



1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE Line Cards for the Cisco 12000 Series Router

This document describes the software configuration of the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards on the Cisco 12000 Series Router.

Feature History

Release	Modification
12.0(21)S1, 12.0(21)ST	This feature was introduced.
12.0(32)S	Added non-support for DS3 loopbacks to Footnote 1 in Table 2.
12.0(32)S11	Added feature for reporting defects that are cleared before the expiry of the delay timer on a 1-Port Channelized OC-48/STM-16 ISE line card.
12.0(33)S4	Updated details on configuring delay timer on a SONET controller.

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Contents

- [Information About the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE Line Cards](#), page 2
- [Initial Configuration of the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE Line Cards](#), page 2
- [Reporting Cleared Alarms on a 1-Port Channelized OC-48/STM-16 ISE](#), page 4
- [Configuring BER Testing](#), page 39



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- [Using show Commands to Verify Controller and Interface Status, page 43](#)
- [Additional References, page 48](#)

Information About the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE Line Cards

The 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards provide IP services engine technology on channelized packet over SONET (POS)/Synchronous Digital Hierarchy (SDH) interfaces. Each of the line cards provides up to 48 channelized POS/SDH, DS-3, or E3 interfaces.

The configuration of these line cards is identical, except for the number of interfaces available on each port. The 1-Port Channelized OC-48/STM-16 ISE line card has 1 port that provides up to 48 interfaces, while the 4-Port Channelized OC-12/STM-4 ISE line card has 4 ports that each provide up to 12 interfaces.

Initial Configuration of the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE Line Cards

The following tables indicate the initial configuration of the line cards. [Table 1](#) lists the default controller parameters and [Table 2](#) lists the default interface parameters.

For information, descriptions of configuration commands, and the configuration options available, refer to the “Feature Overview” and “Configuring Tasks” sections of the *IP Services Engine Line Cards* document and the appropriate software publications listed in the “[Additional References](#)” section on [page 48](#).

Table 1 Controller Default Configuration Values

Parameter ¹	Configuration Command	Default Value
Framing	[no] framing [sdh sonet]	sonet
Clock source	[no] clock source [internal line]	line
AUG mapping ²	[no] aug-mapping [au-3 au-4]	no aug-mapping
Loopback	[no] loopback [internal line]	no loopback
SONET overhead	[no] overhead [j0 value] [s1s0 value]	j0 set to 1; s1s0 set to 0x00 ³
Thresholds	[no] ber-threshold b1-tca [3..9]	6(10e-6)
	[no] ber-threshold b2-tca [3..9]	6(10e-6)
	[no] ber-threshold sd-ber [3..9]	6(10e-6)
	[no] ber-threshold sf-ber [3..9]	3(10e-6)
Alarm reporting	[no] alarm-report [b1-tca b2-tca lais lrdi sd-ber sf-ber slof slof]	b1-tca, b2-tca, sf-ber, slof, slof
Shutdown	[no] shutdown	no shutdown

1. Scrambling is always enabled and is not configurable.

2. AUG mapping is only available for SDH framing.
3. s1s0 should be set to 2 for SDH framing.

Table 2 *Interface Default Configuration Values*

Parameter	Configuration Command	Default Value
Encapsulation	[no] encapsulation [hdlc ppp frame-relay]	hdlc
Transmitter delay	[no] transmitter-delay [0..255]	1
Scramble (POS)	[no] pos scramble-atm	no pos scramble
Scramble (DS3/E3)	[no] scramble	no scramble
CRC (POS)	[no] crc [16 32]	16 for STS-3c/STM-1 POS 32 for STS-12c/STM-4 and STS-48c/STM-16 POS
CRC (DS3/E3)	[no] crc [16 32]	16
MTU	[no] mtu [64..15360]	4470 bytes
Keepalive	[no] keepalive [0..32767]	10 seconds
Shutdown	[no] shutdown	shutdown
Loopback (POS) ¹	[no] loopback [internal network]	no loopback
Loopback (DS3) ¹	[no] loopback [local network remote]	no loopback
Loopback (E3) ¹	[no] loopback [local network]	no loopback
SONET overhead (POS)	[no] pos flag c2 [0..255]	207
SONET overhead (DS3/E3)	[no] overhead c2 [0..255]	4
SONET overhead (DS3/E3) ²	[no] overhead j1 message <string>	string is 15 characters
Thresholds (POS)	[no] pos threshold b3-tca [3..9]	6(10e-6)
BER threshold (DS3/E3)	[no] ber-threshold b3-tca [3..9]	6(10e-6)
Alarm reporting	[no] alarm-report [pais plop prdi b3-tca all]	b3-tca, plop
Framing (DS3)	[no] framing [m13 c-bit]	C-bit
Data inversion (DS3/E3)	[no] invert data	no invert data
DSU bandwidth (DS3)	[no] dsu bandwidth [1..44210]	44,210 Kbps
DSU mode (DS3/E3) ³	[no] dsu mode [cisco digital-link kentrox larscom adtran verilink]	cisco
Remote request (DS3)	[no] dsu remote accept fullrate	accept
National bit (E3)	[no] national bit 1	no national bit 1

1. Note that for DS3 interfaces, the local loopback at the interface level is not a true loopback; the interface is forced to an "up" state so that it can be pinged. For this reason, the following restrictions apply for DS3 interfaces in local loopback:
 - Interface counters do not increment.
 - BERT tests do not function (BERT traffic cannot be passed on this type of loopback).
 - Keepalives must be disabled with the `no keepalive` command.
 - The interface in internal/local loopback should not be on the same subnet as any other interfaces on the router.
2. This command is only for SDH framing.
3. If DSU mode is set to Kentrox, only full DS3/E3 bandwidth is supported for line cards with revision 3 of ASIC GULF. The revision number of ASIC GULF can be obtained with the `show controller provision <slot #>` command.

Table 3 lists the interface/channel configuration commands that are used in the configuration tasks described in this document. You might also need to enter other configuration commands, depending on your system configuration requirements.

Table 3 Interface/Channel Configuration Commands

Command	Description
sts-1 <i>start-channel - end-channel</i> pos	Defines a concatenated channel, such as STS-3c. <i>start-channel</i> also defines the interface number.
au-3 <i>start-au3-number - end-au3-number</i> pos	Defines a concatenated channel such as STM-1. <i>start-au3-number</i> also defines the interface number.
au-4 <i>start-au4-number - end-au4-number</i> pos	Defines a concatenated STM-1 channel. <i>start-au4-number</i> also defines the interface number.
au-3 <i>start-au3-number</i> serial [t3 e3]	Defines a DS3/E3 channel. <i>start-au3-number</i> also defines the interface number.
sts-1 <i>start-channel</i> serial t3	Defines a DS3 channel. <i>start-channel</i> also defines the interface number.
au-4 <i>start-au4-number</i> vc-3 <i>VC3-number</i> serial [t3 e3]	Defines a DS3 or E3 channel. The interface number is defined by <i>start-au4-number:VC3-number</i> . "T3" is equivalent to "DS3".

Reporting Cleared Alarms on a 1-Port Channelized OC-48/STM-16 ISE

Reporting of ongoing network events helps the network administrator to identify any anomalies existing in the network. The section discusses the functionality of storing a log of alarms that get cleared before the delay time expires. The feature is to be used as a tool for understanding the network events and how delay trigger configuration is taking effect. It contains the following topics:

- [Overview, page 5](#)
- [Prerequisites for Logging Cleared Alarm Details, page 5](#)
- [Enabling Logging of Cleared Alarms, page 7](#)

Overview

A trigger is an alarm that, when activated, causes the path or line protocol to go down. Using the **pos delay triggers [line | path] ms** command, activate the alarm and specify the delay for uptime of the POS interface. This delays the line protocol to go down for the specified milliseconds when trigger alarms are received. Alarms generated and persisting after the delay timer expires are escalated and reported. Using the **pos delay triggers report** command on a POS interface of a 1-Port Channelized OC-48/STM-16 ISE line card, you can log details for alarms that are cleared before the expiry of the delay timer.

**Note**

The functionality to log alarms that are cleared before the delay timer expires, is off by default. Only when the command is executed under the DS3 serial interface or POS interface or SONET controller, the feature is turned on. The command syntax varies depending on the interface type.

Prerequisites for Logging Cleared Alarm Details

Following are the prerequisites for executing the command to log details of cleared alarms:

- [Configure delay timers for a 1-Port Channelized OC-48/STM-16 ISE](#)
- [Verify configuration of delay timers](#)

Configuring Delay Timers for a 1-Port Channelized OC-48/STM-16 ISE Line Card

This section discusses how to configure delay timers on a 1-Port Channelized OC-48/STM-16 ISE line card. The command to configure the delay timers on a POS interface/DS3 serial interface/SONET controller is different. The following section describes how each of these can be configured:

- [Configuring Delay Timer on a POS Interface, page 5](#)
- [Configuring Delay Timer on a DS3 Serial Interface, page 6](#)
- [Configuring Delay Timer on a SONET Controller, page 6](#)

Configuring Delay Timer on a POS Interface

You can issue the **pos delay triggers [line | path] ms** command to delay a down trigger of the line or path on the POS interface. You can set the delay from 0 to 10000 milliseconds. The default delay is 100 milliseconds. To configure the POS line or path level delay triggers, use the following command in interface configuration mode:

	Command	Purpose
Step 1	<code>pos delay triggers line ms</code>	Specifies a delay for setting the line protocol to down when a line-level trigger alarm is received, where <ul style="list-style-type: none"> ms—Specifies the delay in milliseconds. The default delay is 100 milliseconds.
	Example: Router(config-if)# <code>pos delay triggers line ms</code>	
Step 2	<code>pos delay triggers path ms</code>	Specifies that path-level alarms should act as triggers and specifies the delay for setting the line protocol to down when a path-level trigger alarm is received, where <ul style="list-style-type: none"> ms—Specifies the delay in milliseconds. The default delay is 100 milliseconds.
	Example: Router(config-if)# <code>pos delay triggers path ms</code>	

Configuring Delay Timer on a DS3 Serial Interface

You can issue the **alarm-delay triggers path ms** command to delay a down trigger of the path on a DS3 serial interface. You can set the delay from 0 to 10000 milliseconds. The default delay is 100 milliseconds. To configure the DS3 path level triggers, use the following command in interface configuration mode:

	Command	Purpose
Step 1	<code>alarm-delay triggers path ms</code>	Specifies a delay for setting the path protocol on a DS3 serial interface to down when a path-level trigger alarm is received, where <ul style="list-style-type: none"> ms—Specifies the delay in milliseconds. The default delay is 100 milliseconds.
	Example: Router# <code>configure</code> Router(config)# <code>interface serial 3/0:1</code> Router(config-if)# <code>alarm-delay triggers path ms</code>	

Configuring Delay Timer on a SONET Controller

You can issue the **delay triggers line ms** command to delay a down trigger of the line on a SONET controller. You can set the delay from 0 to 10000 milliseconds. The default delay is 100 milliseconds. For Cisco IOS Release 12.0(33)S4 or later, if the **delay triggers path** is configured on an interface, the value for **delay triggers line** can be equal to or less than the value configured for the **delay triggers path**.

