JUNIPER NETWORKS

Junos® OS

Channelized OC12/STM4 Interfaces Feature Guide for Routing Devices

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Junos® OS Channelized OC12/STM4 Interfaces Feature Guide for Routing Devices

The information in this document is current as of the date on the title page.

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If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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Supported Platforms

For the features described in this document, the following platforms are supported:

- M Series
- MX Series
- T Series
- J Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   interfaces {
     fxp0 {
       disable;
       unit 0 {
         family inet {
           address 10.0.0.1/24;
         }
       }
     }
   }
   ```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

   ```
   [edit]
   user@host# load merge /var/tmp/ex-script.conf
   load complete
   ```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   commit {
     file ex-script-snippet.xsl; }
   ```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

   ```
   [edit]
   user@host# edit system scripts
   [edit system scripts]
   ```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

   ```
   [edit system scripts]
   user@host# load merge relative /var/tmp/ex-script-snippet.conf
   load complete
   ```

For more information about the **load** command, see the *CLI User Guide*.

Documentation Conventions

Table 1 on page xiii defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page xiii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the**configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Italic text like this	• Introduces or emphasizes important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: **[edit]** **root@# set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Enclose optional keywords or variables.	**stub <default-metric** ***metric*****>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**
Indention and braces ({ })	Identify a level in the configuration hierarchy.	**[edit]** **routing-options {** ** static {** ** route default {** ** nexthop** *address*; ** retain;** ** }** ** }** **}**
; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to techpubs-comments@juniper.net, or fill out the documentation feedback form at https://www.juniper.net/cgi-bin/docbugreport/ . If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

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Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/

- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html.

PART 1

Overview

CHAPTER 1

Channelized OC12/STM4 Interfaces

Channelized OC12/STM4 IQ and IQE Interfaces Overview

Channelized IQ and channelized IQE interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than the channelized interfaces. Channelized OC12/STM4 IQ and IQE Physical Interface Cards (PICs) can be configured to operate in SONET or SDH mode. Each physical port on a multiple-port IQE PIC can be configured to operate in either SONET or SDH mode for increased granularity. The following sections describe the different modes of operation and channelization possibilities.

Related Documentation

- *Channelized Interfaces Overview*

PART 2

Configuration

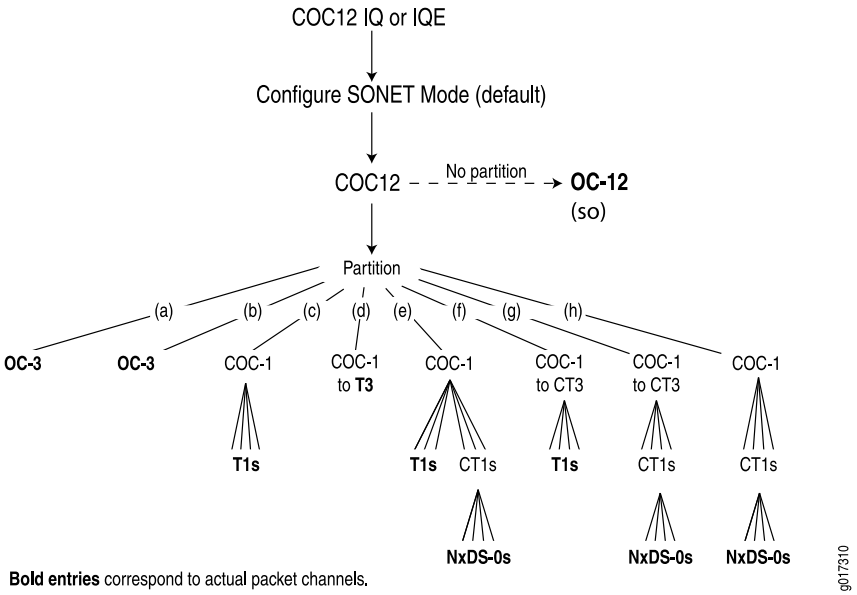
CHAPTER 2

Channelized OC12/STM4 Interfaces

Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode)

Channelized OC12/STM4 IQ PICs and Channelized OC12/STM4 IQE PICs can be configured to operate in SONET or SDH mode and partitioned into various partitions. Figure 1 on page 8 illustrates one possible channelization configuration for Channelized OC12/STM4 IQ and IQE PICs operating in SONET mode.

Figure 1: Sample Channelization of OC12/STM4 IQ or IQE PIC (SONET Mode)



In the example in Figure 1 on page 8, a Channelized OC12/STM4 IQ or IQE PIC operating in SONET mode is partitioned into the following OC slices:

a. An OC3 interface.

b. Another OC3 interface.

c. A channelized OC1 partitioned into T1 interfaces.

d. A channelized OC1 converted into a T3 interface.

e. A channelized OC1 partitioned into T1 interfaces and channelized T1s, which are partitioned into NxDS0 interfaces.

f. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces.

g. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into NxDS0 interfaces.

h. A channelized OC1 partitioned into channelized T1s, which are partitioned into NxDS0 interfaces.

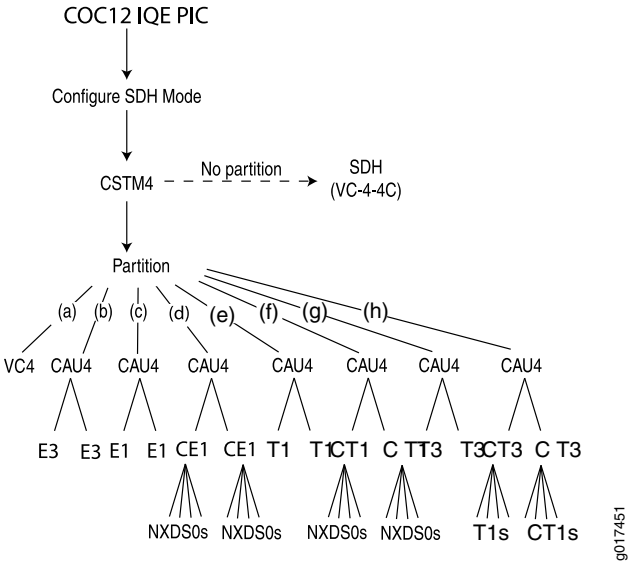
Related Documentation

- *Example: Channelized OC3 IQ Interface Configuration*

Channelization of OC12/STM4 IQE PIC (SDH Mode)

Channelized OC12/STM4 IQE PICs can be configured to operate in SONET or SDH mode and partitioned to various smaller partitions. Figure 2 on page 9 illustrates one possible channelization configuration for Channelized OC12/STM4 IQE PICs operating in SDH mode.

Figure 2: Sample Channelization of OC12/STM4 IQE PIC (SDH Mode)



In Figure 2 on page 9, a Channelized OC12/STM4 IQE PIC operating in SDH mode results in a channelized STM4 interface, which can be nonpartitioned into one SDH VC-4-VC interface or partitioned into the following OC slices:

a. An SDH VC-4 interface.

b. A channelized AU-4 partitioned into E3 interfaces.

c. A channelized AU-4 interface partitioned into E1 interfaces.

d. A channelized AU-4 interface partitioned into CE1 interfaces partitioned into *N*xDS0 interfaces.

e. A channelized AU-4 interface partitioned into T1 interfaces.

f. A channelized AU-4 interface partitioned into CT1 interfaces.

g. A channelized AU-4 interface partitioned into T3 interfaces partitioned into T1 interfaces.

h. A channelized AU-4 interface partitioned into CT3 interfaces partitioned into CT1 interfaces.

This is one of thousands of ways to configure a Channelized OC12/STM4 IQE PIC.

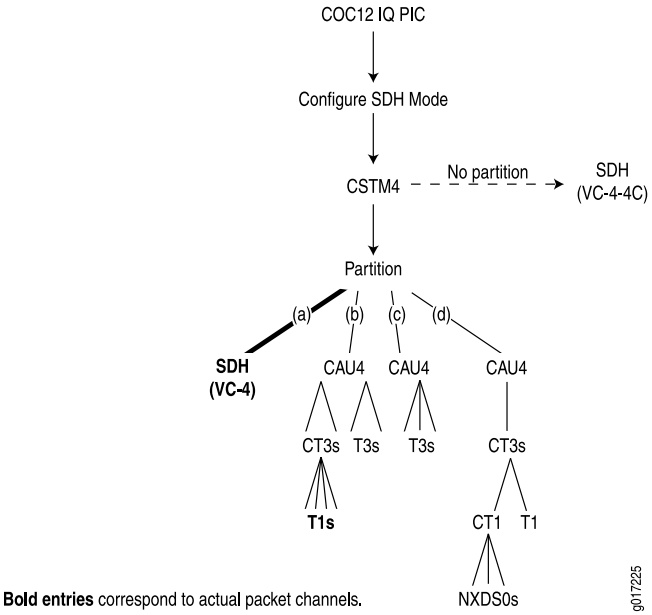
Related Documentation

- *Example: Complex Configuration for a Channelized OC12 IQ Interface*

Channelization of OC12/STM4 IQ PIC (SDH Mode)

Channelized OC12/STM4 IQ PICs can be configured to operate in SONET or SDH mode and partitioned into various smaller partitions. Figure 3 on page 10 illustrates one possible channelization configuration for Channelized OC12/STM4 IQ PICs operating in SDH mode.

Figure 3: Sample Channelization of OC12/STM4 IQ PIC (SDH Mode)



In Figure 3 on page 10, a Channelized OC12/STM4 IQ PIC operating in SDH mode results in a channelized STM4 interface, which can be nonpartitioned into one SDH VC-4-VC interface or partitioned into the following OC slices:

a. An SDH VC-4 interface.

b. A channelized AU-4 partitioned into channelized T3 interfaces and T3 interfaces.

c. Another channelized AU-4 interface converted into T3 interfaces.

d. Another channelized AU-4 interface converted into a channelized T3 interface, which is partitioned further into a channelized T1 and a T1 interface. The channelized T1 interface is further partitioned into *N*xDS0 interfaces.

This is one of thousands of ways to configure a Channelized OC12/STM4 IQ PIC.

Related Documentation

- *Example: Complex Configuration for a Channelized OC12 IQ Interface*

Channelization of OC12 PIC (SONET Mode)

OC12 PICs can be configured to various smaller partitions, such as T3s.

Figure 4: Sample Channelization of OC12 PIC (non IQ and IQE)

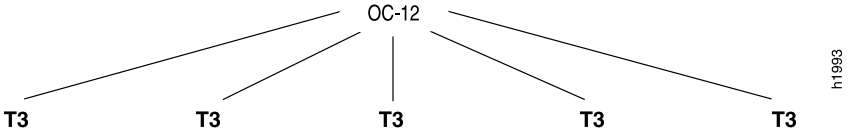


Figure 4 on page 10 shows five T3 channels configured on the Channelized OC12 PIC. You can configure seven additional T3 channels. For more information about configuring Channelized OC12 PICs, see "Configuring Channelized OC12 Interfaces" on page 29.

Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode)

This section describes how to configure channelized OC12/STM4 intelligent queuing (IQ) and enhanced intelligent queuing (IQE) interfaces, discussing the following topics:

Configuring an OC12/STM4 Interface

You can configure one OC12 interface on a 1-port Channelized OC12/STM4 IQ or IQE PIC. On a 4-port OC12/STM4 IQ or IQE PIC, you can configure one OC12 interface per port. To configure an OC12 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces coc12-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ and IQE interfaces. You can apply CoS rules only to the aggregate bit streams.

NOTE: If you configure the **per-unit-scheduler** statement on the physical interface of a 4-port Channelized OC-12 IQ PIC and configure 975 logical interfaces or DLCIs, some of the logical interfaces or data link connection identifiers (DLCIs) will drop all packets intermittently.

Configuring T3 Interfaces

To configure a T3 interface on an OC12 PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc12-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) coc1;
```

This configuration creates interface **coc1-*fpc/pic/port*:*channel***.

Then, include the **no-partition interface-type** statement at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t3** interface type:

```
[edit interfaces coc1-fpc/pic/port:channel]
no-partition interface-type (Interfaces) t3;
```

This configuration creates interface **t3-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized OC1 interfaces, the partition number can be from 1 through 12.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12/STM4 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. For channelized OC1 interfaces, the OC slice can be from 1 through 12. You can configure only one OC slice per channelized OC1 interface.

The interface type is the channelized interface type or clear channel you are creating. For channelized OC12 interfaces, ***type*** can be **so** or **coc1**.

NOTE: Channelized OC12/STM4 IQ and IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0 through 3 of each OC12 space for STS3c SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, Junos OS allocates them starting from channel 4 because channels 0 through 3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (that is, channels 4 through 11 are configured) for E3 or T3 channels will Junos OS then allocate the channel 0–3 space for further E3 or T3 channels; thereby using up the 0–3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4–6 or 7–9 with an OC3 SONET channel; it fails because the channel 0–3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the device control daemon (dcd) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3 or T3 channels with OC3 channels, to free channels 0 through 3.

Example: Configuring T3 Interfaces

Configure a T3 interface using partition 3 and OC slice 3. This configuration creates interface **t3-1/1/0:3**:

```
[edit interfaces coc12-1/1/0]
partition 3 oc-slice 3 interface-type coc1;
[edit interfaces coc1-1/1/0:3]
no-partition interface-type t3;
```

For a full configuration example, see the *Junos OS Feature Guides*.

Configuring OC3 Interfaces

To configure an OC3 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces coc12-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

The partition number is the sublevel interface partition index. For SONET/SDH interfaces, the partition number does not correlate with bandwidth size. For OC3 interfaces, the partition number can be from 1 through 4.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. OC3 interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

By contrast, the T3 and OC1 IQ interfaces each occupy one OC slice per interface.

The interface type is the channelized interface type or data channel you are creating. For channelized OC12 interfaces, the interface type can be **coc1** or **so**.

Example: Configuring OC3 Interfaces

Configure an OC3 interface, using partition 1 and OC slices 4 through 6. This configuration creates interface **so-1/1/0:1**:

```
[edit interfaces coc12-1/1/0]
partition 1 oc-slice 4-6 interface-type so;
```

For a full configuration example, see the *Junos OS Feature Guides*.

Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces

To configure T1 interfaces on a Channelized OC12 IQ or IQE PIC, perform the following tasks:

1. Partition the channelized OC12 interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   [edit interfaces coc12-*fpc/pic/port*]
   partition *partition-number* oc-slice *oc-slice-range* interface-type (Interfaces) coc1;

2. If your network equipment uses virtual tributary (VT) mapping, partition the channelized OC1 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

   [edit interfaces coc1-*fpc/pic/port*]
   partition *partition-number* interface-type (Interfaces) t1;

3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port:channel*]** hierarchy level, specifying the **ct3** interface type. Note that because the **no-partition** statement is included, this configuration does not create another level of channelization, as denoted by the number of colons in the resulting interface.

   [edit interfaces coc1-*fpc/pic/port*]
   no-partition *partition-number* interface-type (Interfaces) ct3;

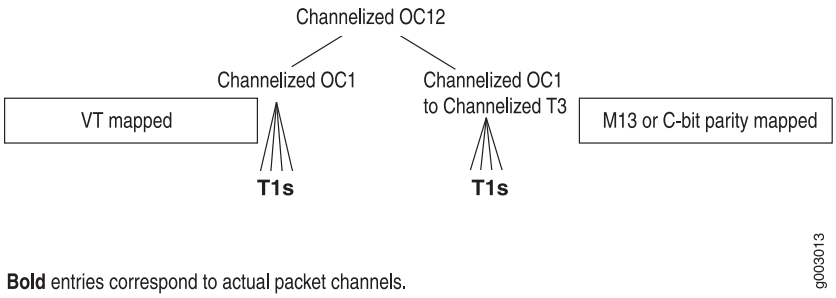
4. Partition the channelized T3 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

   [edit interfaces ct3-*fpc/pic/port*]
   partition *partition-number* interface-type (Interfaces) t1;

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Figure 5 on page 15 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

Figure 5: T1 Interfaces on a Channelized OC12 PIC



Bold entries correspond to actual packet channels.

Example: Configuring T1 Interfaces

Configure the following T1 interfaces:

```
t1-0/0/0:1:1
t1-0/0/0:1:2
t1-0/0/0:1:3
t1-0/0/0:1:4
t1-0/0/0:1:5
```

VT-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 1-5 interface-type t1;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 1-5 interface-type t1;
```

For a full configuration example, see the *Junos OS Feature Guides*.

Configuring NxDS0 Interfaces

To configure *N*xDS0 interfaces on a Channelized OC12 IQE PIC, perform the following tasks:

1. Partition the channelized OC12 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   ```
   [edit interfaces coc12-fpc/pic/port]
   partition partition-number oc-slice oc-slice-range interface-type (Interfaces) coc1;
   ```

2. If your network equipment uses VT mapping, partition the channelized OC1 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements

at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **ct1** interface type:

```
[edit interfaces coc1-fpc/pic/port]
partition partition-number interface-type (Interfaces) ct1;
```

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **ct3** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port]
   no-partition partition-number interface-type (Interfaces) ct3;
   ```

   NOTE: Because the **no-partition** statement is included, this configuration task does not create another level of channelization, as denoted by the number of colons in the resulting interface.

