     0     0     0

  AU-4# 1, TUG-3# 1, TUG-2# 1 VC-12# 3:
  INTERVAL       CV    ES   SES   UAS
  20:47-20:50     0     0     0     0
[display text omitted]

SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  20:47-20:50     0     0     0     0     0     0     0     0     0     0     0
SONET 2/0/0   E1   1/1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  20:47-20:50     0     0     0     0     0     0     0     0     0     0     0
SONET 2/0/0   E1   1/1/1/3 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  20:46-20:50     0     1     0     0     0     0     0     0     0    32     0
[display text omitted]
```

When AUG mapping is AU-3, view information about the SONET controller by using the **sonet controller sonet** *slot/port* [**brief | tabular**] command for a Cisco 7200 series router. Use the **sonet controller sonet** *slot/port-adapter/port* [**brief | tabular**] command for a Cisco 7500 series router.

The following examples show sample output for a Cisco 7500 series router:

```
Router# show controller sonet 2/0/0
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU3.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM

Regenerator Section Status:
  No alarms detected.

Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects
  Path# 2 has no defects
  Path# 3 has no defects

Lower Order Path Status:
  VC-12 1/1/1 has no defects
```

```
  VC-12 1/1/2 has no defects
  VC-12 1/1/3 has no defects
  VC-12 1/2/1 has no defects
[display text omitted]
Data in current interval (85 seconds elapsed):
   Regenerator Section:
     0 CVs, 0 ESs, 0 SESs, 0 SEFSs
   Multiplex Section:
     0 CVs, 0 ESs, 0 SESs, 0 UASs
   Higher Order Path:
     Path# 1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     Path# 2: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     Path# 3: 0 CVs, 0 ESs, 0 SESs, 0 UASs
   Lower Order Path:
     VC-12 1/1/1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/1/2: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/1/3: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/2/1: 0 CVs, 0 ESs, 0 SESs, 0 UASs
     VC-12 1/2/2: 0 CVs, 0 ESs, 0 SESs, 0 UASs
[display text omitted]

SONET 2/0/0   E1   1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (85 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
SONET 2/0/0   E1   1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (85 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
[display text omitted]

Router# show controller sonet 2/0/0 brief
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU3.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM

Regenerator Section Status:
  No alarms detected.

Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects
  Path# 2 has no defects
  Path# 3 has no defects

Lower Order Path Status:
  VC-12 1/1/1 has no defects
  VC-12 1/1/2 has no defects
```

```
  VC-12 1/1/3 has no defects
  VC-12 1/2/1 has no defects
[display text omitted]
SONET 2/0/0   E1   1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
SONET 2/0/0   E1   1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
SONET 2/0/0   E1   1/1/3 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
[display text omitted]

Router# show controller sonet 2/0/0 tabular
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
  Applique type is Channelized Sonet/SDH
  Clock Source is Internal, AUG mapping is AU3.

Medium info:
  Type:SDH, Line Coding:NRZ, Line Type:Short SM

Regenerator Section Status:
  No alarms detected.

Multiplex Section Status:
  No alarms detected.

Higher Order Path Status:
  Path# 1 has no defects
  Path# 2 has no defects
  Path# 3 has no defects

Lower Order Path Status:
  VC-12 1/1/1 has no defects
  VC-12 1/1/2 has no defects
  VC-12 1/1/3 has no defects
  VC-12 1/2/1 has no defects
[display text omitted]
Regenerator Section:
  INTERVAL       CV    ES   SES  SEFS
  21:22-21:24     0     0     0     0

Multiplex Section:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0

Higher Order Path:
  Path# 1:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0

  Path# 2:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0

  Path# 3:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0
```

```
Lower Order Path:
  AU-3# 1, TUG-2# 1 VC-12# 1:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0

  AU-3# 1, TUG-2# 1 VC-12# 2:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0

  AU-3# 1, TUG-2# 1 VC-12# 3:
  INTERVAL       CV    ES   SES   UAS
  21:22-21:24     0     0     0     0
[display text omitted]

SONET 2/0/0   E1   1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  21:22-21:24     0     0     0     0     0     0     0     0     0     0     0
SONET 2/0/0   E1   1/1/2 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  21:22-21:24     0     0     0     0     0     0     0     0     0     0     0
SONET 2/0/0   E1   1/1/3 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  21:22-21:24     0     0     0     0     0     0     0     0     0     0     0
[display text omitted]
```

When AUG mapping is AU-4, view information about a specific E1 line of a SONET controller by using the **show controller sonet** *slot/port.au-4-number/tug-3-number/tug-2-number/e1-number* [**brief | tabular**] command for a Cisco 7200 series router.

Use the **show controller sonet** *slot/port-adapter/port.au-4-number/tug-3-number/tug-2-number/e1-number* [**brief | tabular**] command for a Cisco 7500 series router. This command displays error and performance statistics.

The following examples show sample output for a Cisco 7500 series router:

```
Router# show controller sonet 2/0/0.1/1/1/1

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (237 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

Router# show controller sonet 2/0/0.1/1/1/1 brief

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
```

```
  Framing is crc4, Clock Source is internal, National bits are 0x1F.