To configure the SONET line level triggers, use the following command in interface configuration mode:

	Command	Purpose
Step 1	<code>delay triggers line ms</code>	Specifies a delay for setting the line protocol on a SONET controller to down when a line-level trigger alarm is received, where <ul style="list-style-type: none"> ms—Specifies the delay in milliseconds. The default delay is 100 milliseconds.
	Example: Router# <code>configure</code> Router(config)# <code>controller sonet 3/0</code> Router(config-if)# <code>delay triggers line ms</code>	

Verifying Delay Timer on a 1-Port Channelized OC-48/STM-16 ISE Line Card

To verify POS alarm trigger delay, execute the following commands in privileged EXEC mode and observe the values shown in the “pos delay triggers line” and “pos delay triggers path” fields.

The following example shows the POS alarm trigger delays for interface port 0 on the POS SPA installed in the SIP that is located in slot 2 of the Cisco 12000 series router:

```
Router# show run interface pos 2/0/0

Building configuration...
Current configuration : 258 bytes
!
interface POS2/0/0
no ip address
no ip directed-broadcast
encapsulation frame-relay
loopback internal
crc 32
pos ais-shut
pos delay triggers report

pos delay triggers line 511
pos delay triggers path 511
```

```
frame-relay intf-type dce
```

The following example shows the POS alarm trigger delays for DS3 serial interface on slot 0 and port 1 of the Cisco 12000 series router:

```
Router# show run interface serial 3/0:1

Building configuration...
Current configuration : 100 bytes
interface Serial3/0:1
no ip address
no ip directed-broadcast
alarm delay triggers report

pos delay triggers path 511
```

The following example shows the POS alarm trigger delays for a SONET controller on slot 3, port 0 of the Cisco 12000 series router:

```
Router# show run | b SONET

controller SONET 3/0
clock source internal
delay triggers report

delay triggers line 100
```

Enabling Logging of Cleared Alarms

To log cleared alarms and track the network events that are cleared before the delay timer expires, execute the **pos delay triggers report** command on a POS interface. When defects are detected on the Cisco 12000 Series Router, system looks if there is any path or line delay configured. If delay trigger is configured, the respective timer is started and a message is logged on the console indicating the time stamp, defect type, and the interface on which the delay timer has been kicked off. If the trigger persists even after the delay timer expires then an alarm is escalated and reported to the administrator. If the defect clears before the expiry of the timer, a message is logged on the console indicating the time stamp, defect type and interface under which the defect got cleared.

**Note**

This feature is supported on all POS line cards, shared port adapters (SPAs), serial interfaces, or POS interfaces on a 1-Port Channelized OC-48/STM-16 ISE line card.

The command syntax for enabling this feature varies, depending on the interface type. The following examples, provide details regarding the command syntax to enable this feature for each of the interface types for a 1-Port Channelized OC-48/STM-16 ISE line card:

The following example is for enabling the feature on a POS interface:

```
Router(config-if)# pos delay triggers report
```

The following example is for enabling the feature on a DS3 serial interface:

```
Router(config-if)# alarm-delay triggers report
```

The following example is for enabling the feature on a SONET controller:

```
Router(config-controller)# delay triggers report
```


The following is an example of messages logged on the console, after the delay timer is started:

```
SLOT 0:*Apr 3 23:13:21.440: port 16: PAIS holdoff timer started
SLOT 0:*Apr 3 23:13:21.440: port POS0/1/0: PAIS holdoff timer started
SLOT 0:*Apr 3 23:13:21.440: port POS0/1/0: clear_alarm(PAIS): defect cleared in the
holdoff period
SLOT 0:*Apr 3 23:13:21.440: port 16: clear_alarm(PAIS): Defect cleared in the holdoff
period
Router#
*Apr 3 23:13:31.464: %SONET-4-ALARM: POS0/1/0: LAIS
Router#
*Apr 3 23:13:41.464: %LINK-3-UPDOWN: Interface POS0/1/0, changed state to down
*Apr 3 23:13:42.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface POS0/1/0, changed
state to down
```

Configuring Interfaces Using SONET or SDH Framing

This section provides procedures for configuring the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards with SONET or SDH framing:

- [Verifying Dynamic Provisioning Capability of a Line Card, page 9](#)
- [Configuring Interfaces Using SONET Framing, page 10](#)
- [Configuring Interfaces Using SDH Framing with AU-3 Mapping, page 12](#)
- [Configuring Interfaces Using SDH Framing with AU-4 Mapping, page 22](#)

A Cisco 12000 Series Router identifies an interface address by its line card slot number and port number, in the format *slot/port*. There is one port on the 1-Port Channelized OC-48/STM-16 ISE line card; the port is numbered 0. There are four ports on the 4-Port Channelized OC-12/STM-4 ISE line card; they are numbered 0 to 3.

Verifying Dynamic Provisioning Capability of a Line Card

Dynamic provisioning refers to the ability of a line card to support rechannelization of a fiber port without having to reload the microcode for the line card after a channelization change.

The 1-port channelized OC-48/STM-16 ISE and 4-port channelized OC-12/STM-4 ISE line cards with ASIC GULF chips with revision 4 or higher support dynamic provisioning. To determine whether the line card has dynamic provisioning, use the **show controller provision <slot #>** command to verify the ASIC GULF chip revision level as follows:

```
router# show controller provision 2
Slot 2 :CH-OC16-3-X, GULF Revision:4, Dynamic Provisioning:enabled
'microcode reload' required:No
      Interface POS5/0:1 :      activated
      Interface POS5/1:1 :      activated
      Interface POS5/1:4 :      activated
```

If the revision level of the ASIC GULF chip is 4 or higher, you can enable dynamic provisioning by using the **hardware-module <slot #> provision dynamic** command. Refer to the *IP Services Engine Line Cards* document.

Configuring Interfaces Using SONET Framing

When using SONET framing, you can channelize each port on the 1-Port Channelized OC-48/STM-16 ISE line cards to have one of the following:

- 1 STS-48c POS interface
- 4 STS-12c POS interfaces
- 16 STS-3c POS interfaces
- 48 DS3 serial interfaces
- a combination of STS-12c POS interfaces, STS-3c POS interfaces, and DS3 interfaces, provided that the SONET time slot grouping rule is respected.

When using SONET framing, you can channelize each port on the 4-Port Channelized OC-12/STM-4 ISE line card to have 1, 4, or 12 interfaces, or a combination of STS-3c POS interfaces and DS-3 serial interfaces. The number of interfaces you have available depends on how you group the channels together.

Before you configure the line card, you must decide how you want to channelize each port. Refer to the “Feature Overview” and “Configuring Tasks” sections of the *IP Services Engine Line Cards* document and the appropriate software publications listed in the “Additional References” section on page 48.

This procedure describes how to enable an interface and specify IP routing on a 1-Port Channelized OC-48/STM-16 ISE line card that is channelized as follows:

- Channels 1 to 3: STS-3c POS interface
- Channels 4 to 6: 3 DS3 interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STS-12c POS interface
- Channels 25 to 48: not configured



Note

The 4-Port Channelized OC-12/STM-4 ISE line card is configured using a similar procedure, except the channelization will differ.

Step 1 Enter the **configure terminal** EXEC command to enter global configuration mode as follows:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

Step 2 If the line card supports dynamic provisioning (see “[Verifying Dynamic Provisioning Capability of a Line Card](#)” section on page 9), use the **hardware-module <slot #> provision dynamic** command to enable dynamic provisioning. Otherwise go to Step 3.

```
router(config)# hardware-module slot 5 provision dynamic
```

Step 3 Configure channels 1 to 3 as an STS-3c POS interface, channels 4 to 6 as three DS3 serial interfaces, and channels 13 to 24 as an STS-12c POS interface port 0 as follows:

```
router(config)# controller sonet 5/0
router(config-controller)# sts-1 1 - 3 pos
router(config-controller)# sts-1 4 serial t3
router(config-controller)# sts-1 5 serial t3
router(config-controller)# sts-1 6 serial t3
router(config-controller)# sts-1 13 - 24 pos
```

- Step 4** If dynamic provisioning is disabled, use the **microcode reload** configuration command to activate the interface on each port (see the “[Verifying Dynamic Provisioning Capability of a Line Card](#)” section on page 9), then proceed to Step 5.

```
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.
```

- Step 5** Use the **show controller provision** command to verify that each interface is activated on the slot/port.
- If dynamic provisioning is enabled, the display shows Dynamic Provisioning:enabled.
 - If dynamic provisioning is disabled, the display shows Dynamic Provisioning:disabled.