4. Partition the channelized T3 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **ct1** interface type:

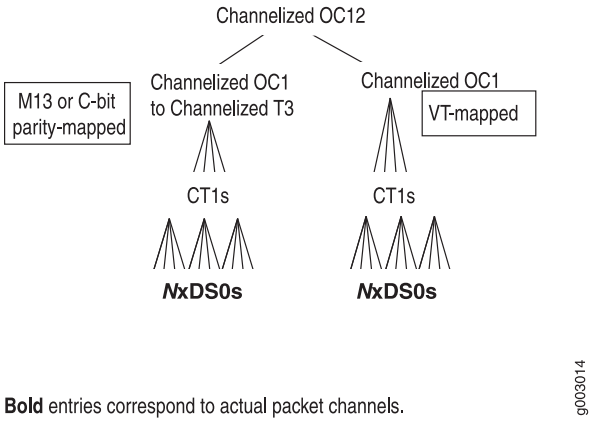
   ```
   [edit interfaces ct3-fpc/pic/port]
   partition partition-number interface-type (Interfaces) ct1;
   ```

5. Configure channelized *N*xDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level, specifying the **ds** interface type:

   ```
   [edit interfaces ct1-fpc/pic/port:channel:channel]
   partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
   ```

Figure 6 on page 17 shows VT-mapped and M13 or C-bit parity-mapped configurations of *N*xDS0 IQ interfaces.

Figure 6: Sample Channelization of OC12 IQE PIC



Bold entries correspond to actual packet channels.

Example: Configuring NxDS0 Interfaces

Configure the following two *N*xDS0 interfaces with 10 time slots and 4 time slots, respectively:

```
ds-0/0/0:1:2:1
ds-0/0/0:1:2:2
```

VT-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

For a full configuration example, see the *Junos OS Feature Guides*.

Configuring Fractional T1 Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized OC12 IQE PIC, perform the following tasks:

1. Configure a T1 interface. For more information, see *Configuring T1 Interfaces*.
2. Configure the number of time slots allocated to the T1 interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port*<:*channel*> t1-options]** hierarchy level:

   ```
   [edit interfaces t1-fpc/pic/port<:channel> t1-options]
   timeslots time-slot-range;
   ```

For channelized T1 interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 Interfaces

Configure a fractional T1 interface that uses time slots 1 through 5 and 10:

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-5,10;
```

For a full configuration example, see the *Junos OS Feature Guides*.

Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode)

The Channelized OC12 IQE PIC configured for SDH mode creates a single channelized STM4 interface. You can configure this interface as unpartitioned using the **no-partition** statement at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level to create a single SDH VC-4-4C interface, or you can partition it into the following OC slices:

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- E3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)
- Channelized E1 or E1 interfaces from a channelized AU-4 interface (63 interfaces, any combination)
- *N*xDS0 interfaces from a channelized E1 interface

This section describes how to configure the following channelized OC12 IQE interfaces on a Channelized OC12 IQE PIC configured in SDH mode:

- Configuring Channelized OC12/STM4 IQE PICs for SDH Mode on page 19
- Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC on page 19
- Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs on page 20
- Configuring Channelized AU-4 Interfaces on page 20
- Configuring E3 Interfaces on page 21

Configuring Channelized OC12/STM4 IQE PICs for SDH Mode

The 4-port Channelized OC12 IQE PIC allows SONET/SDH configuration on a per port basis, permitting combinations of SONET and SDH ports on the same PIC. The 1-port Channelized OC12 IQE PIC operates in either SONET or SDH mode only.

To configure a 1-port Channelized OC12 IQE PIC to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level:

```
[edit chassis]
fpc 0 {
  pic 2 {
    framing sdh;
  }
}
```

This configuration creates interface **cstm4-0/2/0**.

You can also use the above configuration example to configure all 4 ports of a 4-port Channelized OC12 IQE PIC for SDH mode. To configure individual ports to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level. The following example configures port 2 for SDH mode:

```
[edit chassis]
fpc 0 {
  pic 2 {
    port 2 {
      framing sdh;
    }
  }
}
```

This configuration creates interface **cstm4-0/2/2**.

For more information, see the *Junos OS Administration Library for Routing Devices*.

Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC

On a Channelized OC12 IQE PIC, you can configure one SDH (VC-4-4C) interface. To configure an SDH (VC-4-4C) interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm4-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port***.

Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface

Configure an unpartitioned SDH (VC-4-4C) interface, using partition 1 and OC slices 4 through 6:

```
[edit interfaces cstm4-0/2/0]
```

```
no-partition interface-type so;
```

This configuration creates the interface **so-0/2/0**.

Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs

To configure an SDH (VC-4) interface on a Channelized OC12 IQE PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For Channelized OC12 IQE PICs, the OC-slice range can be from 1 through 12.

NOTE: **For channelized OC12 IQE interfaces, channel numbering begins with 1 (:1).**

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. SDH (VC-4) interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type so;
partition 2 oc-slice 4-6 interface-type so;
partition 3 oc-slice 7-9 interface-type so;
partition 4 oc-slice 10-12 interface-type so;
```

This configuration creates the interfaces **so-0/2/0:1** through **so-0/2/0:4**.

Configuring Channelized AU-4 Interfaces

To configure a channelized AU-4 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) cau4;
```

This configuration creates interface **cau4-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index. For SDH interfaces, the partition number is not correlated with bandwidth size. A channelized STM-4 interface can have from 1 through 4 partition numbers.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 interfaces (both IQ and IQE), channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. Channelized AU-4 IQ interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

Configure channelized AU-4 interfaces, using partitions 1 through 4:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type cau4;
partition 2 oc-slice 4-6 interface-type cau4;
partition 3 oc-slice 7-9 interface-type cau4;
partition 4 oc-slice 10-12 interface-type cau4;
```

This configuration creates the interfaces **cau4-0/2/0:1** through **cau4-0/2/0:4**.

Configuring E3 Interfaces

To configure E3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e3** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
    partition partition-number interface-type (Interfaces) e3;
}
```

This configuration creates the interfaces **e3-*fpc/pic/port*:*channel*** and **e3-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

NOTE: Channelized OC12/STM4 IQ and IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0-3 of each OC12 space for STS3C SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, Junos OS allocates them starting from channel 4 because channels 0-3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (all 4 through 11 configured) for E3 or T3 channels will Junos OS then allocate channel 0-3 space for further E3 or T3 channels; thereby using up the 0-3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4-6 or 7-9 with an OC3 SONET channel; it fails because the channel 0-3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the Device Control Daemon (DCD) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3/T3 channels with OC3 channels, to free channels 0-3.

Example: Configuring E3 Interfaces

Configure E3 interfaces, using partition 1:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 1 interface-type e3;
}
e3-0/2/0:1:1;
```

Configuring E1 or Channelized E1 Interfaces

To configure E1 or channelized E1 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e1** or **ce1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
   partition partition-number interface-type (Interfaces) e1;
}
cau4-fpc/pic/port {
   partition partition-number interface-type (Interfaces) ce1;
}
```

This configuration creates the interfaces **e1-*fpc/pic/port*:*channel*** and **ce1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Example: Configuring E1 or Channelized CE1 Interfaces

Configure E1 or channelized CE1 interfaces, using partition 3 and partition 4:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 3 interface-type e1;
}
cau4-0/2/0:1 {
   partition 4 interface-type ce1;
}
```

This configuration creates interfaces **e1-0/2/0:1:3** and **ce1-0/2/0:1:4**.

Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs

Configure channelized *N*xDS0 interfaces on the channelized E1 interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ce1-fpc/pic/port:channel:channel]
partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
```

This configuration creates the interface **ds-*fpc/pic/port*:*channel***.

The time-slot range is from 1 through 32. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. You can use a combination of ranges and discontinuous time slots, for example:

```
1,9-18,21
```

Example: Configuring NxDS0 Interfaces

Configure channelized *N*xDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[edit interfaces]
ce1-0/2/0:1:2:3 {
   partition 4 interface-type ds0 timeslots 1-10;
}
```

This configuration creates interface **ds-0/2/0:1:2:4**.

Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode)

The Channelized OC12 IQ PIC configured for SDH mode creates a single channelized STM4 interface. You can configure this interface as unpartitioned using the **no-partition**

statement at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level to create a single SDH VC-4-4C interface, or you can partition it into the following OC slices:

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- Channelized T3 or T3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)
- Channelized T1 or T1 interfaces from a channelized T3 interface (28 interfaces, any combination)
- *N*xDS0 interfaces from a channelized T1 interface

NOTE: **If you configure the per-unit-scheduler statement on the physical interface of a 4-port channelized OC-12 IQ PIC and configure 975 logical interfaces or data link connection identifiers (DLCIs), some of the logical interfaces or DLCIs will drop all packets intermittently.**

This section describes how to configure the following channelized OC12 IQ interfaces on a Channelized OC12 IQ PIC configured in SDH mode:

Configuring Channelized OC12/STM4 IQ PICs for SDH Mode

To configure a Channelized OC12 IQ PIC to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level:

```
[edit chassis]
fpc 0 {
  pic 2 {
    framing sdh;
  }
}
```

This configuration creates interface **cstm4-0/2/0**.

For more information, see the *Junos OS Administration Library for Routing Devices*.

Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQ PIC

On a Channelized OC12 IQ PIC, you can configure one SDH (VC-4-4C) interface. To configure an SDH (VC-4-4C) interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm4-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port***.

Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface

Configure an unpartitioned SDH (VC-4-4C) interface, using partition 1 and OC slices 4 through 6:

```
[edit interfaces cstm4-0/2/0]
no-partition interface-type so;
```

This configuration creates the interface **so-0/2/0**.

Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQ PICs

To configure an SDH (VC-4) interface on a Channelized OC12 IQ PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For Channelized OC12 IQ PICs, the OC-slice range can be from 1 through 12.

NOTE: For channelized OC12 IQ interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. SDH (VC-4) interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type so;
partition 2 oc-slice 4-6 interface-type so;
partition 3 oc-slice 7-9 interface-type so;
partition 4 oc-slice 10-12 interface-type so;
```

This configuration creates the interfaces **so-0/2/0:1** through **so-0/2/0:4**.

Configuring Channelized AU-4 Interfaces

To configure a channelized AU-4 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) cau4;
```

This configuration creates interface **cau4-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index. For SDH interfaces, the partition number is not correlated with bandwidth size. A channelized STM-4 interface can have from 1 through 4 partition numbers.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 interfaces (both IQ and IQE), channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. Channelized AU-4 IQ interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

Configure channelized AU-4 interfaces, using partitions 1 through 4:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type cau4;
partition 2 oc-slice 4-6 interface-type cau4;
partition 3 oc-slice 7-9 interface-type cau4;
```

```
partition 4 oc-slice 10-12 interface-type cau4;
```

This configuration creates the interfaces **cau4-0/2/0:1** through **cau4-0/2/0:4**.

Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces

To configure T3 or channelized T3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t3** or **ct3** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) t3;
}
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) ct3;
}
```

This configuration creates the interfaces **t3-*fpc/pic/port*:*channel*** and **ct3-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Example: Configuring T3 or Channelized T3 Interfaces

Configure T3 and channelized T3 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
  partition 1 interface-type t3;
}
cau4-0/2/0:1 {
  partition 2 interface-type ct3;
}
t3-0/2/0:1:1 ct3-0/2/0:1:2;
```

Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces

To configure T1 or channelized T1 interfaces under channelized AU-4 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t1** or **ct1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) t1;
}
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) ct1;
}
```

This configuration creates the interfaces **t1-*fpc/pic/port*:*channel*** and **ct1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Example: Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces

Configure T1 and channelized T1 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 1 interface-type t1;
}
cau4-0/2/0:1 {
   partition 2 interface-type ct1;
}
t1-0/2/0:1:1 ct1-0/2/0:1:2;
```

Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces

To configure T1 or channelized T1 interfaces under channelized T3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **t1** or **ct1** interface type:

```
[edit interfaces]
ct3-fpc/pic/port {
   partition partition-number interface-type (Interfaces) t1;
}
ct3-fpc/pic/port {
   partition partition-number interface-type (Interfaces) ct1;
}
```

This configuration creates the interfaces **t1-*fpc/pic/port*:*channel*** and **ct1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Example: Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces

Configure T1 or channelized T1 interfaces, using partition 3 and partition 4:

```
[edit interfaces]
ct3-0/2/0:1:2 {
   partition 3 interface-type t1;
}
ct3-0/2/0:1:2 {
   partition 4 interface-type ct1;
}
```

This configuration creates interfaces **t1-0/2/0:1:2:3** and **ct1-0/2/0:1:2:4**.

Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs

Configure channelized *N*xDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ct1-fpc/pic/port:channel:channel]
partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
```

This configuration creates the interface **ds-*fpc/pic/port*:*channel***.

The time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. You can use a combination of ranges and discontinuous time slots:

```
1,9-18,21
```

Example: Configuring NxDS0 Interfaces

Configure channelized *N*xDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[edit interfaces]
ct1-0/2/0:1:2:3 {
   partition 4 interface-type ds0 timeslots 1-10;
}
```

This configuration creates interface **ds-0/2/0:1:2:3:4**.

Configuring Channelized OC12 Interfaces

On Channelized OC12 PICs, you can configure 12 T3 channels per port. To configure channelized OC12 interface properties, you can include the **sonet-options** and **t3-options** statements at the **[edit interfaces *interface-name*]** hierarchy level. Some SONET/SDH options are ignored, and some can only be configured for channel 0, though they apply equally to all channels. The **long-buildout** statement under **t3-options** is also ignored.

For T3 channels on a channelized OC12 interface, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of channels 1 through 11. The clock source configured for channel 0 applies to all channels on the channelized OC12 interface. The individual T3 channels use a gapped 45-MHz clock as the transmit clock. When you configure the clock source for a channelized interface—**ds-*fpc/pic/port*:0**, for example—you must also include the **channel-group** statement at the **[edit chassis]** hierarchy level and specify channel group 0. For more information, see *Clock Sources on Channelized Interfaces*.

For more information, see *SONET/SDH Interfaces Overview* and *T3 Interfaces Overview*. For a configuration example, see *Configuring Aggregated SONET/SDH Interfaces*.

Table 3 on page 30 summarizes the OC12-to-DS3 numbering scheme.

Table 3: OC12-to-DS3 Numbering Scheme

Two-Level STS-1 Number (STS-3,STS-1)	One-Level STS Number	OC12-to-DS3 PIC DS3 Number
1,1	1	0
1,2	2	1
1,3	3	2
2,1	4	3
2,2	5	4
2,3	6	5
3,1	7	6
3,2	8	7
3,3	9	8
4,1	10	9
4,2	11	10
4,3	12	11

Example: Configuring Channelized OC12 Interfaces

The following configuration is sufficient to get the channelized OC12 interface up and running. The OC12 interface can be divided into 12 channels. DS3 channels can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces.

```
[edit interfaces]
t3-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.1/30;
```

```
      }
      family iso;
    }
  }
  t3-fpc/pic/port:1 {
    encapsulation ppp;
    t3-options {
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0 {
      family inet {
        address 10.11.30.5/30;
      }
      family iso;
    }
  }
  t3-fpc/pic/port:2 {
    encapsulation frame-relay;
    t3-options {
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0 {
      dlci 100;
      family inet {
        address 10.11.30.9/30;
      }
      family iso;
    }
    unit 1 {
      dlci 101;
      family inet {
        address 10.11.31.9/30;
      }
      family iso;
    }
  }
  t3-1fpc/pic/port:3 {
    encapsulation cisco-hdlc-ccc;
    t3-options {
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0;
  }
  t3-fpc/pic/port:4 {
    encapsulation ppp-ccc;
    t3-options {
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0;
  }
  t3-fpc/pic/port:5 {
    dce;
```

```
    encapsulation frame-relay-ccc;
    t3-options {
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0 {
      encapsulation frame-relay-ccc;
      dlci 1000;
    }
    unit 1 {
      encapsulation frame-relay-ccc;
      dlci 1001;
    }
  }
```

Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces

For Channelized OC12 IQ or IQE PICs used as linking PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails. To do this, include the no-termination-request statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
no-termination-request;
```

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only.

For information about interchassis and intrachassis LSQ failover, see the *Junos OS Services Interfaces Library for Routing Devices*.

Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel

Configuring a SONET/SDH Interface

Configure a channelized OC12 interface as an unpartitioned, clear channel:

```
[edit interfaces]
coc12-5/0/0 {
  no-partition interface-type so; # so-5/0/0
}
```

Configuring Multiple Interface Types

Configure the following interfaces on a Channelized OC12 IQ or IQE PIC:

a. An OC3 interface

b. Another OC3 interface

c. A channelized OC1 partitioned into T1 interfaces

d. A channelized OC1 converted into a T3 interface

e. A channelized OC1 partitioned into T1 interfaces and channelized T1s, which are partitioned into *N*xDS0 interfaces

f. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces

g. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into *N*xDS0 interfaces

h. A channelized OC1 partitioned into channelized T1s, which are partitioned into *N*xDS0 interfaces

Configuring the Interface Partitions

```
[edit interfaces]
coc12-1/1/0 {
  sonet-options {
    sonet-options-statements;
  }
  partition 1 oc-slice 1-3 interface-type so; # (a) so-1/1/0:1
  partition 2 oc-slice 4-6 interface-type so; # (b) so-1/1/0:2
  partition 3 oc-slice 7 interface-type coc1; # (c) coc1-1/1/0:3
  partition 4 oc-slice 8 interface-type coc1; #(d) coc1-1/1/0:5
  partition 5 oc-slice 9 interface-type coc1; # (e) coc1/1/0:5
  partition 6 oc-slice 10 interface-type coc1; # (f) coc1-1/1/0:6
  partition 7 oc-slice 11 interface-type coc1; # (g) coc1-1/1/0:7
  partition 8 oc-slice 12 interface-type coc1; # (h) coc1-1/1/0:8
}
```

(a)

```
so-1/1/0:1 {
  description "(a) OC-slice 1-3 of coc12-1/1/0. COC12 > OC3.;
  sonet-options {
    sonet-options-statements;
  }
}
```

(b)

```
so-1/1/0:2 {
  description "(b) OC-slice 4-6 of coc12-1/1/0. COC12 > OC3.;
  sonet-options {
    sonet-options-statements;
  }
}
```

(c)

```
coc1-1/1/0:3 {
  description "(c) OC-slice 7 of coc12-1/1/0. COC12 to COC1 VT-mapped to T1s.";
  sonet-options {
    sonet-options-statements;
  }
  partition 1 - 10 interface-type t1; # t1-1/1/0:[1-10]
}
t1-1/1/0:3:1 {
  description "(c) OC-slice 7 of coc12-1/1/0. T1 interface configuration.";
  t1-options {
    t1-options-statements;
  }
}
...
```

(d)

```
coc1-1/1/0:4 {
  description "(d) OC-slice 8 of coc12-1/1/0. COC12 to COC1 converted to a T3.";
  sonet-options {
    sonet-options-statements;
  }
```

```
    no-partition interface-type t3; # t3-1/1/0:4
  }
  t3-1/1/0:4 {
    description "(d) OC-slice 8 of coc12-1/1/0. T3 interface configuration.";
  }
```

(e)

```
  coc1-1/1/0:5 {
    description "(e) OC-slice 9 of coc12-1/1/0. COC12 to COC1 VT-mapped to T1s.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 3 interface-type t1; # t1-1/1/0:5:[1-3]
    partition 4 interface-type ct1; # ct1-1/1/0:5:4
  }
  t1-1/1/0:5:1 {
    description "(e) OC-slice 9 of coc12-1/1/0. T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
  ct1-1/1/0:5:4 {
    description "(e) OC-slice 9 of coc12-1/1/0. CT1 to NxDSOs.;
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:5:4:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:5:4:2
    ...
  }
```

(f)

```
  coc1-1/1/0:6 {
    description "(f) OC-slice 10 of coc12-1/1/0. COC12 to COC1 converted to a CT3 to T1s.";
    sonet-options {
      sonet-options-statements;
    }
    no-partition interface-type ct3; # ct3-1/1/0:6
  }
  ct3-1/1/0:6 {
    description "(f) COC12 to CT3 M-13 and C-bit parity-mapped to T1s.;
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 10 interface-type t1; # t1-1/1/0:6:[1-10]
  }
  t1-1/1/0:6:1 {
    description "(f) T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
```

(g)

```
  coc1-1/1/0:7 {
```

```
    description "(g) OC-slice 11 of coc12-1/1/0. COC12 to COC1 converted to a CT3 to T1s and
      CT1 to NxDS0s.";
    sonet-options {
      sonet-options-statements;
    }
    no-partition interface-type ct3; # ct3-1/1/0:7
  }
  ct3-1/1/0:7 {
    description "(g) COC12 to CT3 M-13 and C-bit parity-mapped to T1s and CT1.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 10 interface-type t1; # t1-1/1/0:7:[1-10]
    partition 2 interface-type ct1; # ct1-1/1/0:7:11
  }
  t1-1/1/0:7:1 {
    description "(g) T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
  ct1-1/1/0:7:11 {
    description "(g) CT1 to NxDSOs.";
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:7:11:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:7:11:2
    ...
  }
```

(h)

```
  coc1-1/1/0:8 {
    description "(h) OC-slice 12 of coc12-1/1/0. COC12 to COC1 VT-mapped to CT1 to NxDS0s.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 interface-type t1; # ct1-1/1/0:8:1
  }
  ct1-1/1/0:8:1 {
    description "(h) CT1 to NxDSOs.";
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:8:1:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:8:1:2
    ...
  }
```

For a full configuration example, see the *Junos OS Feature Guides*.

Related Documentation

- *Channelized Interfaces Overview*

Example: Configuring Channelized OC12 Interfaces with Partitioned Channels

The following configuration is sufficient to get the channelized OC12 interface up and running. The OC12 interface can be divided into 12 channels. DS3 channels can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces.

```
[edit interfaces]
t3-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.1/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:1 {
    encapsulation ppp;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.5/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:2 {
    encapsulation frame-relay;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        dlci 100;
        family inet {
            address 10.11.30.9/30;
        }
        family iso;
    }
    unit 1 {
```

```
        dlci 101;
        family inet {
          address 10.11.31.9/30;
        }
        family iso;
      }
    }
    t3-1fpc/pic/port:3 {
      encapsulation cisco-hdlc-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:4 {
      encapsulation ppp-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:5 {
      dce;
      encapsulation frame-relay-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0 {
        encapsulation frame-relay-ccc;
        dlci 1000;
      }
      unit 1 {
        encapsulation frame-relay-ccc;
        dlci 1001;
      }
    }
```

Related Documentation

- Configuring Channelized OC12 Interfaces on page 29

CHAPTER 3

Network Interfaces Configuration Statements and Hierarchy

[edit chassis] Hierarchy Level

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
    }
    sonet {
      device-count number;
    }
  }
    maximum-links {
    }
  channel-group number {
    ethernet {
      device-count number;
    }
    fpc slot-number{
      pic pic-number {
        adaptive-services{
          service-package (layer-2 | layer-3);
        }
        aggregate-ports;
        atm-cell-relay-accumulation;
        atm-l2circuit-mode (aal5 | cell | trunk trunk);
        ce1 {
          e1 link-number {
            channel-group group-number;
            timeslots time-slot-range;
          }
        }
        channelization;
        ct1 {
          t1 link-number {
```

```
            channel-group group-number;
            timeslots time-slot-range;
          }
        }
        ct3 {
          port port-number {
            t1 link-number {
              channel-group group-number;
              timeslots time-slot-range;
            }
          }
          framing sdh;
        }
        max-queues-per-interface number;
        mlfr-uni-nni-bundles num-intf;
        no-concatenate;
        shdsl {
          pic-mode (1-port-atm | 2-port-atm);
        }
        vtmapping (klm | itu-t);
      }
    }
    fpc slot-number{
    pic pic-number{
      account-layer2-overhead
        egress-policer-overhead bytes;
        ingress-policer-overhead bytes;
      }
    }
  }
```

[edit interfaces] Hierarchy Level

The statements at the **[edit interfaces** *interface-name* **unit** *logical-unit-number***]** hierarchy level can also be configured at the **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number***]** hierarchy level.

NOTE: The *accounting-profile* statement is an exception to this rule. The **accounting-profile** statement can be configured at the **[edit interfaces** *interface-name* **unit** *logical-unit-number***]** hierarchy level, but it cannot be configured at the **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number***]** hierarchy level.

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    account-layer2-overhead (Interface Level) {
      value;
```

```
    egress bytes;
    ingress bytes;
  }
  accounting-profile name;
  aggregated-ether-options {
    (flow-control | no-flow-control);
    lacp {
      (active | passive);
      link-protection {
        disable;
      (revertive | non-revertive);
      periodic interval;
      system-priority priority;
    }
    link-protection;
    link-speed speed;
    (loopback | no-loopback);
    mc-ae{
      chassis-id chassis-id;
      mc-ae-id mc-ae-id;
      mode (active-active | active-standby);
      redundancy-group group-id;
      status-control (active | standby);
    }
    minimum-links number;
    source-address-filter {
      mac-address;
    }
    (source-filtering | no-source-filtering);
  }
  shared-scheduler;
  aggregated-sonet-options {
    link-speed speed | mixed;
    minimum-links number;
  }
  atm-options {
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
      high-plp-max-threshold percent;
      low-plp-max-threshold percent;
      queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    pic-type (atm1 | atm2);
    plp-to-clp;
    promiscuous-mode {
      vpi vpi-identifier;
    }
    scheduler-maps map-name {
      forwarding-class class-name {
        epd-threshold cells plp1 cells;
```

```
            linear-red-profile profile-name;
            priority (high | low);
            transmit-weight (cells number | percent number);
          }
          vc-cos-mode (alternate | strict);
        }
        use-null-cw;
          vpi vpi-identifier {
          maximum-vcs maximum-vcs;
          oam-liveness {
            down-count cells;
            up-count cells;
          }
          oam-period (seconds | disable);
          shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
              burst length);
            queue-length number;
          }
        }
      }
      clocking clock-source;
      data-input (system | interface interface-name);
      dce;
      serial-options {
        clock-rate rate;
        clocking-mode (dce | internal | loop);
        control-polarity (negative | positive);
        cts-polarity (negative | positive);
        dcd-polarity (negative | positive);
        dce-options {
          control-signal (assert | de-assert | normal);
          cts (ignore | normal | require);
          dcd (ignore | normal | require);
          dsr (ignore | normal | require);
          dtr signal-handling-option;
          ignore-all;
          indication (ignore | normal | require);
          rts (assert | de-assert | normal);
          tm (ignore | normal | require);
        }
        dsr-polarity (negative | positive);
        dte-options {
          control-signal (assert | de-assert | normal);
          cts (ignore | normal | require);
          dcd (ignore | normal | require);
          dsr (ignore | normal | require);
          dtr signal-handling-option;
          ignore-all;
          indication (ignore | normal | require);
          rts (assert | de-assert | normal);
          tm (ignore | normal | require);
        }
        dtr-circuit (balanced | unbalanced);
        dtr-polarity (negative | positive);
        encoding (nrz | nrzi);
```

```
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
description text;
dialer-options {
    pool pool-name <priority priority>;
}
disable;
ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
}
e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
e3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
    (unframed | no-unframed);
}
encapsulation type;
es-options {
    backup-interface es-fpc/pic/port;
}
fastether-options {
    802.3ad aex;
```

```
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    ingress-rate-limit rate;
    (loopback | no-loopback);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    source-address-filter {
      mac-address;
    }
    (source-filtering | no-source-filtering);
  }
  flexible-vlan-tagging;
  gigether-options {
    802.3ad aex;
    (asynchronous-notification | no-asynchronous-notification);
    (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
      local-interface-offline>;
    auto-reconnect seconds;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    (loopback | no-loopback);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    no-auto-mdix;
    source-address-filter {
      mac-address;
    }
    (source-filtering | no-source-filtering);
    ethernet-switch-profile {
      (mac-learn-enable | no-mac-learn-enable);
      tag-protocol-id [ tpids ];
      ethernet-policer-profile {
        input-priority-map {
          ieee802.1p premium [ values ];
        }
        output-priority-map {
          classifier {
            premium {
              forwarding-class class-name {
                loss-priority (high | low);
              }
            }
          }
        }
        policer cos-policer-name {
          aggregate {
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
          premium {
```

```
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
        }
      }
    }
}
(gratuitous-arp-reply | no-gratuitous-arp-reply);
hold-time up milliseconds down milliseconds;
ima-group-options {
  differential-delay number;
  frame-length (32 | 64 | 128 | 256);
  frame-synchronization {
    alpha number;
    beta number;
    gamma number;
  }
  minimum-links number;
  symmetry (symmetrical-config-and-operation |
    symmetrical-config-asymmetrical-operation);
  test-procedure {
    ima-test-start;
    ima-test-stop;
    interface name;
    pattern number;
    period number;
  }
  transmit-clock (common | independent);
  version (1.0 |1.1);
}
ima-link-options group-id group-id;
interface-set interface-set-name {
  interface ethernet-interface-name {
    (unit unit-number | vlan-tags-outer vlan-tag);
  }
  interface interface-name {
    (unit unit-number);
  }
}
isdn-options {
  bchannel-allocation (ascending | descending);
  calling-number number;
  pool pool-name <priority priority>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
  lmi-type (ansi | itu | c-lmi);
  n391dte number;
  n392dce number;
```

```
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interfaceinterface-name;
        }
    }
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
optics-options {
    alarm low-light-alarm {
        (link-down | syslog);
    }
```

```
    tx-power dbm;
    warning low-light-warning {
      (link-down | syslog);
    }
    wavelength nm;
  }
  otn-options {
    bytes transmit-payload-type value;
    fec (efec | gfec | gfec-sdfec | none);
    (is-ma | no-is-ma);
    (laser-enable | no-laser-enable);
    (line-loopback | no-line-loopback);
    (local-loopback | no-local-loopback);
    (odu-ttim-action-enable | no-odu-ttim-action-enable);
    (otu-ttim-action-enable | no-otu-ttim-action-enable);
    odu-delay-management {
      (bypass | no-bypass);
      (monitor-end-point | no-monitor-end-point);
      (number-of-frames | no-number-of-frames);
      (start-measurement | no-start-measurement);
    }
    (prbs | no-prbs);
    preemptive-fast-reroute {
      (backward-frr-enable | no-backward-frr-enable);
      (signal-degrade-monitor-enable | no-signal-degrade-monitor-enable);
    }
    rate {
      (fixed-stuff-bytes | no-fixed-stuff-bytes);
      otu4;
      (pass-through | no-pass-through);
    }
    signal-degrade {
      ber-threshold-clear value;
      ber-threshold-signal-degrade value;
      interval value;
    }
    trigger trigger-identifier;
    tti tti-identifier;
  }
  partition partition-number oc-slice oc-slice-range interface-type type;
  timeslots time-slot-range;
  passive-monitor-mode;
  per-unit-scheduler;
  ppp-options {
    chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
    }
    compression {
      acfc;
      pfc;
    }
    dynamic-profile profile-name;
    no-termination-request;
```

```
    pap {
      access-profile name;
      local-name name;
      local-password password;
      compression;
    }
  }
  psn-vcipsn-vci-identifier;
  psn-vpipsn-vpi-identifier;
  receive-bucket {
    overflow (discard | tag);
    rate percentage;
    threshold bytes;
  }
  redundancy-options {
    priority sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
    hot-standby;
  }
  satop-options {
    payload-size n;
  }
  schedulers number;
  serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
```

```
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
        rate new-sessions-per-second;
        }
        syslog {
        host hostname {
            facility-override facility-name;
            log-prefix prefix-number;
            services priority-level;
        }
    }
}
shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
        current margin;
        snext margin;
    }
}
sonet-options {
    aggregate asx;
    aps {
        advertise-interval milliseconds;
        annex-b;
        authentication-key key;
        fast-aps-switch;
        force;
        hold-time milliseconds;
        lockout;
        neighbor address;
        paired-group group-name;
        preserve-interface;
        protect-circuit group-name;
        request;
        revert-time seconds;
        switching-mode (bidirectional | unidirectional);
        working-circuit group-name;
    }
    bytes {
        c2 value;
        e1-quiet value;
        f1 value;
        f2 value;
        s1 value;
        z3 value;
```

```
      z4 value;
    }
    fcs (16 | 32);
    loopback (local | remote);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    path-trace trace-string;
    (payload-scrambler | no-payload-scrambler);
    rfc-2615;
    trigger {
      defect ignore;
      hold-time up milliseconds down milliseconds;
    }
    vtmapping (itu-t | klm);
    (z0-increment | no-z0-increment);
  }
  speed (10m | 100m | 1g | oc3 | oc12 | oc48);
  stacked-vlan-tagging;
  switch-options {
    switch-port port-number {
      (auto-negotiation | no-auto-negotiation);
      speed (10m | 100m | 1g);
      link-mode (full-duplex | half-duplex);
    }
  }
  t1-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout value;
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
  }
  t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
      value>;
    fcs (16 | 32);
```

```
    (feac-loop-respond | no-feac-loop-respond);
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    account-layer2-overhead {
        value;
        egress bytes;
        ingress bytes;
    }
    accounting-profile name;
    advisory-options {
        downstream-rate rate;
        upstream-rate rate;
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
        interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
        rtp {
            f-max-period number;
            maximum-contexts number <force>;
            queues [ queue-numbers ];
            port {
                minimum port-number;
                maximum port-number;
```

```
      }
    }
  }
  compression-device interface-name;
  copy-tos-to-outer-ip-header;
  demux-destination family;
  demux-source family;
  demux-options {
    underlying-interface interface-name;
  }
  description text;
  interface {
    l2tp-interface-id name;
    (dedicated | shared);
  }
  dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
      caller (caller-id | accept-all);
      initial-route-check seconds;
      load-interval seconds;
      load-threshold percent;
      pool pool-name;
      redial-delay time;
      watch-list {
        [ routes ];
      }
    }
  }
  disable;
  disable-mlppp-inner-ppp-pfc;
  dlci dlci-identifier;
  drop-timeout milliseconds;
  dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
  }
  encapsulation type;
  epd-threshold cells plp1 cells;
  fragment-threshold bytes;
  inner-vlan-id-range start start-id end end-id;
  input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  interleave-fragments;
  inverse-arp;
  layer2-policer {
```

```
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
  }
  link-layer-overhead percent;
  minimum-links number;
  mrru bytes;
  multicast-dlci dlci-identifier;
  multicast-vci vpi-identifier.vci-identifier;
  multilink-max-classes number;
  multipoint;
  oam-liveness {
    down-count cells;
    up-count cells;
  }
  oam-period (seconds | disable);
  output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  passive-monitor-mode;
  peer-unit unit-number;
  plp-to-clp;
  point-to-point;
  ppp-options {
    chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
    }
    compression {
      acfc;
      pfc;
      pap;
      default-pap-password password;
      local-name name;
      local-password password;
      passive;
    }
    dynamic-profile profile-name;
    lcp-max-conf-req number;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-max-conf-req number;
    ncp-restart-timer milliseconds;
  }
  pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
```

```
    underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
      burst length);
    queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id];
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            direction;
        }
    }
    access-concentrator name;
    address address {
        destination address;
    }
    bundle ml-fpc/pic/port | ls-fpc/pic/port);
    duplicate-protection;
    dynamic-profile profile-name;
    filter {
        group filter-group-number;
        input filter-name;
        input-list {
            [ filter-names ];
            output filter-name;
        }
        output-list {
            [ filter-names ];
        }
```

```
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
max-sessions-vsa-ignore;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
  fail-filter filter-name;
  mode loose;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-names <service-filter filter-name>;
  }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
  maximum-seconds>;
targeted-broadcast {
  forward-and-send-to-re;
  forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
  profile-name | preferred-source-address address>;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
```

```
                inverse-arp;
                oam-liveness {
                    up-count cells;
                    down-count cells;
                }
                oam-period (seconds | disable);
                shaping {
                    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                        rate burst length);
                    queue-length number;
                }
                vci vpi-identifier.vci-identifier;
            }
            preferred;
            primary;
            (vrrp-group | vrrp-inet6-group) group-number {
                (accept-data | no-accept-data);
                advertise–interval seconds;
                authentication-type authentication;
                authentication-key key;
                fast-interval milliseconds;
                (preempt | no-preempt) {
                    hold-time seconds;
                }
                priority-number number;
                track {
                    priority-cost seconds;
                    priority-hold-time interface-name {
                        bandwidth-threshold bits-per-second {
                            priority;
                        }
                        interface priority;
                    }
                    route ip-address/mask routing-instance instance-name priority-cost cost;
                }
                virtual-address [ addresses ];
            }
        }
    }
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- *Ethernet Interfaces*
- *Junos OS Network Interfaces Library for Routing Devices*

[edit logical-systems] Hierarchy Level

The following lists the statements that can be configured at the **[edit logical-systems]** hierarchy level that are also documented in this manual. For more information about logical systems, see the *Logical Systems Feature Guide for Routing Devices*.