Router# show controller sonet 2/0/0.1/1/1/1 tabular

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
SONET 2/0/0   E1   1/1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  20:47-20:51     0     0     0     0     0     0     0     0     0     0     0

Router# show controller sonet 0/0/0.1/2/4/1 brief

SONET 0/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version : 0.2.3, ROM Version : 1.2
  FREEDM version : 2, F/W Version : 0.14.0
SONET 0/0/0   E1   1/2/4/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is line, National bits are 0x1F.


Router# show controller sonet 0/0/0.1/2/4/1 tabular

SONET 0/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version : 0.2.3, ROM Version : 1.2
  FREEDM version : 2, F/W Version : 0.14.0
SONET 0/0/0   E1   1/2/4/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is line, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  16:56-16:57     0     0     0     0     0     0     0     0     0     1     0
```

When AUG mapping is AU-3, view information about a specific E1 line of a SONET controller by using the **show controller sonet** *slot/port.au-3-number/tug-2-number/e1-number* [**brief | tabular**] command for a Cisco 7200 series router.

Use the **show controller sonet** *slot/port-adapter/port.au-3-number/tug-2-number/e1-number* [**brief | tabular**] command for a Cisco 7500 series router. This command displays error and performance statistics.

The following examples show sample output for a Cisco 7500 series router:

```
Router# show controller sonet 2/0/0.1/1/1

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
SONET 2/0/0   E1   1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  Data in current interval (175 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

Router# show controller sonet 2/0/0.1/1/1 brief
```

```
SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version :0.2.3, ROM Version :1.2
  FREEDM version :2, F/W Version :1.2.0
SONET 2/0/0   E1   1/1/1 is up
  No alarms detected.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.

Router# show controller sonet 2/0/0.1/1/1 brief

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version : 0.2.3, ROM Version : 1.2
  FREEDM version : 2, F/W Version : 0.14.0
SONET 2/0/0   E1   1/1/1 is down
  Transmitter is sending LOF Indication (RAI).
  Receiver has loss of frame.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.

Router# show controller sonet 2/0/0.1/1/1 tabular

SONET 2/0/0 is up.
Channelized OC-3/STM-1 SMI PA
  H/W Version : 0.2.3, ROM Version : 1.2
  FREEDM version : 2, F/W Version : 0.14.0
SONET 2/0/0   E1   1/1/1 is down
  Transmitter is sending LOF Indication (RAI).
  Receiver has loss of frame.
  Framing is crc4, Clock Source is internal, National bits are 0x1F.
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SS
  17:26-17:29     0     0     0     0     0     0     0     0     0   173     0
  17:11-17:26     0     0     0     0     0     0     0     0     0   471     0
  16:56-17:11     0     0     0     0     0     0     0     0     0     0     0
  16:41-16:56     0     0     0     0     0     0     0     0     0     0     0
  16:26-16:41     0     0     0     0     0     0     0     0     0   216     0
  16:11-16:26     0     0     0     0     0     0     0     0     0   225     0
  Total           0     0     0     0     0     0     0     0     0   912     0
```

Monitoring and Maintaining the PA-MC-STM-1

To monitor and maintain the PA-MC-STM-1, use the **show interface** command.

The following sample output displays the interface statistics of a PA-MC-STM-1 in port adapter slot 0 of a VIP4 in interface processor slot 2 of a Cisco 7500 series router:

```
Router# show interface serial 2/0/0.1.1.1.1:1

Serial2/0/0.1/1/1/1:1 is up, line protocol is up
Hardware is cyBus Channelized OC3/STM-1 PA
Internet address is 105.105.105.1/24
MTU 1500 bytes, BW 1984 Kbit, DLY 20000 usec, rely 255/255, load 36/255
Encapsulation HDLC, loopback not set
Keepalive not set
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Input queue: 1/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations  0/1/256 (active/max active/max total)
Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 286000 bits/sec, 36 packets/sec
5 minute output rate 284000 bits/sec, 36 packets/sec
8019 packets input, 11695347 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
7991 packets output, 11650799 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
2 carrier transitions no alarm present
Timeslot(s) Used:1-31, Transmitter delay is 0 flags, transmit queue length 6
[Additional display text for remaining interfaces omitted]
```

Configuration Examples

- Configuring the PA-MC-STM-1 Example
- Configuring a Logical Channel Group on an E1 Line Example
- Configuring a Channel Group Interface Example
- Configuring an E1 Unframed Channel Example

Configuring the PA-MC-STM-1 Example

You can configure each of the AUGs and TUGs of a PA-MC-STM-1 to carry a set of E1 links that are mapped into tributary unit level-12s (TU-12s).

In the following example, SDH framing, internal clock source, AUG mapping au-4 and idle pattern are configured:

```
Router(config)# controller sonet 1/0
Router(config-controller)# framing sdh
Router(config-controller)# clock source internal
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# mode c-12
Router(config-ctrlr-tug3)# tug-2 4 e1 channel-group 15 timeslots 1-5, 20-23
Router(config-ctrlr-tug3)# idle pattern 0x0
```

Configuring a Logical Channel Group on an E1 Line Example

To configure a logical channel group on an E1 line, use the **tug-2** *tug-2-number* **e1** *e1-number* **channel-group** *channel-group-number* **timeslots** *list-of-timeslots* command. In the following example, logical channel group 15 on E1 line 1 is configured and channelized time slots 1 to 5 and 20 to 23 are assigned to the newly created logical channel group:

```
Router(config)# controller sonet 1/0/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# mode c-12
Router(config-ctrlr-tug3)# tug-2 4 e1 1 channel-group 15 timeslots 1-5, 20-23
```

Configuring a Channel Group Interface Example

Once a channel group has been created, interface serial configuration commands may be used as in the following example:

```
Router(config)# controller sonet 1/0/0
Router(config-controller)# framing sdh
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# mode c-12
Router(config-ctrlr-tug3)# tug-2 4 e1 10 channel-group 15 timeslots 1-5, 20-23
Router(config-ctrlr-tug3)# exit
Router(config-controller)# exit
Router(config)# interface serial 1/1/0.1/2/4/1:15
Router(config-if)# ip address 1.1.1.10 255.255.255.252
Router(config-if)# encapsulation ppp
```

Configuring an E1 Unframed Channel Example

To create an unframed or clear channel logical channel group on an E1 line, use the **tug-2** *tug-2-number* **e1** *e1-number* **unframed** command, as shown in the following example:

```
Router(config)# controller sonet 1/0/0
Router(config-controller)# aug mapping au-4
Router(config-controller)# au-4 1 tug-3 2
Router(config-ctrlr-tug3)# tug-2 4 e1 1 unframed
Router(config-ctrlr-tug3)# mode c-12
```

Feature Information for Multichannel STM-1 Port Adapter

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for Multichannel STM-1 Port Adapter

Feature Name	Releases	Feature Information
Multichannel STM-1 Port Adapter	12.0(14)S	This feature was introduced for the Cisco 7500 series on Cisco IOS Release 12.0(14)S.
	12.1(7)E	This feature was integrated into Cisco IOS Release 12.1(7)E. Support for this feature was added to Cisco 7200 VXR routers and Catalyst 6000 family switches.
	12.2(8)T	This feature was integrated into Cisco IOS Release 12.2(8)T for Cisco Cisco 7200 and Cisco 7500 series routers.
	12.0(14)S	This feature was introduced for the Cisco 7500 series on Cisco IOS Release 12.0(14)S.

Glossary

AUG—administrative unit group in SDH mode

BER—bit error rate

CAS—channel-associated signalling

CRC4—cyclic redundancy check. Error-checking technique in which the frame recipient calculates a remainder by dividing frame contents by a prime binary divisor and compares the calculated remainder to a value stored in the frame by the sending node.

E1—A digital carrier used to transmit a formatted signal at 2.048 Mbps.

ITU—International Telecommunication Union–Telecommunication standards sector

PRI—Primary Rate Interface

SDH—synchronous digital hierarchy. The ITU equivalent of SONET.

SONET—Synchronous Optical Network. The ANSI specification describing the data format used in high-speed optical data transmission

STM-n—Synchronous Transport Module level-n (STM-1 is 155.52 Mbps.)

TU-n—tributary unit level-n

TUG-n—tributary unit group-n

VC—virtual circuit

VC-n—virtual container level-n

VIP—Virtual Interface Processor