The example that follows shows dynamic provisioning enabled.

```
router# show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:enabled
'microcode reload' required:No
Interface POS5/0:1 :    activated
Interface Serial5/0:4 :    activated
Interface Serial5/0:5 :    activated
Interface Serial5/0:6 :    activated
Interface POS5/0:13 :    activated
```

- Step 6** For the STS-3c interface on port 0, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and to enable the interface.

```
router# configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:13
router(config-if)# ip address 10.0.13.1 255.255.255.0
router(config-if)# no shutdown
```

- Step 7** For the first DS3 serial interface on port 1, do the following:

- Use the **interface serial** configuration command to select the first interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and to enable the interface.

```
router (config-if)# interface serial 5/0:4
router (config-if)# ip address 10.1.4.1 255.255.255.0
router (config-if)# no shutdown
```

- Step 8** For the second DS3 serial interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and to enable the interface.

```
router (config-if)# interface serial 5/0:5
router (config-if)# ip address 10.0.5.1 255.255.255.0
router (config-if)# no shutdown
```

Step 9 For the third DS3 serial interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and to enable the interface.

```
router (config-if)# interface serial 5/0:6
router (config-if)# ip address 10.0.6.1 255.255.255.0
router (config-if)# no shutdown
```

Step 10 For the STM-4 POS interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and to enable the interface.

```
router (config-if)# interface serial 5/0:13
router (config-if)# ip address 10.0.13.1 255.255.255.0
router (config-if)# no shutdown
```

Step 11 Enter **exit** to exit configuration mode:

```
router(config-if)# exit
router#
```

Step 12 Write the new configuration to nonvolatile random-access memory (NVRAM) by using the **copy running-config startup-config** command:

```
router# copy running-config startup-config
[OK]
router#
```

Configuring Interfaces Using SDH Framing with AU-3 Mapping

When using SDH framing with AU-3 mapping, you can channelize each port on the 1-Port Channelized OC-48/STM-16 ISE line card to have one of the following:

- 1 STM-16 POS interface
- 4 STM-4 POS interfaces
- 16 STM-1 POS interfaces
- 48 DS3/E3 serial interfaces
- a combination of STM-4 POS interfaces, STM-1 POS interfaces, and DS3/E3 interfaces, provided that the SONET time slot grouping rule is respected.

When using SDH framing with AU-3 mapping, you can channelize each port on the 4-Port Channelized OC-12/STM-4 ISE line card to have 1, 4, or 12 interfaces, or a combination of STS-3c POS interfaces and DS-3/E3 serial interfaces. The number of interfaces you have available depends on how you group the channels together.

Before you configure the line card, you must decide how you want to channelize each port. Refer to the “Feature Overview” and “Configuring Tasks” sections of the *IP Services Engine Line Cards* document and the appropriate software publications listed in the “Additional References” section on page 48.

This procedure is an example of how to enable an interface under SDH framing with AU-3 mapping and specify IP routing on the 4-Port Channelized OC-12/STM-4 ISE line card that is channelized as follows:

- Port 0 has 1 STM-4 POS interface.
- Port 1 has 4 STM-1 POS interfaces.
- Port 2 has 12 DS-3 interfaces.
- Port 3 has 12 E3 interfaces.

**Note**

The 1-Port Channelized OC-48/STM-16 ISE line card is configured using a similar procedure, except the channelization will differ.

**Note**

When you connect an E3 interface on the 4-Port Channelized OC-12/STM-4 ISE line card to an E3 interface on another line card or chassis, you must configure the E3 interface on the far end as shown in [Table 4](#).

Table 4 Far-End E3 Interface Configuration

E3 Far-End Equipment	Configuration
Cisco Internet Series Router, 12-port packet over E3	dsu mode kentrox
Cisco C7200 and C7500, 2-port E3-port adaptor (PA) card	dsu mode 1
Digital-link DL3100E E3 access multiplexer	clear channel mode

Step 1 Enter the **configure terminal EXEC** command to enter global configuration mode as follows:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

Step 2 If the line card supports dynamic provisioning (see [“Verifying Dynamic Provisioning Capability of a Line Card”](#) section on page 9), use the **hardware-module <slot #> provision dynamic** command to enable dynamic provisioning. Otherwise go to Step 3.

```
router(config)# hardware-module slot 5 provision dynamic
```

Step 3 Configure port 0 as 1 STM-4 interface as follows:

```
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 - 12 pos
```

Step 4 Configure port 1 as 4 STM-1 interfaces as follows:

```
router(config-controller)# controller sonet 5/1
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 - 3 pos
router(config-controller)# au-3 4 - 6 pos
router(config-controller)# au-3 7 - 9 pos
```

```
router(config-controller)# au-3 10 - 12 pos
```

Step 5 Configure port 2 as 12 DS-3 interfaces as follows:

```
router(config-controller)# controller sonet 5/2
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 serial t3
router(config-controller)# au-3 2 serial t3
router(config-controller)# au-3 3 serial t3
router(config-controller)# au-3 4 serial t3
router(config-controller)# au-3 5 serial t3
router(config-controller)# au-3 6 serial t3
router(config-controller)# au-3 7 serial t3
router(config-controller)# au-3 8 serial t3
router(config-controller)# au-3 9 serial t3
router(config-controller)# au-3 10 serial t3
router(config-controller)# au-3 11 serial t3
router(config-controller)# au-3 12 serial t3
```

Step 6 Configure port 3 as 12 E3 interfaces as follows:

```
router(config-controller)# controller sonet 5/3
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 serial e3
router(config-controller)# au-3 2 serial e3
router(config-controller)# au-3 3 serial e3
router(config-controller)# au-3 4 serial e3
router(config-controller)# au-3 5 serial e3
router(config-controller)# au-3 6 serial e3
router(config-controller)# au-3 7 serial e3
router(config-controller)# au-3 8 serial e3
router(config-controller)# au-3 9 serial e3
router(config-controller)# au-3 10 serial e3
router(config-controller)# au-3 11 serial e3
router(config-controller)# au-3 12 serial e3
```

Step 7 If dynamic provisioning is disabled, use the **microcode reload** configuration command to activate the interface on each port. (See the [“Verifying Dynamic Provisioning Capability of a Line Card”](#) section on [page 9](#).) Then go to Step 8.

```
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.
```

Step 8 Use the **show control provision** command to verify that each interface is activated on the slot/port. If dynamic provisioning is enabled, Dynamic Provisioning:enabled appears. If dynamic provisioning is disabled, Dynamic Provisioning:disabled appears. This example that follows shows dynamic provisioning enabled.

```
router# show controller provision 5
Slot 5 :CH-OC12-4-X, GULF Revision:4, Dynamic Provisioning:enabled
  'microcode reload' required:No
  Interface POS5/0:1 :    activated
  Interface POS5/1:1 :    activated
  Interface POS5/1:4 :    activated
  Interface POS5/1:7 :    activated
  Interface POS5/1:10 :   activated
  Interface Serial5/2:1 :  activated
  Interface Serial5/2:2 :  activated
  Interface Serial5/2:3 :  activated
```

```

Interface Serial5/2:4 :    activated
Interface Serial5/2:5 :    activated
Interface Serial5/2:6 :    activated
Interface Serial5/2:7 :    activated
Interface Serial5/2:8 :    activated
Interface Serial5/2:9 :    activated
Interface Serial5/2:10 :   activated
Interface Serial5/2:11 :   activated
Interface Serial5/2:12 :   activated
Interface Serial5/3:1 :    activated
Interface Serial5/3:2 :    activated
Interface Serial5/3:3 :    activated
Interface Serial5/3:4 :    activated
Interface Serial5/3:5 :    activated
Interface Serial5/3:6 :    activated
Interface Serial5/3:7 :    activated
Interface Serial5/3:8 :    activated
Interface Serial5/3:9 :    activated
Interface Serial5/3:10 :   activated
Interface Serial5/3:11 :   activated
Interface Serial5/3:12 :   activated

```

Step 9 For the STM-4 interface on port 0, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```

router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown

```

Step 10 For the first STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the first interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```

router(config-if)# interface pos 5/1:1
router(config-if)# ip address 10.1.1.1 255.255.255.0
router(config-if)# no shutdown

```

Step 11 For the second STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the second interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```

router(config-if)# interface pos 5/1:2
router(config-if)# ip address 10.1.2.1 255.255.255.0
router(config-if)# no shutdown

```

Step 12 For the third STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the third interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.

- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:3
router(config-if)# ip address 10.1.3.1 255.255.255.0
router(config-if)# no shutdown
```

Step 13 For the fourth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the fourth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:4
router(config-if)# ip address 10.1.4.1 255.255.255.0
router(config-if)# no shutdown
```

Step 14 For the fifth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the fifth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:5
router(config-if)# ip address 10.1.5.1 255.255.255.0
router(config-if)# no shutdown
```

Step 15 For the sixth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the sixth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:6
router(config-if)# ip address 10.1.6.1 255.255.255.0
router(config-if)# no shutdown
```

Step 16 For the seventh STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the seventh interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:7
router(config-if)# ip address 10.1.7.1 255.255.255.0
router(config-if)# no shutdown
```

Step 17 For the eighth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the eighth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:8
```



```
router(config-if)# ip address 10.1.8.1 255.255.255.0
router(config-if)# no shutdown
```

Step 18 For the ninth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the ninth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:9
router(config-if)# ip address 10.1.9.1 255.255.255.0
router(config-if)# no shutdown
```

Step 19 For the tenth STM-1 interface on port 1, do the following:

- Use the **interface pos** configuration command to select the tenth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/1:10
router(config-if)# ip address 10.1.10.1 255.255.255.0
router(config-if)# no shutdown
```

Step 20 For the first DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the first interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:1
router(config-if)# ip address 10.2.1.1 255.255.255.0
router(config-if)# no shutdown
```

Step 21 For the second DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the second interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:2
router(config-if)# ip address 10.2.2.1 255.255.255.0
router(config-if)# no shutdown
```

Step 22 For the third DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the third interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:3
router(config-if)# ip address 10.2.3.1 255.255.255.0
router(config-if)# no shutdown
```

Step 23 For the fourth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the fourth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:4
router(config-if)# ip address 10.2.4.1 255.255.255.0
router(config-if)# no shutdown
```

Step 24 For the fifth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the fifth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:5
router(config-if)# ip address 10.2.5.1 255.255.255.0
router(config-if)# no shutdown
```