```
logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
          policer {
            input cos-policer-name;
            output cos-policer-name;
          }
        }
      }
      allow-any-vci;
      atm-scheduler-map (map-name | default);
      bandwidth rate;
      backup-options {
        interface interface-name;
      }
      cell-bundle-size cells;
      clear-dont-fragment-bit;
      compression {
        rtp {
          f-max-period number;
          port {
            minimum port-number;
            maximum port-number;
          }
          queues [ queue-numbers ];
        }
      }
      compression-device interface-name;
      description text;
      interface {
        l2tp-interface-id name;
        (dedicated | shared);
      }
      dialer-options {
        activation-delay seconds;
        deactivation-delay seconds;
        dial-string [ dial-string-numbers ];
        idle-timeout seconds;
        initial-route-check seconds;
        load-threshold number;
        pool pool;
        remote-name remote-callers;
        watch-list {
          [ routes ];
        }
      }
      disable;
      dlci dlci-identifier;
      drop-timeout milliseconds;
      dynamic-call-admission-control {
        activation-priority priority;
        bearer-bandwidth-limit kilobits-per-second;
      }
      encapsulation type;
```

```
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
   inner-tag-protocol-id;
   inner-vlan-id;
   (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
   tag-protocol-id tpid;
   vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
   input-policer policer-name;
   input-three-color policer-name;
   output-policer policer-name;
   output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
   up-count cells;
   down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
   inner-tag-protocol-id;
   inner-vlan-id;
   (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
   tag-protocol-id tpid;
   vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
   chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
   }
   compression {
      acfc;
      pfc;
      }
   }
   dynamic-profile profile-name;
   pap {
      default-pap-password password;
      local-name name;
```

```
      local-password password;
      passive;
    }
  }
  proxy-arp;
  service-domain (inside | outside);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
      burst length);
    queue-length number;
  }
  short-sequence;
  transmit-weight number;
  (traps | no-traps);
  trunk-bandwidth rate;
  trunk-id number;
  tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
      destination routing-instance-name;
    }
    source source-address;
    ttl number;
  }
  vci vpi-identifier.vci-identifier;
  vlan-id number;
  vlan-id-list [vlan-id vlan-id–vlan-id]
  vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
  vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id]
  vpi vpi-identifier;
  family family {
    accounting {
      destination-class-usage;
      source-class-usage {
        direction;
      }
    }
    bundle interface-name;
    filter {
      group filter-group-number;
      input filter-name;
      input-list {
        [ filter-names ];
      }
      output filter-name;
      output-list {
        [ filter-names ];
      }
    }
    ipsec-sa sa-name;
    keep-address-and-control;
    mtu bytes;
    multicast-only;
    no-redirects;
```

```
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
  <mode loose>;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
  profile-name;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise–interval seconds;
```



```
                authentication-type authentication;
                authentication-key key;
                fast-interval milliseconds;
                (preempt | no-preempt) {
                  hold-time seconds;
                }
                priority-number number;
                track {
                  priority-cost seconds;
                  priority-hold-time interface-name {
                    interface priority;
                    bandwidth-threshold bits-per-second {
                      priority;
                    }
                  }
                  route ip-address/mask routing-instance instance-name priority-cost cost;
                }
              }
              virtual-address [ addresses ];
            }
          }
        }
      }
    }
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- *Ethernet Interfaces*
- *Junos OS Network Interfaces Library for Routing Devices*

CHAPTER 4

Statement Summary

fast-aps-switch

Syntax fast-aps-switch;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced in Junos OS Release 12.1.

Description (M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only and EX Series switches) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.

NOTE:

- Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.
- When the **fast-aps-switch** statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.
- To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.
- The **fast-aps-switch** statement cannot be configured when the APS **annex-b** option is configured.
- The interfaces that have the **fast-aps-switch** statement configured cannot be used in virtual private LAN service (VPLS) environments.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Reducing APS Switchover Time in Layer 2 Circuits*

interface-type (Interfaces)

Syntax interface-type (bc | coc1 | ct1 | ct3 | dc | ds |so | t1 | t3);

Hierarchy Level [edit interfaces *interface-range name* no-partition],
[edit interfaces *interface-range name* partition *partition-number*],
[edit interfaces *interface-range name* partition *partition-number* oc-slice *oc-slice-range*],
[edit interfaces *interface-range name* partition *partition-number* timeslot *timeslot-range*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ and IQE interfaces only, configure the sublevel interface type.

Options

bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a bearer (B) channel **bc-*pim*/0/*port*:*channel*** interface for each time you want to function as an ISDN PRI B-channel.

coc1—Channelized OC1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

ct1—Channelized T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* interface-type ct3-*fpc/pic/port*<:*channel*>]** hierarchy level.

ct3—Channelized T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc1-*fpc/pic/port*:*channel* no-partition]** hierarchy level.

dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a (D) channel **dc-*pim*/0/*port*** to control the B-channels.

ds—DS0 interface type. You can specify this interface type at the **[edit interfaces *interface-name*partition *partition-number* interface-type (ce1-*fpc/pic/port* | ct1-*fpc/pic/port*<:*channel*>)]** hierarchy level.

so—SONET/SDH interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

t1—T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*)]** hierarchy level.

t3—T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice*oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*:*channel* no-partition)]** hierarchy level.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Channelized E1 IQ and IQE Interfaces Overview*
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3
- *Configuring Channelized T3 IQ Interfaces*

no-partition

Syntax no-partition interface-type (e1 | (cau4 | so) | (ct3 | t3) | so | t3);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces coc1-*fpc/pic/port*:*channel*],
[edit interfaces coc12-*fpc/pic/port*],
[edit interfaces cstm1-*fpc/pic/port*],
[edit interfaces ct3-*fpc/pic/port*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.

For Channelized OC12 PIC only, convert the channelized OC1 IQ interface into a channelized T3 interface or a T3 interface. You perform this configuration task for C-bit parity and M13-mapped configurations.

For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.

For Channelized STM1 PIC only, convert the channelized STM1 IQ interface into a channelized Administrative Unit 4 (AU-4) interface or a SONET/SDH STM1 interface.

For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.

Default If you do not include either this statement or the **partition** statement, the Channelized IQ PIC is not partitioned, and no data channels are configured.

Options The option used must correspond to the physical interface type:

e1—E1 interface type.

coc12 so—Channelized OC12 interface type, in SONET mode.

cau4—Channelized AU-4 interface type.

cstm1—SONET/SDH STM1 interface type, in SDH mode.

ct3—Channelized T3 interface type.

t3—T3 interface type.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Channelized E1 IQ and IQE Interfaces Overview*
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3
- Configuring an OC12/STM4 Interface on page 11

- *Configuring Channelized STM1 IQ and IQE Interfaces*
- *Configuring T3 IQ Interfaces*
- partition on page 69
- *no-partition*

no-termination-request

Syntax no-termination-request;

Hierarchy Level [edit interfaces *interface-name* ppp-options],
[edit interfaces lsq-*fpc/pic/port* lsq-failure-options]

Release Information Statement introduced in Junos OS Release 7.4.
Support at the **[edit interfaces *interface-name* ppp-options]** hierarchy level added in Junos OS Release 8.3.

Description For LSQ PICs or link PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the PIC fails.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces*
- Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 32
- *Configuring Link PIC Failover on Channelized STM1 Interfaces*
- *Junos OS Services Interfaces Library for Routing Devices*

oc-slice

Syntax oc-slice *oc-slice-range*;

Hierarchy Level [edit interfaces *interface-name* partition *partition-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For channelized OC12 IQ interfaces only, configure the range of SONET/SDH slices.

Default If you do not include either this statement or the **no-partition** statement, the Channelized OC12 IQ PICs not partitioned, and no data channels are configured.

Options ***oc-slice-range***—Range of SONET/SDH slices. OC3 interfaces must occupy three consecutive OC slices per interface, in the form 1–3, 4–6, 7–9, or 10–12. The T3, T1, and DS0 interface types each occupy one OC slice per interface.

Range: For OC3 interfaces,1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12

The remaining statement is explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3

partition

Syntax partition *partition-number* oc-slice *oc-slice-range* interface-type *type* timeslots *time-slot-range*;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ interfaces and J Series interfaces on the Dual-Port Channelized E1 and T1PIM, configure the channelized interface partition. The partition number is correlated with the channel number. Partition and channel numbering on IQ interfaces begins with **:1**, not **:0**.

Default If you omit this statement, the channelized PIC or PIM is not partitioned, and no data channels are configured.

Options ***partition-number***—Sublevel interface partition index.

Range:

- 1 through 4 for an OC3 interface on a channelized OC12 IQ interface.
- 1 through 12 for a T3 interface on a channelized OC12 IQ interface.
- 1 through 4 for a T3 interface on a channelized T3 IQ interface.
- 1 through 28 for a T1 IQ interface on a channelized OC12 IQ or channelized T3 IQ interface.
- 1 through 10 for an E1 interface on a channelized E1 IQ interface.
- 1 through 30 on a channelized E1 interface.
- 1 through 23 on a channelized T1 interface.
- 1 through 24 for *N*xDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces.
- 0 through 31(with 0 reserved for framing) for *N*xDS0 interfaces on channelized E1 IQ interfaces.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Channelized E1 IQ and IQE Interfaces Overview*
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3
- *Configuring Channelized T3 IQ Interfaces*
- no-partition on page 66

sonet-options

Syntax

```
sonet-options {
  aps {
    advertise-interval milliseconds;
    annex-b
    authentication-key key;
    (break-before-make | no-break-before-make);
    fast-aps-switch;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    defect hold-time up milliseconds down milliseconds;
  }
}
vtmapping (itu-t | klm);
(z0-increment | no-z0-increment);
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure SONET/SDH-specific interface properties.

On SONET/SDH OC48 interfaces that you configure for channelized (multiplexed) mode (by including the **no-concatenate** statement at the **[edit chassis fpc *slot-number* pic *pic-number*]** hierarchy level), the **bytes e1-quiet** and **bytes f1** options have no effect. The **bytes f2**, **bytes z3**, **bytes z4**, and **path-trace** options work correctly on channel 0 and work in the transmit direction only on channels 1, 2, and 3.

On a channelized OC12 interface, the **bytes e1-quiet, bytes f1, bytes f2, bytes z3,** and **bytes z4** options are not supported. The **fcs** and **payload-scrambler** statements are also not supported; you must configure these for each DS3 channel using the **t3-options fcs** and **t3-options payload-scrambler** statements. The **aps** and **loopback** statements are supported only on channel 0 and are ignored if included in the configurations for channels 1 through 11. You can configure loopbacks for each DS3 channel with the **t3-options loopback** statement. The **path-trace** statement can be included in the configuration for each DS3 channel, thereby configuring a unique path trace for each channel.

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, and cstm1). It is ignored for path-level interfaces **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel***.

If you are running Intermediate System-to-Intermediate System (IS-IS) over SONET/SDH interfaces, use PPP if you are running Cisco IOS Release 12.0 or later. If you need to run HDLC, configure an ISO family MTU of 4469 on the router.

The statements are explained separately.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring SONET/SDH Parameters on ATM Interfaces*
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3
- *Channelized STM1 Interfaces Overview*
- *SONET/SDH Physical Interface Properties Overview*
- *no-concatenate*

timeslots

Syntax timeslots *time-slot-range*;

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* partition *partition-number*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For E1 and T1interfaces, allocate the specific time slots by number.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **timeslots** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***time-slot-range***—Actual time slot numbers allocated:

Range: Ranges vary by interface type and configuration option as follows:

- 1 through 24 for T1 interfaces (0 is reserved)
- 1 through 31 for 4-port E1 PICs (0 is reserved)
- 1 through 31 for *Nx*DS0 interfaces (0 is reserved)
- 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved)
- 2 through 32 for the setting under **e1-options** with IQE PICs (1 is reserved) (when creating fractional E1)
- 1 through 31 for the setting under **partition** with IQE PICs (0 is reserved) (when creating *Nx*DS0)

NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Fractional E1 IQ and IQE Interfaces*
- *Configuring Fractional T1 IQ and IQE Interfaces*

- *Configuring Fractional E1 Time Slots*
- *Configuring Fractional T1 Time Slots*
- *Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots*

PART 3

Administration

CHAPTER 5

Monitoring Commands

show interfaces (Channelized OC12)

Syntax show interfaces t3-*fpc/pic/port*:*t3channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 interface.

Options

t3-*fpc/pic/port*:*t3channel*—Display standard information about the specified channelized OC12 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized OC12) on page 78

Output Fields See the output field table for the *show interfaces (Channelized OC3 IQ and IQE)* command.

Sample Output

show interfaces extensive (Channelized OC12)

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 32, SNMP ifIndex: 21, Generation: 2719
  Link-level type: Frame-Relay, PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: T3, Loopback: None, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
```

```
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-05-23 16:59:03 PDT (18:23:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 1700                    0 bps
   Output bytes  :                 1714                    0 bps
   Input  packets:                  123                    0 pps
   Output packets:                  124                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 1100817, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                      18            1  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                      36       122399
    CCV                      72        91948
    LES                       0
    PES                      18
    PSES                     18
    CES                      18
    CSES                     18
    SEFS                     18
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5           529         6348            0            0
  SONET PHY:            Seconds        Count  State
```

```
  PLL Lock                 0            0  OK
  PHY Light               20            1  OK
SONET section:
  BIP-B1                   0            0
  SEF                     20            1  OK
  LOS                     20            1  OK
  LOF                     20            1  OK
  ES-S                    20
  SES-S                   20
  SEFS-S                  20
SONET line:
  BIP-B2                   0            0
  REI-L                    0            0
  RDI-L                    0            0  OK
  AIS-L                    0            0  OK
  BERR-SF                 18            1  OK
  BERR-SD                  2            1  OK
  ES-L                    20
  SES-L                   20
  UAS-L                   10
  ES-LFE                   0
  SES-LFE                  0
  UAS-LFE                  0
SONET path:
  BIP-B3                   0            0
  REI-P                    0            0
  LOP-P                   20            1  OK
  AIS-P                    0            0  OK
  RDI-P                    0            0  OK
  UNEQ-P                   0            0  OK
  PLM-P                   20            1  OK
  ES-P                    20
  SES-P                   20
  UAS-P                   10
  ES-PFE                   0
  SES-PFE                  0
  UAS-PFE                  0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/3/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95     42499200  95            0      low    none
  3 network-control          5      2236800   5            0      low    none
Logical interface t3-0/3/0:0.0 (Index 11) (SNMP ifIndex 268) (Generation 499)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 578, Route table: 0
    Flags: None
```

```
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 22.22.22.1, Local: 22.22.22.2, Broadcast: Unspecified,
Generation: 98
DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                  0
      Output bytes  :                  0
      Input  packets:                  0
      Output packets:                  0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
```

show interfaces (Channelized OC12 IQ and IQE)

Syntax show interfaces (*type-fpc/pic/port*<:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 IQ and IQE interface.