Step 25 For the sixth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the sixth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:6
router(config-if)# ip address 10.2.6.1 255.255.255.0
router(config-if)# no shutdown
```

Step 26 For the seventh DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the seventh interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:7
router(config-if)# ip address 10.2.7.1 255.255.255.0
router(config-if)# no shutdown
```

Step 27 For the eighth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the eighth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:8
router(config-if)# ip address 10.2.8.1 255.255.255.0
router(config-if)# no shutdown
```

Step 28 For the ninth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the ninth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:9
router(config-if)# ip address 10.2.9.1 255.255.255.0
router(config-if)# no shutdown
```

Step 29 For the tenth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the tenth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:10
router(config-if)# ip address 10.2.10.1 255.255.255.0
router(config-if)# no shutdown
```

Step 30 For the eleventh DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the eleventh interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:11
router(config-if)# ip address 10.2.11.1 255.255.255.0
router(config-if)# no shutdown
```

Step 31 For the twelfth DS-3 interface on port 2, do the following:

- Use the **interface serial** configuration command to select the twelfth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/2:12
router(config-if)# ip address 10.2.12.1 255.255.255.0
router(config-if)# no shutdown
```

Step 32 For the first E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the first interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:1
router(config-if)# ip address 10.3.1.1 255.255.255.0
router(config-if)# no shutdown
```

Step 33 For the second E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the second interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:2
router(config-if)# ip address 10.3.2.1 255.255.255.0
router(config-if)# no shutdown
```

Step 34 For the third E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the third interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:3
router(config-if)# ip address 10.3.3.1 255.255.255.0
router(config-if)# no shutdown
```

Step 35 For the fourth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the fourth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:4
router(config-if)# ip address 10.3.4.1 255.255.255.0
router(config-if)# no shutdown
```

Step 36 For the fifth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the fifth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:5
router(config-if)# ip address 10.3.5.1 255.255.255.0
router(config-if)# no shutdown
```

Step 37 For the sixth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the sixth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:6
router(config-if)# ip address 10.3.6.1 255.255.255.0
router(config-if)# no shutdown
```

Step 38 For the seventh E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the seventh interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:7
router(config-if)# ip address 10.3.7.1 255.255.255.0
router(config-if)# no shutdown
```

Step 39 For the eighth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the eighth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:8
router(config-if)# ip address 10.3.8.1 255.255.255.0
router(config-if)# no shutdown
```

Step 40 For the ninth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the ninth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:9
router(config-if)# ip address 10.3.9.1 255.255.255.0
router(config-if)# no shutdown
```

Step 41 For the tenth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the tenth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:10
router(config-if)# ip address 10.3.10.1 255.255.255.0
router(config-if)# no shutdown
```

Step 42 For the eleventh E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the eleventh interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:11
router(config-if)# ip address 10.3.11.1 255.255.255.0
router(config-if)# no shutdown
```

Step 43 For the twelfth E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the twelfth interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3:12
router(config-if)# ip address 10.3.12.1 255.255.255.0
router(config-if)# no shutdown
```

Step 44 Enter **exit** to exit configuration mode:

```
router(config-if)# exit
router#
```

Step 45 Write the new configuration to nonvolatile random-access memory (NVRAM) by using the **copy running-config startup-config** command:

```
router# copy running-config startup-config
[OK]
router#
```

Configuring Interfaces Using SDH Framing with AU-4 Mapping

When using SDH framing with AU-4 mapping, you can channelize the port on the 1-Port Channelized OC-48/STM-16 ISE line card to have one of the following:

- 1 STM-16 POS interface
- 4 STM-4 POS interfaces
- 16 STM-1 POS interfaces
- 48 DS3/E3 serial interfaces
- a combination of STM-4 POS interfaces, STM-1 POS interfaces, and DS3/E3 interfaces, provided the SONET time slot grouping rule is respected.

When using SDH framing with AU-4 mapping, you can channelize each port on the 4-Port Channelized OC-12/STM-4 ISE line card to have 1, 4, or 12 interfaces, or a combination of STS-3c interfaces and DS-3/E3 serial interfaces. The number of interfaces you have available depends on how you group the channels together.

Before you configure the line card, you must decide how you want to channelize each port. Refer to the “Feature Overview” and “Configuring Tasks” sections of the *IP Services Engine Line Cards* document and the appropriate software publications listed in the “[Additional References](#)” section on page 48.

This procedure describes how to enable an interface and specify IP routing on a 1-Port Channelized OC-48/STM-16 ISE line card that is channelized as follows:

- Channels 1 to 3: STM-1 POS interface
- Channels 4 to 6: 3 DS3 serial interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STM-4 POS interface
- Channels 25 to 27: 3 E3 serial interfaces
- Channels 28 to 48: not configured

**Note**

The 4-Port Channelized OC-12/STM-4 ISE line card is configured using a similar procedure, except the channelization will differ.

Step 1 Enter the **configure terminal EXEC** command to enter global configuration mode as follows:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

Step 2 If the line card supports dynamic provisioning (see [“Verifying Dynamic Provisioning Capability of a Line Card” section on page 9](#)), use the **hardware-module <slot #> provision dynamic** command to enable dynamic provisioning. Otherwise go to Step 3.

```
router(config)# hardware-module slot 5 provision dynamic
```

Step 3 Configure channels 1 to 3, AU-4:VC-4 #1 as an STM-1 POS interface, channels 4 to 6, AU-4:VC-4 #2 as a 3 DS3 serial interface, channels 13 to 24, AU-4:VC-4 #5 to #8 as an STM-4 POS interface, and channels 25 to 27, AU-4:VC-4 #9 as three E3 serial interfaces as follows:

```
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 pos
router(config-controller)# au-4 2 vc-3 1 serial t3
router(config-controller)# au-4 2 vc-3 2 serial t3
router(config-controller)# au-4 2 vc-3 3 serial t3
router(config-controller)# au-4 5 - 8 pos
router(config-controller)# au-4 9 vc-3 1 serial e3
router(config-controller)# au-4 9 vc-3 2 serial e3
router(config-controller)# au-4 9 vc-3 3 serial e3
```

Step 4 If dynamic provisioning is disabled, use the **microcode reload** configuration command to activate the interface on each port (see the [“Verifying Dynamic Provisioning Capability of a Line Card” section on page 9](#)), then proceed to Step 5.

```
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.
```

Step 5 Use the **show controller provision** command to verify that each interface is activated on the slot/port. If dynamic provisioning is enabled, the display shows Dynamic Provisioning:enabled. If dynamic provisioning is disabled, the display shows Dynamic Provisioning:disabled. The example that follows shows dynamic provisioning enabled.

```
router# show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:4, Dynamic Provisioning:enabled
'microcode reload' required:No
  Interface POS5/0:1 :      activated
  Interface Serial5/0.2:1 :  activated
  Interface Serial5/0.2:2 :  activated
  Interface Serial5/0.2:3 :  activated
  Interface POS5/0:5:      activated
  Interface Serial5/0.9:1 :  activated
  Interface Serial5/0.9:2 :  activated
  Interface Serial5/0.9:3 :  activated
```

Step 6 For the STM-1 POS interface and the STM-4 POS interface, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.

- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
```

Step 7 For the first DS3 serial interface, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/0.2:1
router(config-if)# ip address 10.0.21.1 255.255.255.0
router(config-if)# no shutdown
```

Step 8 For the second DS3 serial interface, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface pos 5/0.2:2
router(config-if)# ip address 10.0.22.1 255.255.255.0
router(config-if)# no shutdown
```

Step 9 For the third DS3 serial interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/0.2:3
router(config-if)# ip address 10.0.23.1 255.255.255.0
router(config-if)# no shutdown
```

Step 10 For the STM-4 POS interface, do the following:

- Use the **interface pos** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config)# interface pos 5/0:5
router(config-if)# ip address 10.0.5.1 255.255.255.0
router(config-if)# no shutdown
```

Step 11 For the first E3 interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.


```
router(config-if)# interface serial 5/0.9:1
router(config-if)# ip address 10.0.91.1 255.255.255.0
router(config-if)# no shutdown
```

Step 12 For the second E3 interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/0.9:2
router(config-if)# ip address 10.0.92.1 255.255.255.0
router(config-if)# no shutdown
```

Step 13 For the last E3 serial interface, do the following:

- Use the **interface serial** configuration command to select the interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/0.9:3
router(config-if)# ip address 10.0.93.1 255.255.255.0
router(config-if)# no shutdown
```

Step 14 For the first E3 interface on port 3, do the following:

- Use the **interface serial** configuration command to select the first interface.
- Use the **ip address** interface configuration command to specify an IP address and subnet mask.
- Use the **no shutdown** interface command to change the shutdown state to up and enable the interface.

```
router(config-if)# interface serial 5/3.1:1
router(config-if)# ip address 10.3.1.1 255.255.255.0
router(config-if)# no shutdown
```

Step 15 Enter **exit** to exit configuration mode:

```
router(config-if)# exit
router#
```

Step 16 Write the new configuration to nonvolatile random-access memory (NVRAM) by using the **copy running-config startup-config** command:

```
router# copy running-config startup-config
[OK]
router#
```

Configuration Examples

This section contains the following examples:

- [Configuration Example for SONET with Dynamic Provisioning Enabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 26
- [Configuration Example for SONET with Dynamic Provisioning Disabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 27
- [Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Enabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 28
- [Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Disabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 29
- [Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Disabled \(4-Port Channelized OC-12/STM-4 ISE Line Card\)](#), page 31
- [Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Enabled \(4-Port Channelized OC-12/STM-4 ISE Line Card\)](#), page 34
- [Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Enabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 37
- [Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Disabled \(1-Port Channelized OC-48/STM-16 ISE Line Card\)](#), page 38

Configuration Example for SONET with Dynamic Provisioning Enabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 1-Port Channelized OC-48/STM-16 ISE line card that is channelized as follows:

- Channels 1 to 3: STS-3c POS interface
- Channels 4 to 6: 3 DS3 interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STS-12c POS interface

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# hardware-module slot 5 provision dynamic
router(config)# controller sonet 5/0
router(config-controller)# sts-1 1 - 3 pos
router(config-controller)# sts-1 4 serial t3
router(config-controller)# sts-1 5 serial t3
router(config-controller)# sts-1 6 serial t3
router(config-controller)# sts-1 13 - 24 pos
router# show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:enabled
'microcode reload' required:No
Interface POS5/0:1 :    activated
Interface Serial5/0:4 :    activated
Interface Serial5/0:5 :    activated
Interface Serial5/0:6 :    activated
Interface POS5/0:13 :    activated
router# configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
```

```

router(config)# interface pos 5/0:13
router(config-if)# ip address 10.0.13.1 255.255.255.0
router(config-if)# no shutdown
router (config-if)# interface serial 5/0:4
router (config-if)# ip address 10.1.4.1 255.255.255.0
router (config-if)# no shutdown
router (config-if)# interface serial 5/0:5
router (config-if)# ip address 10.1.5.1 255.255.255.0
router (config-if)# no shutdown
router (config-if)# interface serial 5/0:6
router (config-if)# ip address 10.0.6.1 255.255.255.0
router (config-if)# no shutdown
router(config-if)# exit
router#

```

Configuration Example for SONET with Dynamic Provisioning Disabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 1-Port Channelized OC-48/STM-16 ISE line card with dynamic provisioning disabled that is channelized as follows:

- Channels 1 to 3: STS-3c POS interface
- Channels 4 to 6: 3 DS3 interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STS-12c POS interface

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z
router(config)# controller sonet 5/0
router(config-controller)# sts-1 1 - 3 pos
router(config-controller)# sts-1 4 serial t3
router(config-controller)# sts-1 5 serial t3
router(config-controller)# sts-1 6 serial t3
router(config-controller)# sts-1 13 - 24 pos
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.
router# show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:disabled
'microcode reload' required:No
Interface POS5/0:1 : activated
Interface Serial5/0:4 : activated
Interface Serial5/0:5 : activated
Interface Serial5/0:6 : activated
Interface POS5/0:13 : activated
router# configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:13
router(config-if)# ip address 10.0.13.1 255.255.255.0
router(config-if)# no shutdown
router (config-if)# interface serial 5/0:4
router (config-if)# ip address 10.1.4.1 255.255.255.0
router (config-if)# no shutdown
router (config-if)# interface serial 5/0:5
router (config-if)# ip address 10.1.5.1 255.255.255.0
router (config-if)# no shutdown

```

```

router (config-if)# interface serial 5/0:6
router (config-if)# ip address 10.0.6.1 255.255.255.0
router (config-if)# no shutdown
router (config-if)# exit
router#

```

Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Enabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 1-Port Channelized OC-48/STM-16 ISE line card in slot 5, configured with SDH framing and with channelization enabled, that has its ports configured as follows:

- Channels 1 to 3: STM-1 POS interface
- Channels 4 to 6: 3 DS3serial interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STM-4 POS interface
- Channels 25 to 27: 3 E3 serial interfaces
- Channels 28 - 48: not configured

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# hardware-module slot 5 provision dynamic
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 - 3 pos
router(config-controller)# au-3 4 serial t3
router(config-controller)# au-3 5 serial t3
router(config-controller)# au-3 6 serial t3
router(config-controller)# au-3 13 - 24 pos
router(config-controller)# au-3 25 serial e3
router(config-controller)# au-3 26 serial e3
router(config-controller)# au-3 27 serial e3
router # show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:enabled
'microcode reload' required:No
Interface POS5/0:1 :      activated
Interface Serial5/0:4 :    activated
Interface Serial5/0:5 :    activated
Interface Serial5/0:6 :    activated
Interface Serial5/0:13 :   activated
Interface Serial5/0:25 :   activated
Interface Serial5/0:26 :   activated
Interface Serial5/0:27 :   activated

```

```
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:13
router(config-if)# ip address 10.0.13.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:4
router(config-if)# ip address 10.0.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:5
router(config-if)# ip address 10.0.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:6
router(config-if)# ip address 10.0.6.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:25
router(config-if)# ip address 10.0.25.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:27
router(config-if)# ip address 10.0.27.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit
router(config)# exit
router#
```

Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Disabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 1-Port Channelized OC-48/STM-16 ISE line card in slot 5, configured with SDH framing and with channelization disabled, that has its ports configured as follows:

- Channels 1 to 3: STM-1 POS interface
- Channels 4 to 6: 3 DS3serial interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STM-4 POS interface
- Channels 25 to 27: 3 E3 serial interfaces
- Channels 28 to 48: not configured

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 - 3 pos
router(config-controller)# au-3 4 serial t3
router(config-controller)# au-3 5 serial t3
router(config-controller)# au-3 6 serial t3
router(config-controller)# au-3 13 - 24 pos
router(config-controller)# au-3 25 serial e3
router(config-controller)# au-3 26 serial e3
router(config-controller)# au-3 27 serial e3
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.
router # show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:disabled
'microcode reload' required:No
Interface POS5/0:1 :    activated
Interface Serial5/0:4 :    activated
Interface Serial5/0:5 :    activated
Interface Serial5/0:6 :    activated
Interface Serial5/0:13 :    activated
Interface Serial5/0:25 :    activated
Interface Serial5/0:26 :    activated
Interface Serial5/0:27 :    activated
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:13
router(config-if)# ip address 10.0.13.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:4
router(config-if)# ip address 10.0.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:5
router(config-if)# ip address 10.0.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:6
router(config-if)# ip address 10.0.6.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:25
router(config-if)# ip address 10.0.25.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:26
router(config-if)# ip address 10.0.26.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0:27
router(config-if)# ip address 10.0.27.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit
router(config)# exit
router#

```

Configuration Example for SDH with AU-3 Mapping and Dynamic Provisioning Disabled (4-Port Channelized OC-12/STM-4 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 4-Port Channelized OC-12/STM-4 ISE line card in slot 5 configured with SDH framing and channelization disabled that has its ports configured as follows:

- Port 0 has 1 STM-4 interface
- Port 1 has 4 STM-1 interfaces
- Port 2 has 12 DS-3 interfaces
- Port 3 has 12 E3 interfaces

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 - 12 pos
router(config-controller)# controller sonet 5/1
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# au-3 1 - 3 pos
router(config-controller)# au-3 4 - 6 pos
router(config-controller)# au-3 7 - 9 pos
router(config-controller)# au-3 10 - 12 pos
router(config-controller)# controller sonet 5/2
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 serial t3
router(config-controller)# au-3 2 serial t3
router(config-controller)# au-3 3 serial t3
router(config-controller)# au-3 4 serial t3
router(config-controller)# au-3 5 serial t3
router(config-controller)# au-3 6 serial t3
router(config-controller)# au-3 7 serial t3
router(config-controller)# au-3 8 serial t3
router(config-controller)# au-3 9 serial t3
router(config-controller)# au-3 10 serial t3
router(config-controller)# au-3 11 serial t3
router(config-controller)# au-3 12 serial t3
router(config-controller)# controller sonet 5/3
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-3
router(config-controller)# au-3 1 serial e3
router(config-controller)# au-3 2 serial e3
router(config-controller)# au-3 3 serial e3
router(config-controller)# au-3 4 serial e3
router(config-controller)# au-3 5 serial e3
router(config-controller)# au-3 6 serial e3
router(config-controller)# au-3 7 serial e3
router(config-controller)# au-3 8 serial e3
router(config-controller)# au-3 9 serial e3
router(config-controller)# au-3 10 serial e3
router(config-controller)# au-3 11 serial e3
router(config-controller)# au-3 12 serial e3
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.

```

```

router# show controller provision 5
Slot 5 :CH-OC12-4-X, GULF Revision:2, Dynamic Provisioning:disabled
  'microcode reload' required:No
  Interface POS5/0:1 :    activated
  Interface POS5/1:1 :    activated
  Interface POS5/1:4 :    activated
  Interface POS5/1:7 :    activated
  Interface POS5/1:10 :   activated
  Interface Serial5/2:1 :  activated
  Interface Serial5/2:2 :  activated
  Interface Serial5/2:3 :  activated
  Interface Serial5/2:4 :  activated
  Interface Serial5/2:5 :  activated
  Interface Serial5/2:6 :  activated
  Interface Serial5/2:7 :  activated
  Interface Serial5/2:8 :  activated
  Interface Serial5/2:9 :  activated
  Interface Serial5/2:10 :  activated
  Interface Serial5/2:11 :  activated
  Interface Serial5/2:12 :  activated
  Interface Serial5/3:1 :  activated
  Interface Serial5/3:2 :  activated
  Interface Serial5/3:3 :  activated
  Interface Serial5/3:4 :  activated
  Interface Serial5/3:5 :  activated
  Interface Serial5/3:6 :  activated
  Interface Serial5/3:7 :  activated
  Interface Serial5/3:8 :  activated
  Interface Serial5/3:9 :  activated
  Interface Serial5/3:10 :  activated
  Interface Serial5/3:11 :  activated
  Interface Serial5/3:12 :  activated
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:1
router(config-if)# ip address 10.1.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:2
router(config-if)# ip address 10.1.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:3
router(config-if)# ip address 10.1.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:4
router(config-if)# ip address 10.1.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:5
router(config-if)# ip address 10.1.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:6
router(config-if)# ip address 10.1.6.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:7
router(config-if)# ip address 10.1.7.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:8
router(config-if)# ip address 10.1.8.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:9
router(config-if)# ip address 10.1.9.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:10

```