Options ***type-fpc/pic/port*:*channel*:*channel*:*channel***—Interface type with optional corresponding channel levels.

For SONET mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **coc12**. For the clear channel, ***type*** is **so** (for OC12).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1**(channelized OC1), **ct3** (from **coc1)**, **so** (for OC3), or **t3.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **ct3**or **coc1)** or **t1** (from **ct3** or **coc1)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ds** (from **ct1**).

For SDH mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **cstm4**. For the clear channel, ***type*** is **so** (for SONET/SDH (vc-4-4c)).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization,***type*** can be **so** (from **cstm4)** or **cau4** (from **cstm4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct3**or **t3** (from or **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ct1** or **t1** (from **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the fourth level of channelization, ***type*** is **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output

Output Fields See the output field table for the *show interfaces (Channelized OC3 IQ and IQE)* command.

Sample Output

show interfaces extensive (CAU4 on Channelized OC-12 IQ)

```
user@host> show interfaces cau4-0/2/0:1 extensive
Physical interface: cau4-0/2/0:1, Enabled, Physical link is Up
   Interface index: 219, SNMP ifIndex: 139, Generation: 221
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
   Loopback: None, Parent: cstm4-0/2/0 Interface index 216
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (Channelized OC1 on Channelized OC12 IQ)

```
user@host> show interfaces extensive coc1-4/2/0:7
Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: 51840kbps, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized OC12 IQ) (Physical)

```
user@host> show interfaces extensive coc12-4/2/0
Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 266, SNMP ifIndex: 1269, Generation: 601
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None  Device flags   : Present
Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
...
```

show interfaces extensive (Channelized T1 from Channelized OC12 IQ)

```
user@host> show interfaces extensive ct1-4/2/0:7:1
Physical interface: ct1-4/2/0:4:1, Enabled, Physical link is Up
  Interface index: 305, SNMP ifIndex: 2410, Generation: 640
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16,
  Framing: ESF, Parent: coc1-4/2/0:7 (Index 304)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T3 on Channelized OC12 IQ)

```
user@host> show interfaces ct3-0/2/0:1 extensive
Physical interface: ct3-0/2/0:1:1, Enabled, Physical link is Up
   Interface index: 220, SNMP ifIndex: 140, Generation: 222
   Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
   Mode: C/Bit parity, Parent: cau4-0/2/0:1 Interface index 219
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (CSTM4 on Channelized OC-12 IQ)

```
user@host> show interfaces cstm4-0/2/0 extensive
 Physical interface: cstm4-0/2/0, Enabled, Physical link is Up
   Interface index: 216, SNMP ifIndex: 33, Generation: 218
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC12,
   Loopback: None, Parent: None   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized OC12 IQ)

```
user@host> show interfaces extensive ds-4/2/0:7:1:1
Physical interface: ds-4/2/0:4:1:1, Enabled, Physical link is Up
  Interface index: 306, SNMP ifIndex: 2411, Generation: 641
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16, Parent: ct1-4/2/0:7:1 (Index 305)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces extensive (SONET Interface on Channelized OC12 IQ)

```
user@host> show interfaces so-0/2/0:1 extensive
Physical interface: so-0/2/0:1, Enabled, Physical link is Up
  Interface index: 750, SNMP ifIndex: 23, Generation: 11709
  Link-level type: Multilink-FR, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-0/2/0 Interface index 749
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
```

```
  Link flags     : Keepalives DTE
...
```

show interfaces extensive (T1 on Channelized OC12 IQ)

```
user@host> show interfaces t1-0/2/0:1:1:1 extensive
   Physical interface: t1-0/2/0:1:1:1, Enabled, Physical link is Up
   Interface index: 222, SNMP ifIndex: 143, Generation: 226
   Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
   Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/2/0:1:1
   Interface index 221
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : Keepalives
...
```

CHAPTER 6

Command Summaries

Channelized E1 Interface Operational Mode Commands

Table 4 on page 87 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized E1 interfaces. Commands are listed in alphabetical order.

Table 4: Channelized E1 Interface Operational Mode Commands

Task	Command
Display status information about channelized E1 interfaces.	*show interfaces (Channelized E1)*
Display channelized E1 IQ interface information.	*show interfaces (Channelized E1 IQ)*
Display the interface names of the physical channelized E1 IQ interface and the channels configured on each interface.	*show interfaces controller (Channelized E1 IQ)*

NOTE: For more information about the channel type and level of channelization, and for information about the number of channels that are supported on the channelized E1 interface, see the *Junos OS Network Interfaces Library for Routing Devices*.

For channelization illustrations and configuration examples for channelized IQ interfaces, see the *Junos Feature Guide*.

Channelized OC Interface Operational Commands

Table 5 on page 88 summarizes the command-line interface (CLI) commands to monitor and troubleshoot channelized OC interfaces. Commands are listed in alphabetical order.

Table 5: Channelized OC Interface Operational Mode Commands

Task or Information to Monitor	CLI Command
Display channelized OC3 IQ and IQE interface information.	*show interfaces (Channelized OC3 IQ and IQE)*
Display status information about channelized OC12 interfaces.	show interfaces (Channelized OC12)
Display channelized OC12 IQ and IQE interface information.	show interfaces (Channelized OC12 IQ and IQE)
Display the interface names of the physical channelized OC3 IQ and IQE interface and the channels configured on each interface.	*show interfaces controller (Channelized OC3 IQ and IQE)*
Display the interface names of the physical channelized OC12 IQ and IQE interface and the channels configured on each interface.	*show interfaces controller (Channelized OC12 IQ and IQE)*
Display channelized OC48 IQ and IQE interface information.	*show interfaces (Channelized OC48 IQ and IQE)*

NOTE: For more information about the channel type and level of channelization, and for information about the number of channels that are supported on channelized OC interfaces, see the *Junos Network Interfaces Configuration Guide*.

For channelization illustrations and configuration examples for channelized IQ and IQE interfaces, see the *Junos Feature Guide*.

Channelized STM1 Interface Operational Mode Commands

Table 6 on page 88 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized STM1 interfaces. Commands are listed in alphabetical order.

Table 6: Channelized STM1 Interface Operational Mode Commands

Task	Command
Display status information about channelized STM1 interfaces.	*show interfaces (Channelized STM1)*

Table 6: Channelized STM1 Interface Operational Mode Commands *(continued)*

Task	Command
Display channelized STM1 IQ interface information.	*show interfaces (Channelized STM1 IQ)*
Display the interface names of the physical channelized STM1 IQ interface and the channels configured on each interface.	*show interfaces controller (Channelized STM1 IQ)*

NOTE: For more information about the channel type and level of channelization, and for information about the number of channels that are supported on the channelized STM1 interface, see the *Junos Network Interfaces Configuration Guide*.

For channelization illustrations and configuration examples for channelized IQ interfaces, see the *Junos Feature Guide*.

Channelized T1 and T3 Interface Operational Mode Commands

Table 7 on page 89 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized T1 and T3 interfaces. Commands are listed in alphabetical order.

Table 7: Channelized T1 and T3 Interface Operational Mode Commands

Task	Command
Display status information about channelized DS3-to-DS0 interfaces.	*show interfaces (Channelized DS3-to-DS0)*
Display status information about channelized DS3-to-DS1 interfaces.	*show interfaces (Channelized DS3-to-DS1)*
Display channelized T1 IQ interface information.	*show interfaces (Channelized T1 IQ)*
Display channelized T3 IQ interface information.	*show interfaces (Channelized T3 IQ)*
Display the interface names of the physical channelized T1 IQ interface and the channels configured on each interface.	*show interfaces controller (Channelized T1 IQ)*
Display the interface names of the physical channelized T3 IQ interface and the channels configured on each interface.	*show interfaces controller (Channelized T3 IQ)*

NOTE: For more information about the channel type and level of channelization, and for information about the number of channels that are supported on the different types of channelized T1 and T3 interfaces, see the *Junos Network Interfaces Configuration Guide.*

For more information on monitoring and troubleshooting channelized DS3-to-DS0 and DS3-to-DS1 interfaces, see the *Junos Interfaces Network Operations Guide*.

For channelization illustrations and configuration examples for channelized IQ interfaces, see the *Junos Feature Guide*.

PART 4

Troubleshooting

CHAPTER 7

Interface Diagnostics

Interface Diagnostics

You can use two diagnostic tools to test the physical layer connections of interfaces: loopback testing and bit error rate test (BERT) testing. Loopback testing enables you to verify the connectivity of a circuit. BERT testing enables you to identify poor signal quality on a circuit. This section contains the following topics:

Configuring Loopback Testing

Loopback testing allows you to verify the connectivity of a circuit. You can configure any of the following interfaces to execute a loopback test: Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, E1, E3, *N*xDS0, serial, SONET/SDH, T1, and T3.

The physical path of a network data circuit usually consists of segments interconnected by devices that repeat and regenerate the transmission signal. The transmit path on one device connects to the receive path on the next device. If a circuit fault occurs in the form of a line break or a signal corruption, you can isolate the problem by using a loopback test. Loopback tests allow you to isolate segments of the circuit and test them separately.

To do this, configure a *line loopback* on one of the routers. Instead of transmitting the signal toward the far-end device, the line loopback sends the signal back to the originating router. If the originating router receives back its own data link layer packets, you have verified that the problem is beyond the originating router. Next, configure a line loopback farther away from the local router. If this originating router does not receive its own data link layer packets, you can assume the problem is on one of the segments between the local router and the remote router's interface card. In this case, the next troubleshooting step is to configure a line loopback closer to the local router to find the source of the problem.

There are several types of loopback testing supported by the Junos OS, as follows:

- DCE local—Loops packets back on the local DCE.
- DCE remote—Loops packets back on the remote DCE.

- Local—Useful for troubleshooting physical PIC errors. Configuring local loopback on an interface allows transmission of packets to the channel service unit (CSU) and then to the circuit toward the far-end device. The interface receives its own transmission, which includes data and timing information, on the local router's PIC. The data received from the CSU is ignored. To test a local loopback, issue the **show interfaces *interface-name*** command. If PPP keepalives transmitted on the interface are received by the PIC, the **Device Flags** field contains the output **Loop-Detected**.
- Payload—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A payload loopback loops data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated.
- Remote—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A remote loopback loops packets, including both data and timing information, back on the remote router's interface card. A router at one end of the circuit initiates a remote loopback toward its remote partner. When you configure a remote loopback, the packets received from the physical circuit and CSU are received by the interface. Those packets are then retransmitted by the PIC back toward the CSU and the circuit. This loopback tests all the intermediate transmission segments.

Table 8 on page 94 shows the loopback modes supported on the various interface types.

Table 8: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	*Configuring Ethernet Loopback Capability*
Circuit Emulation E1	Local and remote	*Configuring E1 Loopback Capability*
Circuit Emulation T1	Local and remote	*Configuring T1 Loopback Capability*
E1 and E3	Local and remote	*Configuring E1 Loopback Capability* and *Configuring E3 Loopback Capability*
*N*xDS0	Payload	*Configuring Channelized E1 IQ and IQE Interfaces*, *Configuring T1 and NxDS0 Interfaces*, "Configuring NxDS0 Interfaces" on page 15, *Configuring Channelized STM1 IQ and IQE Interfaces*, and *Configuring Channelized T3 IQ Interfaces*
Serial (V.35 and X.21)	Local and remote	*Configuring Serial Loopback Capability*
Serial (EIA-530)	DCE local, DCE remote, local, and remote	*Configuring Serial Loopback Capability*
SONET/SDH	Local and remote	*Configuring SONET/SDH Loopback Capability*

Table 8: Loopback Modes by Interface Type *(continued)*

Interface	Loopback Modes	Usage Guidelines
T1 and T3	Local, payload, and remote	*Configuring T1 Loopback Capability* and *Configuring T3 Loopback Capability* See also *Configuring the T1 Remote Loopback Response*

To configure loopback testing, include the **loopback** statement:

loopback *mode*;

You can include this statement at the following hierarchy levels:

- **[edit interfaces** *interface-name* **aggregated-ether-options]**
- **[edit interfaces** *interface-name* **ds0-options]**
- **[edit interfaces** *interface-name* **e1-options]**
- **[edit interfaces** *interface-name* **e3-options]**
- **[edit interfaces** *interface-name* **fastether-options]**
- **[edit interfaces** *interface-name* **gigether-options]**
- **[edit interfaces** *interface-name* **serial-options]**
- **[edit interfaces** *interface-name* **sonet-options]**
- **[edit interfaces** *interface-name* **t1-options]**
- **[edit interfaces** *interface-name* **t3-options]**

Interface Diagnostics

BERT allows you to troubleshoot problems by checking the quality of links. You can configure any of the following interfaces to execute a BERT when the interface receives a request to run this test: E1, E3, T1, T3; the channelized DS3, OC3, OC12, and STM1 interfaces; and the channelized DS3 IQ, E1 IQ, and OC12 IQ interfaces.

A BERT test requires a line loop to be in place on either the transmission devices or the far-end router. The local router generates a known bit pattern and sends it out the transmit path. The received pattern is then verified against the sent pattern. The higher the bit error rate of the received pattern, the worse the noise is on the physical circuit. As you move the position of the line loop increasingly downstream toward the far-end router, you can isolate the troubled portion of the link.

To configure BERT, you must configure the duration of the test, the bit pattern to send on the transmit path, and the error rate to monitor when the inbound pattern is received.

To configure the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream, include the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements, respectively, at the **[edit interfaces** *interface-name interface-type*-**options]** hierarchy level:

[edit interfaces *interface-name interface-type*-options]
bert-algorithm *algorithm*;
bert-error-rate *rate*;
bert-period *seconds*;

By default, the BERT period is 10 seconds. You can configure the BERT period to last from 1 through 239 seconds on some PICs and from 1 through 240 seconds on other PICs.

rate is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from 10^{-0} (1 error per bit) to 10^{-7} (1 error per 10 million bits).

algorithm is the pattern to send in the bit stream. For a list of supported algorithms, enter a **?** after the **bert-algorithm** statement; for example:

```
[edit interfaces t1-0/0/0 t1-options]

user@host# set bert-algorithm ?
Possible completions:
  pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
  pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.152 standard)
  pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
  pseudo-2e20-o153     Pattern is 2^20 - 1 (per O.153 standard)
        ...
```

For specific hierarchy information, see the individual interface types.

NOTE: The 4-port E1 PIC supports only the following algorithms:

```
pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.151 standard)
pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e23-o151     Pattern is 2^23 (per O.151 standard)
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

NOTE: The 12-port T1/E1 Circuit Emulation (CE) PIC supports only the following algorithms:

```
all-ones-repeating   Repeating one bits
all-zeros-repeating  Repeating zero bits
alternating-double-ones-zeros  Alternating pairs of ones and zeros
alternating-ones-zeros  Alternating ones and zeros
pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.151 standard)
pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e7           Pattern is 2^7 - 1
pseudo-2e9-o153      Pattern is 2^9 - 1 (per O.153 standard)
repeating-1-in-4     1 bit in 4 is set
repeating-1-in-8     1 bit in 8 is set
repeating-3-in-24    3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

NOTE: The IQE PICs support only the following algorithms:

```
all-ones-repeating   Repeating one bits
all-zeros-repeating  Repeating zero bits
alternating-double-ones-zeros  Alternating pairs of ones and zeros
alternating-ones-zeros  Alternating ones and zeros
pseudo-2e9-o153      Pattern is 2^9  -1 (per O.153 (511 type) standard)
pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 and O.153 (2047 type)
 standards)
pseudo-2e15-o151     Pattern is 2^15 -1 (per O.151 standard)
pseudo-2e20-o151     Pattern is 2^20 -1 (per O.151 standard)
pseudo-2e20-o153     Pattern is 2^20 -1 (per O.153 standard)
pseudo-2e23-o151     Pattern is 2^23 -1 (per O.151 standard)
repeating-1-in-4     1 bit in 4 is set
repeating-1-in-8     1 bit in 8 is set
repeating-3-in-24    3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

NOTE: BERT is supported on the PDH interfaces of the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP and the DS3/E3 MIC. The following BERT algorithms are supported:

```
all-ones-repeating            Repeating one bits
all-zeros-repeating           Repeating zero bits
alternating-double-ones-zeros Alternating pairs of ones and zeros
alternating-ones-zeros        Alternating ones and zeros
repeating-1-in-4              1 bit in 4 is set
repeating-1-in-8              1 bit in 8 is set
repeating-3-in-24             3 bits in 24 are set
pseudo-2e9-o153               Pattern is 2^9 - 1 (per 0.153 standard)
pseudo-2e11-o152              Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151              Pattern is 2^15 - 1 (per 0.151 standard)
pseudo-2e20-o151              Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153              Pattern is 2^20 - 1 (per 0.153 standard)
pseudo-2e23-o151              Pattern is 2^23 (per 0.151 standard)
```

Table 9 on page 98 shows the BERT capabilities for various interface types.

Table 9: BERT Capabilities by Interface Type

Interface	T1 BERT	T3 BERT	Comments
12-port T1/E1 Circuit Emulation	Yes (ports 0–11)		• Limited algorithms
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)		• Limited algorithms
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	• Single port at a time • Limited algorithms
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	• Single port at a time
Channelized OC12	N/A	Yes (channel 0–11)	• Single channel at a time • Limited algorithms • No bit count
Channelized STM1	Yes (channel 0–62)	N/A	• Multiple channels • Only one algorithm • No error insert • No bit count
Channelized T3 and Multichannel T3	Yes (channel 0–27)	Yes (port 0–3 on channel 0)	• Multiple ports and channels • Limited algorithms for T1 • No error insert for T1 • No bit count for T1

These limitations do not apply to channelized IQ interfaces. For information about BERT capabilities on channelized IQ interfaces, see *Channelized IQ and IQE Interfaces Properties*.

Starting and Stopping a BERT Test

Before you can start the BERT test, you must disable the interface. To do this, include the **disable** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
disable;
```

After you configure the BERT properties and commit the configuration, begin the test by issuing the **test interface *interface-name interface-type*-bert-start** operational mode command:

```
user@host> test interface interface-name interface-type-bert-start
```

The test runs for the duration you specify with the **bert-period** statement. If you wish to terminate the test sooner, issue the **test interface *interface-name interface-type*-bert-stop** command:

```
user@host> test interface interface-name interface-type-bert-stop
```

For example:

```
user@host> test interface t3-1/2/0 t3-bert-start
user@host> test interface t3-1/2/0 t3-bert-stop
```

To view the results of the BERT test, issue the **show interfaces extensive | find BERT** command:

```
user@host> show interfaces interface-name extensive | find BERT
```

For more information about running and evaluating the results of the BERT procedure, see the *Junos OS Operational Mode Commands*.