```
router(config-if)# ip address 10.1.10.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:1
router(config-if)# ip address 10.2.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:2
router(config-if)# ip address 10.2.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:3
router(config-if)# ip address 10.2.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:4
router(config-if)# ip address 10.2.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:5
router(config-if)# ip address 10.2.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:6
router(config-if)# ip address 10.2.6.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:7
router(config-if)# ip address 10.2.7.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:8
router(config-if)# ip address 10.2.8.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:9
router(config-if)# ip address 10.2.9.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:10
router(config-if)# ip address 10.2.10.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:11
router(config-if)# ip address 10.2.11.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2:12
router(config-if)# ip address 10.2.12.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:1
router(config-if)# ip address 10.3.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:2
router(config-if)# ip address 10.3.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:3
router(config-if)# ip address 10.3.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:4
router(config-if)# ip address 10.3.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:5
router(config-if)# ip address 10.3.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:6
router(config-if)# ip address 10.3.6.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:7
router(config-if)# ip address 10.3.7.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:8
router(config-if)# ip address 10.3.8.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:9
router(config-if)# ip address 10.3.9.1 255.255.255.0
```

```

router(config-if)# no shutdown
router(config-if)# interface serial 5/3:10
router(config-if)# ip address 10.3.10.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:11
router(config-if)# ip address 10.3.11.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3:12
router(config-if)# ip address 10.3.12.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit

```

Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Enabled (4-Port Channelized OC-12/STM-4 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 4-Port Channelized OC-12/STM-4 ISE line card in slot 5 configured with SDH framing and channelization enabled that has its ports configured as follows:

- Port 0 has 1 STM-4 interface
- Port 1 has 4 STM-1 interfaces
- Port 2 has 12 DS-3 interfaces
- Port 3 has 12 E3 interfaces

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# hardware-module slot 5 provision dynamic
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 - 4 pos
router(config-controller)# controller sonet 5/1
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 pos
router(config-controller)# au-4 2 pos
router(config-controller)# au-4 3 pos
router(config-controller)# au-4 4 pos
router(config-controller)# controller sonet 5/2
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 vc-3 1 serial t3
router(config-controller)# au-4 1 vc-3 2 serial t3
router(config-controller)# au-4 1 vc-3 3 serial t3
router(config-controller)# au-4 2 vc-3 1 serial t3
router(config-controller)# au-4 2 vc-3 2 serial t3
router(config-controller)# au-4 2 vc-3 3 serial t3
router(config-controller)# au-4 3 vc-3 1 serial t3
router(config-controller)# au-4 3 vc-3 2 serial t3
router(config-controller)# au-4 3 vc-3 3 serial t3
router(config-controller)# au-4 4 vc-3 1 serial t3
router(config-controller)# au-4 4 vc-3 2 serial t3
router(config-controller)# au-4 4 vc-3 3 serial t3
router(config-controller)# controller sonet 5/3
router(config-controller)# framing sdh
router(config-controller)# overhead s1s0 2

```

```

router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 vc-3 1 serial e3
router(config-controller)# au-4 1 vc-3 2 serial e3
router(config-controller)# au-4 1 vc-3 3 serial e3
router(config-controller)# au-4 2 vc-3 1 serial e3
router(config-controller)# au-4 2 vc-3 2 serial e3
router(config-controller)# au-4 2 vc-3 3 serial e3
router(config-controller)# au-4 3 vc-3 1 serial e3
router(config-controller)# au-4 3 vc-3 2 serial e3
router(config-controller)# au-4 3 vc-3 3 serial e3
router(config-controller)# au-4 4 vc-3 1 serial e3
router(config-controller)# au-4 4 vc-3 2 serial e3
router(config-controller)# au-4 4 vc-3 3 serial e3
router# show controller provision 5
Slot 5 :CH-OC12-4-X, GULF Revision:4, Dynamic Provisioning:enabled
'microcode reload' required:No
Interface POS5/0:1 :      activated
Interface POS5/1:1 :      activated
Interface POS5/1:2 :      activated
Interface POS5/1:3 :      activated
Interface POS5/1:4 :      activated
Interface Serial5/2.1:1 :  activated
Interface Serial5/2.1:2 :  activated
Interface Serial5/2.1:3 :  activated
Interface Serial5/2.2:1 :  activated
Interface Serial5/2.2:2 :  activated
Interface Serial5/2.2:3 :  activated
Interface Serial5/2.3:1 :  activated
Interface Serial5/2.3:2 :  activated
Interface Serial5/2.3:3 :  activated
Interface Serial5/2.4:1 :  activated
Interface Serial5/2.4:2 :  activated
Interface Serial5/2.4:3 :  activated
Interface Serial5/3.1:1 :  activated
Interface Serial5/3.1:2 :  activated
Interface Serial5/3.1:3 :  activated
Interface Serial5/3.2:1 :  activated
Interface Serial5/3.2:2 :  activated
Interface Serial5/3.2:3 :  activated
Interface Serial5/3.3:1 :  activated
Interface Serial5/3.3:2 :  activated
Interface Serial5/3.3:3 :  activated
Interface Serial5/3.4:1 :  activated
Interface Serial5/3.4:2 :  activated
Interface Serial5/3.4:3 :  activated

router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:1
router(config-if)# ip address 10.1.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:2
router(config-if)# ip address 10.1.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:3
router(config-if)# ip address 10.1.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/1:4
router(config-if)# ip address 10.1.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.1:1
router(config-if)# ip address 10.2.1.1 255.255.255.0
router(config-if)# no shutdown

```

```

router(config-if)# interface serial 5/2.1:2
router(config-if)# ip address 10.2.1.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.1:3
router(config-if)# ip address 10.2.1.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.2:1
router(config-if)# ip address 10.2.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.2:2
router(config-if)# ip address 10.2.2.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.2:3
router(config-if)# ip address 10.2.2.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.3:1
router(config-if)# ip address 10.2.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.3:2
router(config-if)# ip address 10.2.3.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.3:3
router(config-if)# ip address 10.2.3.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.4:1
router(config-if)# ip address 10.2.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.4:2
router(config-if)# ip address 10.2.4.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/2.4:3
router(config-if)# ip address 10.2.4.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.1:1
router(config-if)# ip address 10.3.1.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.1:2
router(config-if)# ip address 10.3.1.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.1:3
router(config-if)# ip address 10.3.1.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.2:1
router(config-if)# ip address 10.3.2.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.2:2
router(config-if)# ip address 10.3.2.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.2:3
router(config-if)# ip address 10.3.2.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.3:1
router(config-if)# ip address 10.3.3.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.3:2
router(config-if)# ip address 10.3.3.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.3:3
router(config-if)# ip address 10.3.3.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.4:1
router(config-if)# ip address 10.3.4.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.4:2

```

```

router(config-if)# ip address 10.3.4.2 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/3.4:3
router(config-if)# ip address 10.3.4.3 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit

```

Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Enabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 Series Router with a 1-port channelized OC-48/STM-16 ISE in slot 5 configured with SDH framing with channelization enabled that is channelized as follows:

- Channels 1 to 3: STM-1 POS interface
- Channels 4 to 6: 3 DS3 serial interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STM-4 POS interface
- Channels 25 to 27: 3 E3 serial interfaces
- Channels 28 to 48: not configured

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# hardware-module slot 5 provision dynamic
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 pos
router(config-controller)# au-4 2 vc-3 1 serial t3
router(config-controller)# au-4 2 vc-3 2 serial t3
router(config-controller)# au-4 2 vc-3 3 serial t3
router(config-controller)# au-4 5 - 8 pos
router(config-controller)# au-4 9 vc-3 1 serial e3
router(config-controller)# au-4 9 vc-3 2 serial e3
router(config-controller)# au-4 9 vc-3 3 serial e3
router#show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:4, Dynamic Provisioning:enabled
'microcode reload' required:No
      Interface POS5/0:1 :      activated
      Interface Serial5/0.2:1 :      activated
      Interface Serial5/0.2:2 :      activated
      Interface Serial5/0.2:3 :      activated
Interface POS5/0:5 :      activated
Interface Serial5/0.9:1 :      activated
      Interface Serial5/0.9:2 :      activated
      Interface Serial5/0.9:3 :      activated
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:5
router(config-if)# ip address 10.0.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/0.2:1
router(config-if)# ip address 10.0.21.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/0.2:2
router(config-if)# ip address 10.0.22.1 255.255.255.0

```

```

router(config-if)# no shutdown
router(config-if)# interface serial 5/0.2:3
router(config-if)# ip address 10.0.23.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:1
router(config-if)# ip address 10.0.91.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:2
router(config-if)# ip address 10.0.92.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:3
router(config-if)# ip address 10.0.93.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit
router#

```

Configuration Example for SDH with AU-4 Mapping and Dynamic Provisioning Disabled (1-Port Channelized OC-48/STM-16 ISE Line Card)

The following configuration example output shows the configuration commands for a Cisco 12000 series Internet Router with a 1-port channelized OC-48/STM-16 ISE line card in slot 5, configured with SDH framing and with Dynamic Provisioning disabled, that is channelized as follows:

- Channels 1 to 3: STM-1 POS interface
- Channels 4 to 6: 3 DS3 serial interfaces
- Channels 7 to 12: not configured
- Channels 13 to 24: STM-4 POS interface
- Channels 25 to 27: 3 E3 serial interfaces
- Channels 28 to 48: not configured

```

router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# controller sonet 5/0
router(config-controller)# framing sdh
router(config-controller)# aug-mapping au-4
router(config-controller)# au-4 1 pos
router(config-controller)# au-4 2 vc-3 1 serial t3
router(config-controller)# au-4 2 vc-3 2 serial t3
router(config-controller)# au-4 2 vc-3 3 serial t3
router(config-controller)# au-4 5 - 8 pos
router(config-controller)# au-4 9 vc-3 1 serial e3
router(config-controller)# au-4 9 vc-3 2 serial e3
router(config-controller)# au-4 9 vc-3 3 serial e3
router(config-controller)# microcode reload 5
router(config-controller)# end
%% Wait until microcode reload on slot 5 is finished.

```

```

router#show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:4, Dynamic Provisioning:disabled
'microcode reload' required:No
      Interface POS5/0:1 :      activated
      Interface Serial5/0.2:1 :  activated
      Interface Serial5/0.2:2 :  activated
      Interface Serial5/0.2:3 :  activated
Interface POS5/0:5 :      activated
Interface Serial5/0.9:1 :  activated
      Interface Serial5/0.9:2 :  activated
      Interface Serial5/0.9:3 :  activated
router # configure terminal
router(config)# interface pos 5/0:1
router(config-if)# ip address 10.0.1.1 255.255.255.0
router(config-if)# no shutdown
router(config)# interface pos 5/0:5
router(config-if)# ip address 10.0.5.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/0.2:1
router(config-if)# ip address 10.0.21.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface pos 5/0.2:2
router(config-if)# ip address 10.0.22.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.2:3
router(config-if)# ip address 10.0.23.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:1
router(config-if)# ip address 10.0.91.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:2
router(config-if)# ip address 10.0.92.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# interface serial 5/0.9:3
router(config-if)# ip address 10.0.93.1 255.255.255.0
router(config-if)# no shutdown
router(config-if)# exit
router#

```

Configuring BER Testing

Bit error rate test (BERT) circuitry is built into the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards. There is one pseudorandom binary sequence generator every 16 channels. For each group of 16 channels, BER testing can be run on only one interface at a time.

You can set one local DS3/E3 serial port to BERT mode while the remaining local serial ports continue to transmit and receive normal traffic. A BER test checks communication between the local and the remote DS3/E3 ports.

If traffic is not being transmitted or received, create a back-to-back loopback BER test and send out a predictable stream to ensure that you receive the same data that was transmitted.

To determine if the remote DS3/E3 serial port returns the BERT pattern unchanged, the system administrator for the remote router must manually enable network loopback at the remote DS3/E3 serial port, while you enter a **bert pattern** interface configuration command for specified time intervals on the local DS3/E3 serial port.

With BER tests, you can accurately assess the number of errors on a DS3/E3 link and diagnose signal problems in the field.

The 1-port channelized OC-48/STM-16 ISE and 4-port channelized OC-12/STM-4 ISE line card supports the following pseudorandom test patterns:

- 2^{15} —Pseudorandom repeating pattern that is 32,767 bits long.
- 2^{20} —Pseudorandom repeating pattern that is 1,048,575 bits long.
- 2^{23} —Pseudorandom repeating pattern that is 8,388,607 bits long. This pattern is only available for an E3 interface.
- Unframed- 2^{15} —Pseudorandom repeating pattern that is 32,767 bits long, and the DS3 framing bit in the DS3 frame is overwritten when the pattern is inserted in the DS3 frame.
- Unframed- 2^{20} —Pseudorandom repeating pattern that is 1,048,575 bits long, and the DS3 framing bit in the DS3 frame is overwritten when the pattern is inserted in the DS3 frame.
- Unframed- 2^{23} —Pseudorandom repeating pattern that is 8,388,607 bits long, and the DS3 framing bit in the DS3 frame is overwritten when the pattern is inserted in the DS3 frame. This pattern is only available for an E3 interface.

Table 5 lists the BERT patterns, the pattern length, and the command.

Table 5 DS3/E3-Supported BERT Patterns

BERT Pattern	Pattern Length ¹	Command
2^{15}	32,767 bits long	bert pattern 2^{15} interval <i>minutes</i>
2^{20}	1,048,575 bits long	bert pattern 2^{20} interval <i>minutes</i>
2^{23} ²	8,388,607 bits long	bert pattern 2^{23} interval <i>minutes</i>
unframed 2^{15}	32,767 bits long	bert pattern unframed-2^{15} interval <i>minutes</i>
unframed 2^{20}	1,048,575 bits long	bert pattern unframed-2^{20} interval <i>minutes</i>
unframed 2^{23} ²	8,388,607 bits long	bert pattern unframed-2^{23} interval <i>minutes</i>

1. Pseudo-random repeating pattern.
2. This pattern is only available for an E3 interface.

Both the total number of error bits transmitted and the total number of bits received are available for analysis. You can set the testing period from 1 minute to 1440 minutes (240 hours). You can also retrieve the error statistics anytime during the BER test.

When running a BER test, your system expects to receive the same pattern that it is transmitting. To help ensure this, either use a loopback somewhere in the link or network, or configure the remote testing equipment to transmit the same BER test pattern at the same time.

Sending a BERT Pattern on a DS3/E3 Interface

To do a BER test on a serial DS3/E3 interface, select the interface first and then configure the BERT pattern and test duration with the BERT pattern configuration command as follows:

```
router# configure terminal
router(config)# interface serial 5/0:2
router(config-if)# bert pattern  $2^{15}$  interval 3
router(config-if)# end
```

You can terminate a BER test during the specified test period with the **no bert pattern interval time** configuration command. (See the “Terminating a BER Test” section on page 43.)

Entering Errors in BER Tests

To insert errors while a BER test is in progress, select the interface where the BER test is in progress and specify the number of errors to insert in the BER test pattern. You can then display the test while it is running to display the results. (See the “[Displaying a BER Test](#)” section on page 41.)

```
router# configure terminal
router(config)# interface serial 5/0:2
router(config-if)# bert errors 5
router(config-if)# end
```

Displaying a BER Test

The following sections discuss displaying BER tests using SONET or SDH with AU-3 mapping, or using SDH with AU-4 mapping.

Displaying a BER Test Using SONET or SDH with AU-3 Mapping

When framing is SONET or SDH with AU-3 mapping, you can display the results of a BER test anytime during the test or after the test runs completely, using the **show controllers sonet** command, as follows. See [Table 6](#) for a description of the BER test display.

```
router# show controller sonet 5/0:2 bert
Interface Serial5/0:2 (DS3 channel 2)
BERT information:
  State           :enabled (sync'd)
  Pattern          :2^15
  Interval         :3 minute
  Time remaining   :00:00:30
  Total errors     :5
  Time this sync   :00:02:30
  Errors this sync :5
  Sync count      :1
router(config-if)# end
```

Table 6 BERT Display Description

BERT Display	Description
State: enabled (not synchronized)	BERT is active, but the hardware has not synchronized. Errors are counted only when hardware has synchronized.
State: enabled (synchronized)	BERT is active, but the hardware has synchronized. Any errors detected are counted.
State: disabled (synchronization failed)	BERT is finished and test has failed, either because hardware could not synchronize or DS3/E3 alarms are detected on the interface.
State: disabled (synchronized completed)	BERT is finished because the interval has expired.
State: disabled (synchronized aborted)	BERT is finished as a result of user request.
Pattern	One of the supported patterns.
Interval	Value from 1 to 1440 in minutes.
Time remaining	Test duration remaining, formatted in hh:mm:ss.
Total errors	Total number of errors while the hardware is synchronized.
Time this sync	If the hardware is currently synchronized, the amount of time since the synchronization began. If it is not currently synchronized but was synchronized earlier, indicates the amount of time the last or most recent synchronization period lasted. Formatted in hh:mm:ss.
Errors this sync	If the hardware is currently synchronized, the amount of errors encountered during the current synchronization period. If it is not currently synchronized but was synchronized earlier, the number of errors encountered during the last or most recent synchronization period.
Sync count	The number of times synchronization was achieved.

Displaying BER Test Results Using SDH with AU-4 Mapping

When framing is SDH with AU-4 mapping, you can display the results of a BER test anytime during the test or after the test runs completely as follows using the **show controllers sonet** command. See [Table 6](#) for a description of the BER test display.

```
router# show controller sonet 8/1.1:1 bert
Interface Serial8/1.1:1 (E3 channel 1)
BERT information:
  State           :enabled (sync'd)
  Pattern         :2^20
  Interval        :5 minute
  Time remaining  :00:01:40
  Total errors    :9
  Time this sync  :00:03:20
  Errors this sync :9
  Sync count      :1
```

Terminating a BER Test

You can terminate a BER test with the **no bert** configuration command as follows:

```
router# configure terminal
router(config)# interface serial5/0:2
router(config-if)# no bert
router(config-if)# end
```

Using show Commands to Verify Controller and Interface Status

After installing the line card, use **show** commands to display the status of the controller and the interfaces. Following are descriptions and examples of the **show** commands you can use to check the configuration. In the following examples, descriptions are limited to fields that are relevant for verifying the configuration of the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards.

Using the show version Command

Use the **show version** command to display the configuration of the system hardware (the channel of each line card installed), the software release, the names and sources of configuration files, and the boot images. Ensure that the list includes the new 1-port channelized OC-48/STM-16 ISE and 4-port channelized OC-12/STM-4 ISE line card interface.

```
router# show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (GSR-P-M), Experimental Version 12.0(20010922:053231) [jingwan-rel2
113]
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Tue 25-Sep-01 22:01 by jingwan
Image text-base:0x50010968, data-base:0x523E6000
ROM:System Bootstrap, Version 11.2(17)GS2, [htseng 180] EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
BOOTLDR:GS Software (GSR-BOOT-M), Version 12.0(8)S, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
TOP1.2.6C uptime is 13 hours, 48 minutes
System returned to ROM by reload at 20:44:53 UTC Tue Sep 25 2001
System image file is "tftp://10.1.1.253/gsr-p-mz:120-20.3.S"
cisco 12008/GRP (R5000) processor (revision 0x01) with 262144K bytes of memory.
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
 1 Route Processor Card
 2 Clock Scheduler Cards
 3 Switch Fabric Cards
 1 OC48 channelized to STS-48c/STM-16, STS-12c/STM-4,
   STS-3c/STM-1 or DS-3/E3 controller
 1 Ethernet/IEEE 802.3 interface(s)
 1 Packet over SONET network interface(s)
 4 SDCC network interface(s)
507K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
router#
```

Using the show controller sonet Command

To display information about the 1-port channelized OC-48/STM-16 ISE and 4-port channelized OC-12/STM-4 ISE line card, including information on all the configured channels, use the **show controller sonet** command.

show controller sonet Command for the Fiber Port Controller

Use the **show controller sonet** command to display information about the fiber port controller.