NOTE: To exchange BERT patterns between a local router and a remote router, include the **loopback remote** statement in the interface configuration at the remote end of the link. From the local router, issue the **test interface** command.

Example: Configuring Bit Error Rate Testing

Configure a BERT test on a T3 interface. In this example, the run duration lasts for 120 seconds. The configured error rate is 0, which corresponds to a bit error rate of 10^{-0} (1 error per bit). The configured bit pattern of **all-ones-repeating** means that every bit the interface sends is a set to a value of 1.

```
[edit interfaces]
t3-1/2/0 {
    t3-options {
        bert algorithm all-ones-repeating;
        bert-error-rate 0;
        bert-period 120;
```

```
    }
}
```

CHAPTER 8

Investigate Channelized OC12 Interfaces

Investigating Interface Steps and Commands

This section includes the following information to assist you when troubleshooting ATM interfaces:

Investigating Interface Steps and Commands Overview

The "Monitoring Interfaces" on page 101 section helps you determine the nature of the interface problem. The "Performing a Loopback Test on an Interface" on page 102 section provides information to help you isolate the source of the problem. The "Locating Interface Alarms" on page 104 section explains some of the alarms and errors for the media.

Monitoring Interfaces

Problem The following steps are a general outline of how you monitor interfaces to determine the nature of interface problems. For more detailed information on a specific interface, see the corresponding monitor interfaces section.

Solution To monitor interfaces, follow these steps:

1. Display the status of an interface.
2. Display the status of a specific interface.
3. Display extensive status information for a specific interface.
4. Monitor statistics for an interface.

The Table 10 on page 102 lists and describes the operational mode commands you use to monitor interfaces.

Table 10: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse ***interface-name*** For example: **show interfaces terse t1***	Displays summary information about the named interfaces.
show interfaces ***interface-name*** For example: **show interfaces t1-***x/y/z*	Displays static status information about a specific interface.
show interfaces ***interface-name*** **extensive** For example: **show interfaces t1-***x/y/z* **extensive**	Displays very detailed interface information about a specific interface.
monitor interface ***interface-name*** For example: **monitor interface t1-***x/y/z*	Displays real-time statistics about a physical interface, updated every second.

Performing a Loopback Test on an Interface

Problem The following steps are a general outline of how you use loopback testing to isolate the source of the interface problem. For more detailed information on a specific interface, see the corresponding loopback section.

Solution To use loopback testing for interfaces, follow these steps:

1. To diagnose a suspected hardware problem:
   a. Create a loopback.
   b. Set clocking to internal. (Not for Fast Ethernet/Gigabit Ethernet or Multichannel DS3 interfaces.)
   c. Verify that the status of the interface is up.
   d. Configure a static address resolution protocol table entry. (Fast Ethernet/Gigabit Ethernet interfaces only)
   e. Clear the interface statistics.
   f. Force the link layer to stay up.
   g. Verify the status of the logical interface.
   h. Ping the interface.
   i. Check for interface error statistics.
2. To diagnose a suspected connection problem:
   a. Create a loop from the router to the network.

b. Create a loop to the router from various points in the network.

The Table 11 on page 103 lists and describes the operational and configuration mode commands you use to perform loopback testing on interfaces (the commands are shown in the order in which you perform them).

Table 11: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
[edit interfaces *interface-name* interface-options] **set loopback (local | remote)**	All interfaces	The **loopback** statement at the hierarchy level configures a loopback on the interface. Packets can be looped on either the local router or the remote channel service unit (CSU). To turn off loopback, remove the **loopback** statement from the configuration.
show	All interfaces	Verify the configuration before you commit it.
commit	All interfaces	Save the set of changes to the database and cause the changes to take operational effect. Use after you have verified a configuration in all configuration steps.
[edit interfaces *interface-name*] **set clocking internal**	T1, T3, ATM, and SONET interfaces	The **clocking** statement at this hierarchy level configures the clock source of the interface to internal.
show interfaces *interface-name*	Used for all interfaces	Display static status information about a specific interface.
[edit interfaces *interface-name* unit *logical-unit-number* family inet address *ip-address*] **set arp *ip-address mac mac-address***	Fast Ethernet and Gigabit Ethernet interfaces	The **arp** statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
show arp no-resolve	Fast Ethernet and Gigabit Ethernet interfaces	Display the entries in the ARP table without attempting to determine the hostname that corresponds to the IP address (the **no-resolve** option).
clear interfaces statistics *interface-name*	All interfaces	Reset the statistics for an interface to zero.
[edit interfaces *interface-name*] **set encapsulation cisco-hdlc**	T1, T3, SONET, and Multichannel DS3 interfaces	The **encapsulation** statement at this hierarchy level sets the encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol on the physical interface.
[edit interfaces *interface-name*] **set no-keepalives**	T1, T3, SONET, and Multichannel DS3 interfaces	The **no-keepalives** statement at this level disables the sending of keepalives on the physical interface.

Table 11: Commands Used to Perform Loopback Testing on Interfaces *(continued)*

CLI Statement or Command	Interface Type	Description
show interfaces *interface-name* **terse**	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)
ping interface t1-*x/y/z local-ip-address* **bypass-routing count 1000 rapid**	All interfaces	Check the reachability of network hosts by sending **ICMP ECHO_REQUEST** messages to elicit **ICMP ECHO_RESPONSE** messages from the specified host. Use the **bypass-routing** option to ping a local system through an interface that has no route through it. The **count** option sends 1000 ping requests through the system. Type **Ctrl+C** to interrupt a **ping** command.
show interfaces *interface-name* **extensive**	All interfaces	Display very detailed interface information about a specific interface.

Locating Interface Alarms

Problem Locating alarms and errors for the media can be a simple process.

Solution To locate interface alarms and errors, use the **show interfaces** *interface-name* **extensive** command and examine the output for active alarms and defects.

Monitor Channelized OC12 Interfaces

Checklist for Monitoring Channelized OC12 Interfaces

Purpose To monitor Channelized OC12 interfaces and begin the process of isolating Channelized OC12 interface problems when they occur.

Action Table 12 on page 104 provides links and commands for monitoring Channelized OC12 interfaces.

Table 12: Checklist for Monitoring Channelized OC12 Interfaces

Tasks	Command or Action
"Monitor Channelized OC12 Interfaces" on page 105	

Table 12: Checklist for Monitoring Channelized OC12 Interfaces *(continued)*

Tasks	Command or Action
1. Display the Status of Channelized OC12 Interfaces on page 106	show interfaces terse t3-*interface-name**
2. Display the Status of a Specific Channelized OC12 Interface on page 106	show interfaces terse t3-*fpc/pic/port:channel*
3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 107	show interfaces t3-*fpc/pic/port:channel* extensive
4. Monitor Statistics for a Channelized OC12 Interface on page 109	monitor interfaces t3-*fpc/pic/port:channel*
"Monitor Channelized OC12 IQ Interfaces" on page 110	
1. Display the Status of a Channelized OC12 IQ Interface on page 111	show interfaces terse coc* show interfaces controller show interfaces terse
2. Display the Status of the Controller Channelized OC12 IQ Interface on page 115	show interfaces interface-type-*fpc/pic/port* show interfaces *interface-type-fpc/pic/port* show interfaces *interface-type-fpc/pic/port:channel* show interfaces interface-type-*fpc/pic/port:channel:channel* show interfaces interface-type-*fpc/pic/port:channel:channel:channel*
3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 117	show interfaces *interface-type-fpc/pic/port:channel* show interfaces *interface-type-fpc/pic/port:channel:channel* show interfaces *interface-type-fpc/pic/port:channel:channel:channel*
4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 119	show interfaces *interface-type-interface-name* extensive
5. Monitor Statistics for a Channelized OC12 IQ Interface on page 122	monitor interfaces *interface-type-fpc/pic/port:channel*

Monitor Channelized OC12 Interfaces

Purpose

By monitoring Channelized OC12 interfaces, you begin the process of isolating Channelized OC12 interface problems when they occur.

To monitor your Channelized OC12 interfaces, follow these steps:

1. Display the Status of Channelized OC12 Interfaces on page 106
2. Display the Status of a Specific Channelized OC12 Interface on page 106
3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 107
4. Monitor Statistics for a Channelized OC12 Interface on page 109

Display the Status of Channelized OC12 Interfaces

Purpose To display the status of Channelized OC12 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfaces terse t3-*interface-name****

Sample Output 1

The following sample output is for a Channelized OC12 interface:

```
user@host> show interfaces terse t3-0/3/0:*
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:0              up    up
t3-0/3/0:1              up    up
t3-0/3/0:2              up    up
t3-0/3/0:3              up    up
t3-0/3/0:4              up    up
t3-0/3/0:5              up    up
t3-0/3/0:6              up    up
t3-0/3/0:7              up    up
t3-0/3/0:8              up    up
t3-0/3/0:9              up    up
t3-0/3/0:10             up    up
t3-0/3/0:11             up    down
```

Meaning

The sample output shows the status of both the physical and logical interfaces. In this example, all of the Channelized OC12 interfaces are up except the channel interface **t3-0/3/0:11**.

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as a T3 or OC12 SONET link, or a Physical Interface Card (PIC) problem. For more information on monitoring SONET interfaces, see "Checklist for Monitoring Channelized OC12 Interfaces" on page 104.

Display the Status of a Specific Channelized OC12 Interface

Purpose To display the status of specific Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces terse t3-*fpc/pic/port:channel***

Sample Output

```
user@host> show interfaces terse t3-0/3/0:0
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:0              up    up

user@host> show interfaces terse t3-0/3/0:11
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:11             up    down
```


Meaning

The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as an OC12 SONET link or PIC problem. For more information on monitoring SONET interfaces, see "Checklist for Monitoring Channelized OC12 Interfaces" on page 104.

Display Extensive Status Information for a Specific Channelized OC12 Interface

Purpose To display extensive status information for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfacest3-*fpc/pic/port*:*channel* extensive**

Sample Output

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
```

```
  PCV                       0           0
  CCV                       0           0
  LES                       0
  PES                       0
  PSES                      0
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                B/W  WRR       Packets        Bytes
  Queue0          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue1          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue2          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue3          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      1
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    1          307
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      1
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
```

```
  UAS-LFE                  0
SONET path:
  BIP-B3                   1           35
  REI-P                    1            7
  LOP-P                    0            0  OK
  AIS-P                    0            0  OK
  RDI-P                    0            0  OK
  UNEQ-P                   0            0  OK
  PLM-P                    1            1  OK
  ES-P                     1
  SES-P                    0
  UAS-P                    0
  ES-PFE                   1
  SES-PFE                  0
  UAS-PFE                  0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
  0 best-effort              95     42499200  95            0      low    none
  3 network-control           5      2236800   5            0      low    none
```

Meaning

The sample output shows where the errors might be occurring, either with the T3 media or the SONET layer. In this example, there are no SONET or DS3 alarms or defects. However, if errors occur, you must troubleshoot the T3 media or the SONET layer.

Monitor Statistics for a Channelized OC12 Interface

Purpose To monitor statistics for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interfaces t3-*fpc/pic/port*:*channel***

Sample Output

```
user@host> monitor interfaces t3-0/3/0:11
host      Seconds: 12                 Time: 17:27:15
                                                                Delay: 32/0/32
Interface: t3-0/3/0:11, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: T3
Traffic statistics:                                              Current delta
  Input bytes:                    109846 (176 bps)                       [44]
  Output bytes:                   110308 (176 bps)                       [44]
  Input packets:                    1687 (1 pps)                          [2]
  Output packets:                   1693 (1 pps)                          [2]
```

```
Encapsulation statistics:
  Input keepalives:                    8                                [2]
  Output keepalives:                   7                                [2]
Error statistics:
  Input errors:                        0                                [0]
  Input drops:                         0                                [0]
  Input framing errors:             1066                                [0]
  Input runts:                         0                                [0]
  Input giants:                        0                                [0]
  Policed discards:                    0                                [0]
  L3 incompletes:                      0                                [0]
  L2 channel errors:                   3                                [0]
  L2 mismatch timeouts:                0                                [0]
  Carrier transitions:                 7                                [0]
  Output errors:                       0  Output drops:                  [0]
Interface warnings:
  o Loopback detected while not in test mode
```

Meaning

The sample output shows common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the **set cli terminal** command.

CAUTION: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Monitor Channelized OC12 IQ Interfaces

Purpose

By monitoring Channelized OC12 intelligent queuing (IQ) interfaces, you begin the process of isolating Channelized OC12 IQ interface problems when they occur.

To monitor your Channelized OC12 IQ interface, follow these steps:

1. Display the Status of a Channelized OC12 IQ Interface on page 111
2. Display the Status of the Controller Channelized OC12 IQ Interface on page 115
3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 117
4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 119
5. Monitor Statistics for a Channelized OC12 IQ Interface on page 122

Display the Status of a Channelized OC12 IQ Interface

Purpose To display the status of Channelized OC12 IQ interfaces, use one or all of the following Junos OS CLI operational mode commands:

Action

```
user@host> show interfaces terse coc*
user@host> show interfaces controller
user@host> show interfaces terse
```

Sample Output 1

```
user@host> show interfaces terse coc*
Interface               Admin Link Proto Local                 Remote
coc12-0/0/0             up    up
coc1-0/0/0:2      up  up
coc1-0/0/0:3      up  up
coc1-0/0/0:4      up  up
coc1-0/0/0:5      up  up
coc1-0/0/0:6      up  up
```

Sample Output 2

```
user@host> show interfaces controller
Controller                                                      Admin Link
coc12-0/0/0                                                     up    up
    so-0/0/0:1                      up  up
    coc1-0/0/0:2                     up  up
        t1-0/0/0:2:1                   up  up
        t1-0/0/0:2:2                   up  up
        t1-0/0/0:2:3                   up  up
        t1-0/0/0:2:4                                            up    up
        t1-0/0/0:2:5                                            up    up
        t1-0/0/0:2:6                                            up    up
        t1-0/0/0:2:7                                            up    up
        t1-0/0/0:2:8                                            up    up
        t1-0/0/0:2:9                                            up    up
        t1-0/0/0:2:10                                           up    up
        t1-0/0/0:2:11                                           up    up
        t1-0/0/0:2:12                                           up    up
        t1-0/0/0:2:13                                           up    up
        t1-0/0/0:2:14                                           up    up
        t1-0/0/0:2:15                                           up    up
        t1-0/0/0:2:16                                           up    up
        t1-0/0/0:2:17                                           up    up
        t1-0/0/0:2:18                                           up    up
        t1-0/0/0:2:19                                           up    up
        t1-0/0/0:2:20                                           up    up
        t1-0/0/0:2:21                                           up    up
        t1-0/0/0:2:22                                           up    up
        t1-0/0/0:2:23                                           up    up
        t1-0/0/0:2:24                                           up    up
        t1-0/0/0:2:25                                           up    up
        t1-0/0/0:2:26                                           up    up
        t1-0/0/0:2:27                                           up    up
        t1-0/0/0:2:28                                           up    up
    coc1-0/0/0:3                                                up    up
    t3-0/0/0:3                                                  up    up
    coc1-0/0/0:4                                                up    up
        ct1-0/0/0:4:1                                           up    up
            ds-0/0/0:4:1:1                                      up    up
```

```
    coc1-0/0/0:5                                                    up    up
    ct3-0/0/0:5                                                     up    up
        t1-0/0/0:5:1                                                up    up
    coc1-0/0/0:6                                                    up    up
    ct3-0/0/0:6                                                     up    up
        ct1-0/0/0:6:1                                               up    up
            ds-0/0/0:6:1:1                                          up    up
```

Sample Output 3

```
user@host> show interfaces terse
Interface               Admin Link Proto Local                 Remote
coc12-0/0/0             up    up
so-0/0/0:1              up    up
so-0/0/0:1.0     up  up  inet 20.20.20.1/30
coc1-0/0/0:2            up    up
t1-0/0/0:2:1            up    up
t1-0/0/0:2:1.0          up    up   inet  20.20.20.5/30
t1-0/0/0:2:2            up    up
[...Output Truncated...]
t1-0/0/0:2:27           up    up
t1-0/0/0:2:28           up    up
coc1-0/0/0:3            up    up
t3-0/0/0:3              up    up
coc1-0/0/0:4            up    up
ct1-0/0/0:4:1           up    up
ds-0/0/0:4:1:1          up    up
ds-0/0/0:4:1:1.0        up    up   inet  20.20.20.13/30
coc1-0/0/0:5            up    up
ct3-0/0/0:5             up    up
t1-0/0/0:5:1            up    up
t1-0/0/0:5:1.0          up    up   inet  20.20.20.17/30
coc1-0/0/0:6            up    up
ct3-0/0/0:6             up    up
ct1-0/0/0:6:1           up    up
ds-0/0/0:6:1:1          up    up
ds-0/0/0:6:1:1.0        up    up   inet  20.20.20.21/30
```

Meaning

The sample output shows the status of both the physical and logical interfaces. In this example, all of the channelized OC12 IQ interfaces are up.

Sample output 1 shows the channelized interfaces that are configured, but not the channels for those channelized interfaces.

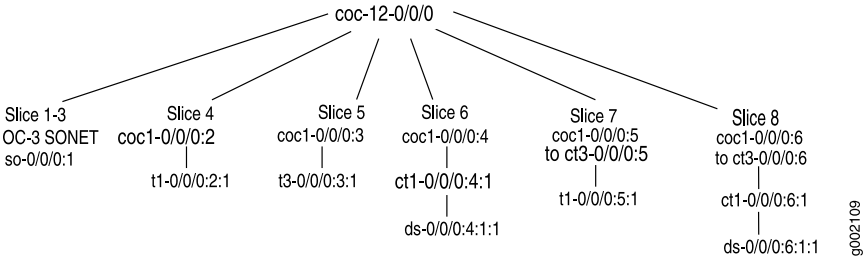
Sample output 2 shows the channels for the channelized interfaces that are configured and the hierarchy, but not the interface address information. At the top, the hierarchy includes the controller interface **coc12-0/0/0**.

Sample output 3 shows all channelized interfaces and their configured channels and the address information.

When only one or some individual channels are down, you must troubleshoot the channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the channels are down, you must work with this as a T1, T3, DS0, or OC12 SONET link or PIC problem. For more information on monitoring these types of interfaces, see the respective sections in this guide.

The interface configuration of the OC12 IQ interface used for all **show** commands in this section is shown in Figure 7 on page 113.

Figure 7: Sample Configuration of Channelized OC12 IQ Interface



In addition, the configuration is shown in the following output:

```
interfaces {
    coc12-0/0/0 {
        partition 1 oc-slice 1-3 interface-type so;
        partition 2 oc-slice 4 interface-type coc1;
        partition 3 oc-slice 5 interface-type coc1;
        partition 4 oc-slice 6 interface-type coc1;
        partition 5 oc-slice 7 interface-type coc1;
        partition 6 oc-slice 8 interface-type coc1;
    }
    so-0/0/0:1 {
        description "oc-slice 1-3 of coc12-0/0/0. COC12 > OC3.";
        unit 0 {
            family inet {
                address 20.20.20.2/30;
            }
        }
    }
    coc1-0/0/0:2 {
        description "oc-slice 4 of coc12-0/0/0. COC12 to COC1 VT-mapped to T1s.";
        partition 1-28 interface-type t1;
    }
    t1-0/0/0:2:1 {
        unit 0 {
            family inet {
                address 20.20.20.6/30;
            }
        }
    }
    coc1-0/0/0:3 {
        description " oc-slice 5 of coc12-0/0/0. COC12 to COC1 converted to a T3.";
        no-partition interface-type t3;
    }
    t3-0/0/0:3:1 {
        unit 0 {
            family inet {
                address 20.20.20.10/30;
            }
        }
    }
```

```
    coc1-0/0/0:4 {
      description " oc-slice 6 of coc12-0/0/0. CT1 to NxDS-Os.";
      partition 1 interface-type ct1;
    }
    ct1-0/0/0:4:1 {
      partition 1 timeslots 1-10 interface-type ds;
    }
    ds-0/0/0:4:1:1 {
      unit 0 {
        family inet {
          address 20.20.20.14/30;
        }
      }
    }
    coc1-0/0/0:5 {
      description " oc-slice 7 of coc12-0/0/0. COC12 to COC1 converted to a CT3 to T1s.";
      no-partition interface-type ct3;
    }
    ct3-0/0/0:5 {
      partition 1 interface-type t1;
    }
    t1-0/0/0:5:1 {
      unit 0 {
        family inet {
          address 20.20.20.18/30;
        }
      }
    }
    coc1-0/0/0:6 {
      description " oc-slice 8 of coc12-0/0/0. COC12 to COC1 converted to a CT3 to CT1 to
        NxDS-0s.";
      no-partition interface-type ct3;
    }
    ct3-0/0/0:6 {
      partition 1 interface-type ct1;
    }
    ct1-0/0/0:6:1 {
      partition 1 timeslots 1 interface-type ds;
    }
    ds-0/0/0:6:1:1 {
      unit 0 {
        family inet {
          address 20.20.20.22/30;
        }
      }
    }
  }
```

The above configuration shows the OC12 IQ interface configured into eight channels or slices as shown in Figure 7 on page 113. A summary of the channels follows:

- Channels 1 through 3 are for SONET interfaces
- Channel 4 is for T1 interfaces
- Channel 5 is for T3 interfaces

- Channel 6 is for DS0 interfaces
- Channels 7 is for T1 interfaces
- Channel 8 is for DS0 interfaces

Display the Status of the Controller Channelized OC12 IQ Interface

Purpose To display the status of the controller OC12 IQ interface, use one or all of the following Junos OS CLI operational mode commands, depending on the level of channelization:

Action

user@host> **show interfaces** *interface-type-fpc/pic/port*
user@host> **show interfaces** *interface-type-fpc/pic /port:channel:channel*
user@host> **show interfaces** *interface-type-fpc/pic/port:channel:channel:channel*

Sample Output 1

```
user@host> show interfaces coc12-0/0/0
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 195, SNMP ifIndex: 82
  Link-level type: Controller , Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 21:37:18 UTC (00:44:19 ago)
  SONET alarms   : None
  SONET defects  : None
```

Sample Output 2

```
user@host> show interfaces coc1-0/0/0:2
Physical interface: coc1-0/0/0:2, Enabled, Physical link is Up
  Interface index: 198, SNMP ifIndex: 88
  Link-level type: Controller , Clocking: Internal, SONET mode, Speed: 51840kbps,
  Loopback: None, Parent: coc12-0/0/0  Interface index 195
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 22:19:18 UTC (00:07:06 ago)
  SONET alarms   : None
  SONET defects  : None
```

Sample Output 3

```
user@host> show interfaces ct3-0/0/0:5
Physical interface: ct3-0/0/0:5, Enabled, Physical link is Up
  Interface index: 233, SNMP ifIndex: 169
  Link-level type: Controller , Clocking: Internal, Speed: T3, Loopback: None,
  Mode: C/Bit parity, Parent: coc1-0/0/0:5 Interface index 232
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  Active alarms  : None
  Active defects : None
  DS-3 BERT configuration:
```

```
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
```

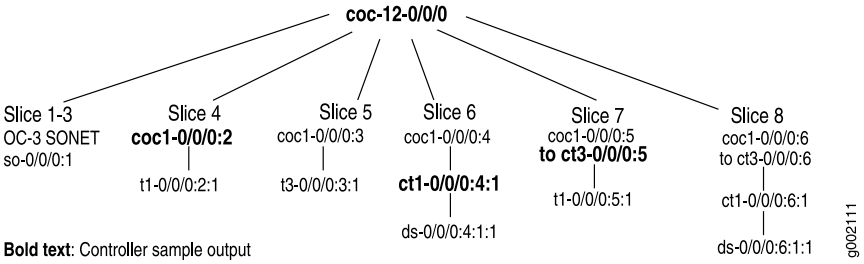
Sample Output 4

```
user@host> show interfaces ct1-0/0/0:4:1
Physical interface: ct1-0/0/0:4:1, Enabled, Physical link is Up
  Interface index: 230, SNMP ifIndex: 167
  Link-level type: Controller , Clocking: Internal, Speed: T1, Loopback: None,
  Framing: ESF, Parent: coc1-0/0/0:4  Interface index 229
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  DS1   alarms   : None
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
```

Meaning The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

The controller interface is partitioned into other interface types and appears at the top of a specific level of channelization. For a visual representation of the controller interface at different levels of channelization, see Figure 8 on page 116.

Figure 8: Controller Interfaces at Different Levels of Channelization



Each of the four examples of controller output is for a different level of channelization.

Sample output 1 for interface **coc12-0/0/0** shows **Parent: None**, which indicates the top-most level of channelization.

Sample output 2 for interface **coc1-0/0/0:2** shows **Parent: coc12-0/0/0**,which indicates that this interface is one level down from the top-most level, and is the OC1 controller for a first level of channelization.

Sample output 3 for interface **ct3-0/0/0:5** shows **Parent: coc1-0/0/0:5**, which indicates that this interface is at the second level of channelization, and is a CT3 controller.

Sample output 4 for interface **ct1-0/0/0:4:1** shows **Parent: coc1-0/0/0:4:1**,which indicates that this interface is at the third level of channelization, and is a CT1 controller.

Display the Status of a Specific Channel of a Channelized OC12 IQ Interface

Purpose To display the status of a specific channel of an OC12 IQ interface, use the following Junos OS CLI operational mode command:

Action

user@host> **show interfaces** *interface-type-fpc/pic/port:channel*
user@host> **show interfaces** *interface-type-fpc/pic/port:channel:channel*
user@host> **show interfaces** *interface-type-fpc/pic/port:channel:channel:channel*

Sample Output 1

```
user@host> show interfaces so-0/0/0:1
Physical interface: so-0/0/0:1, Enabled, Physical link is Up
  Interface index: 197, SNMP ifIndex: 131
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled,
  Parent: coc12-0/0/0  Interface index 195
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 17 (00:00:01 ago), Output: 17 (00:00:08 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 22:19:18 UTC (00:02:59 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None
  Logical interface so-0/0/0:1.0 (Index 70) (SNMP ifIndex 132)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.0/30, Local: 20.20.20.1, Broadcast: 20.20.20.3
```

Sample Output 2

```
user@host> show interfaces t1-0/0/0:2:1
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 199, SNMP ifIndex: 133
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2  Interface index 198
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 44 (00:00:07 ago), Output: 46 (00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
```

```
  DS1   alarms   : None
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
  Logical interface t1-0/0/0:2:1.0 (Index 71) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7
```

Sample Output 3

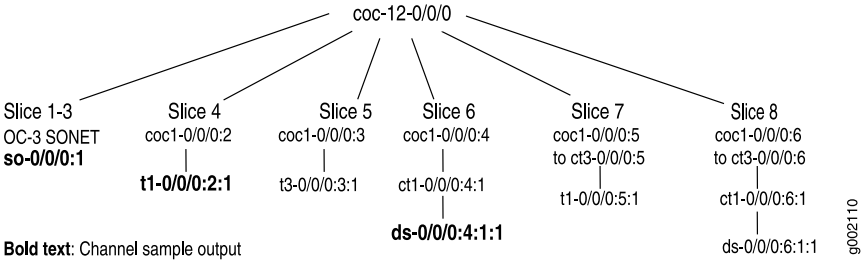
```
user@host> show interfaces ds-0/0/0:4:1:1
Physical interface: ds-0/0/0:4:1:1, Enabled, Physical link is Up
  Interface index: 231, SNMP ifIndex: 168
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/0:4:1  Interface index 230
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 58 (00:00:06 ago), Output: 59 (00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Input rate     : 48 bps (0 pps)
  Output rate    : 48 bps (0 pps)
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Logical interface ds-0/0/0:4:1:1.0 (Index 75) (SNMP ifIndex 173)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.12/30, Local: 20.20.20.13, Broadcast: 20.20.20.15
```

Meaning The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets. All four examples of output show the link is up and can pass packets.

Sample output 1 shows an OC3 SONET interface. Sample output 2 shows a T1 interface that is the result of a partitioned OC1 interface, and sample output 3 shows a DS0 interface that is the result of an OC1 interface partitioned into a T1 interface, which is further partitioned into the DS0 interface.

Figure 9 on page 119 shows a visual representation of the different channel levels.

Figure 9: Specific Channels of a Channelized OC12 IQ Interface



When only one or some individual channels are down, you must troubleshoot the channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the channels are down, you must work with this as a T1, T3, DS0, or OC12 SONET link or PIC problem. For more information on monitoring these types of interfaces, see the respective sections in this guide.

Display Extensive Status Information for a Channelized OC12 IQ Interface

Purpose To display extensive status information for a Channelized OC12 IQ interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces** *interface-type-interface-name* **extensive**

Sample Output 1

The following sample output is for a controller interface:

```
user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms  : None
  SONET defects : None
  SONET PHY:             Seconds        Count  State
    PLL Lock                   0            0  OK
    PHY Light                  0            0  OK
  SONET section:
    BIP-B1                     0            0
    SEF                       77            1  OK
    LOS                       77            1  OK
    LOF                       77            1  OK
    ES-S                      77
    SES-S                     77
    SEFS-S                    77
  SONET line:
    BIP-B2                     0            0
    REI-L                  82584      1274876
    RDI-L                      5            1  OK
```

```
    AIS-L                    0            0  OK
    BERR-SF                 77            1  OK
    BERR-SD                  2            1  OK
    ES-L                    77
    SES-L                   77
    UAS-L                   67
    ES-LFE               82589
    SES-LFE                  5
    UAS-LFE                  0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

Sample Output 2

The following sample output is for a channel on a Channelized OC12 IQ interface:

```
user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 444 (last seen 00:00:05 ago)
    Output: 442 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                10948                    0 bps
   Output bytes  :                11792                    0 bps
   Input  packets:                  892                    0 pps
   Output packets:                  940                    0 pps
  Input errors:
    Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   3                   3                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                937                 937                   0
```

```
DS1 alarms : None
DS1 defects : None
 T1 media:              Seconds        Count  State
  SEF                         1            1  OK
  BEE                         2            2  OK
  AIS                         0            0  OK
  LOF                       108            1  OK
  LOS                         0            0  OK
  YELLOW                      0            0  OK
  BPV                         0            0
  EXZ                         0            0
  LCV                         1            1
  PCV                         0            0
  CS                          0            0
  LES                       108
  ES                        108
  SES                       108
  SEFS                      108
  BES                         0
  UAS                       116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SONET alarms : None
SONET defects : None
SONET vt:
  BIP-BIP2                    0            0
  REI-V                      25           25
  LOP-V                      93            1  OK
  AIS-V                       0            0  OK
  RDI-V                       0            0  OK
  UNEQ-V                      0            0  OK
  PLM-V                      93            1  OK
  ES-V                       93
  SES-V                      93
  UAS-V                      83
  ES-VFE                     25
  SES-VFE                    25
  UAS-VFE                     0
Received SONET overhead:
  V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
```

```
        Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
        Generation: 29
```

Meaning The sample output shows where the errors might be occurring: either with the channel media or the SONET layer. In this example, there are no errors. However, if errors occur, you must troubleshoot the channel media or the SONET layer. For more information, see the sections of this guide that correspond to the media with which you are working.