```
router# show controller sonet 7/0
SONET7/0
  Current state of the controller is up
  Framing is SONET
  Clock source is INTERNAL, Loopback is NONE
SECTION
  LOF = 0          LOS   = 0          BIP(B1) = 0
LINE
  AIS = 0          RDI   = 0          FEBE = 0          BIP(B2) = 0
Active Defects:None
Active Alarms: None
Alarm reporting enabled for:SF SLOS SLOF B1-TCA B2-TCA B3-TCA
APS
  COAPS = 0        PSBF = 0
  State:PSBF_state = False
  ais_shut = FALSE
  Rx(K1/K2):00/00
BER thresholds: SF = 10e-3  SD = 10e-6
TCA thresholds: B1 = 10e-6  B2 = 10e-6

Optical Power Monitoring
Laser Bias = 37.2 mA
Receiver Power = -4.88 dBm (+/- 2 dBm)
```

show controller sonet Command for a POS Interface

Use the **show controller sonet** interface command to display SONET/SDH path information for a POS interface as in the following example:

```
router# show controller sonet 2/0:1
POS2/0:1
PATH
  AIS = 0          RDI   = 0          FEBE = 0          BIP(B3) = 0
  LOP = 0          NEWPTR = 0        PSE  = 0          NSE   = 0

Active Defects:None
Active Alarms: None
Alarm reporting enabled for:PLOP B3-TCA
S1S0 = 00, C2 = CF
PATH TRACE BUFFER :STABLE
  Remote hostname :stanford
  Remote interface:POS2/0:1
  Remote IP addr  :0.0.0.0
  Remote Rx(K1/K2):00/00 Tx(K1/K2):00/00

73 74 61 6E 66 6F 72 64 00 00 00 00 00 00 00 00  stanford.....
00 00 00 00 00 00 00 00 50 4F 53 32 2F 30 3A 31  .....POS2/0:1
00 00 00 00 00 00 30 2E 30 2E 30 2E 30 00 00 00  .....0.0.0.0...
00 00 00 00 00 00 30 30 30 30 30 30 30 0D 0A  .....00000000..

BER thresholds: B3 = 10e-6
```

Use the **show controller sonet details** command to display detailed SONET/SDH path information for a POS interface as in the following example:

```
router# show controller sonet 2/0:1 details
POS2/0:1
Channelization: activated.
PATH
  AIS = 0          RDI   = 0          FEBE = 0          BIP(B3) = 0
  LOP = 0          NEWPTR = 0        PSE  = 0          NSE   = 0

Active Defects:None
Active Alarms: None
Alarm reporting enabled for:PLOP B3-TCA
S1S0 = 00, C2 = CF
PATH TRACE BUFFER :STABLE
  Remote hostname :stanford
  Remote interface:POS2/0:1
  Remote IP addr  :0.0.0.0
  Remote Rx(K1/K2):00/00 Tx(K1/K2):00/00

73 74 61 6E 66 6F 72 64 00 00 00 00 00 00 00 00  stanford.....
00 00 00 00 00 00 00 00 50 4F 53 32 2F 30 3A 31  .....POS2/0:1
00 00 00 00 00 00 30 2E 30 2E 30 2E 30 00 00 00  .....0.0.0.0...
00 00 00 00 00 00 30 30 30 30 30 30 30 0D 0A  .....00000000..

BER thresholds: B3 = 10e-6
```

show controller sonet Command for a DS3/E3 Interface

Use the commands in [Table 7](#) to display SONET/SDH path information for a DS3/E3 serial interface.

Table 7 DS3/E3 show controller Command

Framing and AUG mapping	Show Command
SONET framing	show controller sonet <slot>/<port>:start-chn-num
	show controller sonet <slot>/<port>:start-chn-num[detail]
SDH framing, AU-3 mapping	show controller sonet <slot>/<port>:<start-AU-3-num>
	show controller sonet <slot>/<port>:<start-AU-3-num> [detail]
SDH framing, AU-4 mapping	show controller sonet <slot>/<port>.<start-AU-4-num>:<VC-3-num>
	show controller sonet <slot>/<port>.<start-AU-4-num>:<VC-3-num> [detail]

The example that follows shows information for a DS3/E3 interface that has SDH framing with AU-4 mapping.

```
router# show controller sonet 2/0:13 details

Serial2/0:13

Channelization: activated.
PATH
  AIS = 0          RDI = 0          FEBE = 0          BIP(B3) = 0
  LOP = 0          NEWPTR = 0        PSE = 0          NSE = 0

Active Defects:None
Active Alarms: None
Alarm reporting enabled for:PLOP B3-TCA

  S1S0 = 00, C2 = 04
PATH TRACE BUFFER :STABLE
  Remote hostname :stanford
  Remote interface:Serial2/0:13
  Remote IP addr  :0.0.0.0
  Remote Rx(K1/K2):00/00  Tx(K1/K2):00/00

  73 74 61 6E 66 6F 72 64  00 00 00 00 00 00 00 00  stanford.....
  00 00 00 00 00 00 00 00  53 65 72 69 61 6C 32 2F  ....Serial2/
  30 3A 31 33 00 00 30 2E  30 2E 30 2E 30 00 00 00  0:13..0.0.0.0...
  00 00 00 00 00 00 30 30  30 30 30 30 30 30 0D 0A  ....00000000..

BER thresholds: B3 = 10e-6

Controller SONET 2/0, interface Serial2/0:13 (DS3 channel 13)
cdb = 0x52D532F8, base_hwidb = 0x52A782E0, chn_hwidb = 0x52CDAF00
ssb = 0x52CD94C4, ds = 0x52CD8824
Line state is up
  rxLOS inactive, rxLOF inactive, rxAIS inactive
  txAIS inactive, rxRAI inactive, txRAI inactive
Current configurable parameter settings:
```

```

Loopback is none, Framing is c-bit
DSU mode is cisco, DSU bandwidth limit is 44210 Kbps
Payload scrambling is disabled, CRC is 16
Bert pattern is disabled, Bert interval is 0
Transmitter delay is 0, Encapsulation is HDLC, Invert data is disabled
Remote fullrate has no request outstanding.
Remote accept is enabled, MTU is 4470
Incoming far end requests:
 0 Total requests
 0 Loopback requests, 0 No loopback requests
 0 Full rate requests, 0 No full rate requests
 0 Rejected requests, 0 Unknown requests
MIB information:
Data in current interval (234 seconds elapsed):
 0 Line Code Violations, 0 P-bit Coding Violations
 0 C-bit Coding Violations
 0 P-bit Err Secs, 0 P-bit Sev Err Secs
 0 Sev Err Framing Secs, 0 Unavailable Secs
 0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Sev Err Secs
Total Data (less than 1 interval collected):
No alarms detected.

```

The example that follows shows detailed information for a DS3/E3 interface that has SDH framing with AU-4 mapping.

```

router# show controller sonet 2/0:13 details
Serial2/0:13
Channelization: activated.
PATH
  AIS = 0          RDI = 0          FEBE = 0          BIP(B3) = 0
  LOP = 0          NEWPTR = 0        PSE = 0          NSE = 0
Active Defects:None
Active Alarms: None
Alarm reporting enabled for:PLOP B3-TCA
S1S0 = 00, C2 = 04
PATH TRACE BUFFER :STABLE
  Remote hostname :stanford
  Remote interface:Serial2/0:13
  Remote IP addr  :0.0.0.0
  Remote Rx(K1/K2):00/00 Tx(K1/K2):00/00
73 74 61 6E 66 6F 72 64 00 00 00 00 00 00 00 00  stanford.....
 00 00 00 00 00 00 00 00 53 65 72 69 61 6C 32 2F  ....Serial2/
 30 3A 31 33 00 00 30 2E 30 2E 30 2E 30 00 00 00  0:13..0.0.0.0...
 00 00 00 00 00 00 30 30 30 30 30 30 30 0D 0A  ....00000000..
BER thresholds: B3 = 10e-6

```

Using the show controller provision Command

Use the **show controller provision** command as follows to display interface activation status of a slot of the 1-port channelized OC-48/STM-16 ISE and 4-port channelized OC-12/STM-4 ISE line card:

```
router# show controller provision 5
Slot 5 :CH-OC48-X, GULF Revision:2, Dynamic Provisioning:disabled
  'microcode reload' required:No
  Interface POS5/0:1 :      activated
  Interface POS5/1:1 :      activated
  Interface POS5/1:2 :      activated
  Interface POS5/1:3 :      activated
  Interface POS5/1:4 :      activated
  Interface Serial5/2.1:1 :  activated
  Interface Serial5/2.1:2 :  activated
  Interface Serial5/2.1:3 :  activated
  Interface Serial5/2.2:1 :  activated
  Interface Serial5/2.2:2 :  activated
  Interface Serial5/2.2:3 :  activated
  Interface Serial5/2.3:1 :  activated
  Interface Serial5/2.3:2 :  activated
  Interface Serial5/2.3:3 :  activated
  Interface Serial5/2.4:1 :  activated
  Interface Serial5/2.4:2 :  activated
  Interface Serial5/2.4:3 :  activated
  Interface Serial5/3.1:1 :  activated
  Interface Serial5/3.1:2 :  activated
  Interface Serial5/3.1:3 :  activated
  Interface Serial5/3.2:1 :  activated
  Interface Serial5/3.2:2 :  activated
  Interface Serial5/3.2:3 :  activated
  Interface Serial5/3.3:1 :  activated
  Interface Serial5/3.3:2 :  activated
  Interface Serial5/3.3:3 :  activated
  Interface Serial5/3.4:1 :  activated
  Interface Serial5/3.4:2 :  activated
  Interface Serial5/3.4:3 :  activated
```

(Additional display text is not shown.)

Additional References

The following sections provide references related to the 1-Port Channelized OC-48/STM-16 ISE and 4-Port Channelized OC-12/STM-4 ISE line cards.

Related Documents

Related Topic	Document Title
ISE features	IP Services Engine Line Cards

Related Topic	Document Title
Hardware installation	<i>Channelized and Electrical Interface Line Card Installation and Configuration</i>
Software configuration commands	<ul style="list-style-type: none"> • <i>Software Configuration Guide for the Cisco 12000 Series Internet Router</i> • <i>Cisco IOS Configuration Fundamentals Configuration Guide</i> • <i>Cisco IOS Release 12.0S Release Notes for Cisco 12000 Series Internet Routers</i>

Technical Assistance

Description	Link
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