Monitor Statistics for a Channelized OC12 IQ Interface

Purpose To monitor statistics for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interfaces** ***interface-type-fpc/pic/port:channel***

Sample Output

```
user@host> monitor interfaces so-0/0/0:1.0
host         Seconds: 10                  Time: 00:23:13
                                                        Delay: 0/0/32
Interface: so-0/0/0:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                       Current delta
  Input bytes:                    431244                          [0]
  Output bytes:                   432268                          [0]
  Input packets:                   35933                          [0]
  Output packets:                  36019                          [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                 [0]
  Output bytes:                        0 (0 bps)                 [0]
  Input packets:                       0 (1 pps)                 [0]
  Output packets:                      0 (0 pps)                 [0]
Traffic statistics:
  Input bytes:                    431244                          [0]
  Output bytes:                   432268                          [0]
  Input packets:                   35933                          [0]
  Output packets:                  36019                          [0]
Protocol: inet, MTU: 4470

user@host> monitor interfaces t1-0/0/0:2:1.0
host         Seconds: 1                   Time: 00:32:07
                                                        Delay: 0/0/26
Interface: t1-0/0/0:2:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                       Current delta
  Input bytes:                    432028                          [0]
  Output bytes:                   433076                          [0]
  Input packets:                   35954                          [0]
  Output packets:                  36041                          [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                 [0]
  Output bytes:                        0 (0 bps)                 [0]
  Input packets:                       0 (0 pps)                 [0]
  Output packets:                      0 (0 pps)                 [0]
Traffic statistics:
  Input bytes:                    432028                          [0]
  Output bytes:                   433076                          [0]
```

```
  Input packets:                    35954                              [0]
  Output packets:                   36041                              [0]
Protocol: inet, MTU: 1500

user@host> monitor interfaces ds-0/0/0:4:1:1.0
host         Seconds: 3                  Time: 00:36:59
                                                                 Delay: 0/0/0
Interface: ds-0/0/0:4:1:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                              Current delta
  Input bytes:                    432836                             [0]
  Output bytes:                   433882                             [0]
  Input packets:                   36065                             [0]
  Output packets:                  36152                             [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                     [0]
  Output bytes:                        0 (0 bps)                     [0]
  Input packets:                       0 (0 pps)                     [0]
  Output packets:                      0 (0 pps)                     [0]
Traffic statistics:
  Input bytes:                    432836                             [0]
  Output bytes:                   433882                             [0]
  Input packets:                   36065                             [0]
  Output packets:                  36152                             [0]
Protocol: inet, MTU: 1500
```

Meaning The sample output shows common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the set cli terminal command.

CAUTION: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Use Loopback Testing for Channelized OC12 Interfaces

- Force the Link Layer to Stay Up on page 130
- Verify the Status of the Logical Interface on page 132
- Ping the Channelized Interface on page 133
- Check for Interface Error Statistics on page 133
- Diagnose a Suspected Circuit Problem on page 136

Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces

Purpose To use loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems. The naming convention for the Channelized OC12 IQ interface varies depending on the type of interface.

Action Table 13 on page 124 provides links and commands for using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems.

Table 13: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces

Tasks	Command or Action
"Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 125	
1. Create a Loopback on page 125	
a. Create a Physical Loopback on page 126	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 126	**[edit interfaces t3-*fpc/pic/port:channel* t3 options]** **set loopback local** **show** **commit**
2. Verify That the Interface Is Up on page 127	**show interfaces t3-*fpc/pic/port:channel* extensive**
3. Clear Interface Statistics on page 129	**clear interfaces statistics t3-*fpc/pic/port:channel***
4. Force the Link Layer to Stay Up on page 130	
a. Configure Encapsulation to Cisco-HDLC on page 130	**[edit interfaces t3-*fpc/pic/port:channel*]** **set encapsulation cisco-hdlc** **show** **commit**
b. Configure No-Keepalives on page 131	**[edit interfaces t3-*fpc/pic/port:channel*]** **set no-keepalives** **show** **commit**
5. Verify the Status of the Logical Interface on page 132	**show interfaces t3-*fpc/pic/port:channel***
6. Ping the Channelized Interface on page 133	**ping interface t3-*fpc/pic/port:channel local-IP-address*** **bypass-routing count 1000 rapid**

Table 13: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces *(continued)*

Tasks	Command or Action
7. Check for Interface Error Statistics on page 133	**show interfaces t3-*fpc/pic/port:channel* extensive**
"Diagnose a Suspected Circuit Problem" on page 136	
1. Loop the Entire T3 Interface Toward the Network on page 136	**[edit interfaces t3-*fpc/pic/port:channel* t3-options]** **set loopback remote** **show** **commit**
2. Create a Loop to the Router from Various Points in the Network on page 137	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 125.

Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface

Problem To diagnose a suspected hardware problem with a Channelized OC12 or Channelized OC12 IQ interface, follow these steps:

Solution

- Create a Loopback on page 125
- Verify That the Interface Is Up on page 127
- Clear Interface Statistics on page 129
- Force the Link Layer to Stay Up on page 130
- Verify the Status of the Logical Interface on page 132
- Ping the Channelized Interface on page 133
- Check for Interface Error Statistics on page 133

Create a Loopback

Purpose

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the Channelized OC12 or Channelized OC12 IQ port. If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos OS Network Interfaces Library for Routing Devices*.

1. Create a Physical Loopback on page 126
2. Configure a Local Loopback on page 126

Create a Physical Loopback

Action

To create a physical loopback at the port, connect the transmit port to the receive port.

Meaning

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Configure a Local Loopback

Action

To configure a local loopback, follow these steps:

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces t3-fpc/pic/port:channel  t3-options
   ```

2. Configure the local loopback:

   ```
   [edit interfaces t3-fpc/pic/port:channel t3-options]
   user@host# set loopback local
   ```

   The following is an example of the name for a T3 channel on a channelized DS3 interface:

   ```
   [edit interfaces t3-2/1/0:2 t3-options]
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-2/1/0:2 t3-options]
   user@host# show
   loopback local;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

For example:

```
[edit interfaces t3-2/1/1:2 t3-options]
user@host# commit
commit complete
```

Meaning

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.

NOTE: Remember to delete the loopback statement after completing the test.

Verify That the Interface Is Up

Purpose Display the status of a Channelized OC12 or Channelized OC12 IQ interface to determine whether the physical link is up or down.

Action To verify that the status of the Channelized OC12 or Channelized OC12 IQ interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces t3-fpc/pic/port:channel extensive.
```

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (00:05:00 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
```

```
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS3 alarms : None
SONET alarms : None
DS3 defects : None
SONET defects : None
DS3 media:            Seconds        Count  State
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CCV                       0            0
  LES                       0
  PES                       0
  PSES                      0
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                 B/W  WRR       Packets        Bytes
  Queue0           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue1           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue2           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue3           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
```

```
  ES-S                    1
  SES-S                   0
  SEFS-S                  0
SONET line:
  BIP-B2                  1          307
  REI-L                   0            0
  RDI-L                   3            1  OK
  AIS-L                   0            0  OK
  BERR-SF                 0            0  OK
  BERR-SD                 0            0  OK
  ES-L                    1
  SES-L                   0
  UAS-L                   0
  ES-LFE                  3
  SES-LFE                 3
  UAS-LFE                 0
SONET path:
  BIP-B3                  1           35
  REI-P                   1            7
  LOP-P                   0            0  OK
  AIS-P                   0            0  OK
  RDI-P                   0            0  OK
  UNEQ-P                  0            0  OK
  PLM-P                   1            1  OK
  ES-P                    1
  SES-P                   0
  UAS-P                   0
  ES-PFE                  1
  SES-PFE                 0
  UAS-PFE                 0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
  0 best-effort              95     42499200  95            0      low    none
  3 network-control           5      2236800   5            0      low    none
```

Meaning

The sample output shows that the physical link is up and there are no OC12 alarms or defects. You should not see any OC12 alarms.

Clear Interface Statistics

Purpose

You must reset the Channelized OC12 or Channelized OC12 IQ interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous

input or output errors and packet statistics do not interfere with the current efforts to diagnose the problem.

Action

To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

user@host> **clear interfaces statistics t3-*fpc/pic/port:channel***.

Sample Output

```
user@host> clear interfaces statistics t3-1/1/0:0
user@host>
```

Meaning

This command clears the interface statistics counters for the Channelized OC12 interface only.

NOTE: After a Graceful Routing Engine switchover (GRES) you must run **clear interface statistics** again or interface statistics will display junk vales.

Force the Link Layer to Stay Up

Purpose

To complete the loopback test, the link layer must remain up. However, Junos OS is designed to recognize that loop connections are not valid connections and to bring the link layer down. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

Force the link layer to stay up, follow these steps:

1. Configure Encapsulation to Cisco-HDLC on page 130
2. Configure No-Keepalives on page 131

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T3 physical interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t3-fpc/pic/port:channel
   ```

2. Configure Cisco-HDLC:

   ```
   [edit interfaces t3-fpc/pic /port:channel ]
   user@host# set encapsulation cisco-hdlc
   ```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-0/1/1:8]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-0/1/1:8]
user@host# commit
commit complete
```

Meaning

This command sets the interface encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol.

Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a Channelized OC12 or Channelized OC12 IQ interface, follow these steps:

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces t3-fpc/pic/port:channel
```

2. Configure no-keepalives:

```
[edit interfaces t3-fpc/pic/port:channel]
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-0/1/1:8]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-0/1/1:8]
user@host# commit
commit complete
```

Meaning

By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces t3-*fpc/pic/port:channel***.

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> show interfaces t3-0/3/0:11
Physical interface: t3-0/3/0:11, Enabled, Physical link is Up
  Interface index: 204, SNMP ifIndex: 129
  Link-level type: Cisco-HDLC, MTU: 4474, SONET mode, Speed: T3, Loopback: Local,

  SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:34:24 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS3 alarms : None
  SONET alarms : None
  DS3 defects : None
  SONET defects : None
  DS-3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
   Logical interface t3-0/3/0:11.0  (Index 71) (SNMP ifIndex 130)
     Flags: Point-To-Point  SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.0.0/30, Local: 10.0.0.1, Broadcast: 10.0.0.3
```

Meaning The sample output shows that the channelized interface has the physical and logical links up. There are no alarms or defects.

Ping the Channelized Interface

Purpose Use the ping command to verify the loopback connection.

Action To ping the local interface, use the following Junos OS CLI operational mode command:

user@host> **ping interface t3-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid.**

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> ping interface t3-0/3/0:11 10.0.0.1 bypass-routing count 1000 rapid
PING 10.0.0.1 (10.0.0.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 10.0.0.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.439/0.694/42.590/2.206 ms
```

Meaning This command sends 1000 ping packets out of the channelized interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (JTAC) at **support@juniper.net**, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Check for Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

user@host> **show interfaces t3-*fpc/pic/port:channel* extensive.**

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> show interfaces t3-0/3/0:11 extensive
```



```
Physical interface: t3-0/3/0:11, Enabled, Physical link is Up
  Interface index: 204, SNMP ifIndex: 129, Generation: 133
  Link-level type: Cisco-HDLC, MTU: 4474, SONET mode, Speed: T3, Loopback: Local,

  SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:36:27 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :               109318                 0 bps
   Output bytes  :               109318                 0 bps
   Input  packets:                 1669                 0 pps
   Output packets:                 1669                 0 pps
   Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
   Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3  alarms  : None
  SONET alarms  : None
  DS3  defects : None
  SONET defects : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CCV                       0            0
    LES                       0
    PES                       0
    PSES                      0
    CES                       0
    CSES                      0
    SEFS                      0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
  Interface transmit queues:
                   B/W  WRR       Packets        Bytes
    Queue0           0    0
      Transmitted:                      0            0
```

```
    Drops:                              0            0
    Errors:                             0
  Queue1           0    0
    Transmitted:                        0            0
    Drops:                              0            0
    Errors:                             0
  Queue2           0    0
    Transmitted:                        0            0
    Drops:                              0            0
    Errors:                             0
  Queue3           0    0
    Transmitted:                     1669       109318
    Drops:                              0            0
    Errors:                             0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      1
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    1          307
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      1
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
  UAS-LFE                   0
SONET path:
  BIP-B3                    1           37
  REI-P                     1           23
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                     1            1  OK
  ES-P                      1
  SES-P                     0
  UAS-P                     0
  ES-PFE                    1
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:11
```

```
  74 33 2d 30 2f 31 2f 30 3a 31 31 00 00 00 0d 0a   t3-0/1/0:11.....
Transmitted path trace: t3-0/3/0:11
  74 33 2d 30 2f 33 2f 30 3a 31 31 00 00 00 00 00   t3-0/3/0:11.....
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x02)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                            %          bps   %        bytes
  0 best-effort            95     42499200  95            0      low    none
  3 network-control         5      2236800   5            0      low    none
Logical interface t3-0/3/0:11.0 (Index 71) (SNMP ifIndex 130) (Generation 22)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 4470, Generation: 31, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
     Destination: 10.0.0.0/30, Local: 10.0.0.1, Broadcast: 10.0.0.3, Generation:
43
```

Meaning Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with JTAC at **support@juniper.net**, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose a Suspected Circuit Problem

Purpose

When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

To diagnose a suspected circuit problem, follow these steps:

1. Loop the Entire T3 Interface Toward the Network on page 136
2. Create a Loop to the Router from Various Points in the Network on page 137

Loop the Entire T3 Interface Toward the Network

Purpose

Creating a loop from the entire T3 interface to the network allows the transport-layer engineer to test the router from various points in the network and isolate the problem..

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

Action

To create a loop from the entire T3 interface to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t3-fpc/pic/port:channel t3-options
   ```


2. Configure the loopback:

   ```
   [edit interfaces t3-fpc/pic/port:channel t3-options]
   user@host# set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-2/1/1:0 t3-options]
   user@host# show
   loopback remote;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

Meaning

The **loopback remote** command loops any traffic from the network back into the network.

Create a Loop to the Router from Various Points in the Network

Purpose

The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Steps 2 through 7 in "Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 125. Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

Locate Channelized OC12 Alarms and Errors

Checklist for Channelized OC12 Alarms and Errors

Purpose To check the most common Channelized OC12 alarms and errors encountered when investigating line problems on a Juniper Networks router.

Action Table 14 on page 138 provides links and commands for Channelized OC12 alarms and errors.

Table 14: Checklist for Channelized OC12 Alarms and Errors

Tasks	Command or Action
"Display Channelized OC12 Alarms and Errors" on page 138	show interfaces t3-*fpc/pic/port:channel* extensive
"Display Channelized OC12 IQ Alarms and Errors" on page 141	show interfaces *interface-type-interface-name* extensive

Display Channelized OC12 Alarms and Errors

Purpose To display Channelized OC12 interface alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfacest3-*fpc/pic/port:channel* extensive**

Sample Output 1

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3  alarms  : None
  SONET alarms  : None
  DS3  defects : None
  SONET defects : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
```

```
  CCV                       0            0
  LES                       0
  PES                       0
  PSES                      0
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                B/W  WRR       Packets        Bytes
  Queue0          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue1          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue2          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue3          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      1
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    1          307
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      1
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
  UAS-LFE                   0
```

```
SONET path:
  BIP-B3                    1           35
  REI-P                     1            7
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                     1            1  OK
  ES-P                      1
  SES-P                     0
  UAS-P                     0
  ES-PFE                    1
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         bytes
  0 best-effort             95     42499200  95             0      low    none
  3 network-control          5      2236800   5             0      low    none
```

Meaning The sample output shows that there are no active alarms or active defects, either with the T3 media or the SONET layer. If alarms or errors occur, you must troubleshoot the T3 media or the SONET layer. For more information on diagnosing a T3 media problem or a SONET layer problem, see the topics in the Related Topics section.

When a major error (such as an alarm indication signal [AIS]) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T3 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell).

NOTE: T3 is a general term used to refer to the transmission of 44.736-Mbps digital circuits over any media. T3 can be transported over copper, fiber, or radio. DS3 is the term for the electrical signal found at the metallic interface for this circuit where most of the testing is performed.

Table 15 on page 141 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 15: T3 Interface Error Counter Definitions

T3 Alarm or Error	Definition
AIS	Alarm indication signal
EXZ	Excessive zeros
FERF	Far-end failures
IDLE	Idle code detected
LCV	Line code violation
LOS	Loss of signal
LOF	Loss of frame
YLW	Remote defect indication (yellow alarm)
PLL	Phase locked loop

For more details on T3 alarms and statistics, see *Checklist of Common T3 Alarms and Errors*.

Display Channelized OC12 IQ Alarms and Errors

Purpose To display Channelized OC12 IQ interface alarms and errors, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces *interface-type-interface-name* extensive**

Sample Output 1

The following sample output is for a controller interface:

```
user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms  : None
  SONET defects : None
```

```
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                      77            1  OK
    LOS                      77            1  OK
    LOF                      77            1  OK
    ES-S                     77
    SES-S                    77
    SEFS-S                   77
  SONET line:
    BIP-B2                    0            0
    REI-L                 82584      1274876
    RDI-L                     5            1  OK
    AIS-L                     0            0  OK
    BERR-SF                  77            1  OK
    BERR-SD                   2            1  OK
    ES-L                     77
    SES-L                    77
    UAS-L                    67
    ES-LFE                82589
    SES-LFE                   5
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

Sample Output 2

The following sample output is for a T1 channel on a Channelized OC12 IQ interface:

```
user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 444 (last seen 00:00:05 ago)
    Output: 442 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                10948                    0 bps
   Output bytes  :                11792                    0 bps
   Input  packets:                  892                    0 pps
   Output packets:                  940                    0 pps
```

```
Input errors:
  Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   3                   3                   0

  1 expedited-fo                  0                   0                   0

  2 assured-forw                  0                   0                   0

  3 network-cont                937                 937                   0

DS1 alarms : None
DS1 defects : None
 T1 media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       2            2  OK
  AIS                       0            0  OK
  LOF                     108            1  OK
  LOS                       0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       1            1
  PCV                       0            0
  CS                        0            0
  LES                     108
  ES                      108
  SES                     108
  SEFS                    108
  BES                       0
  UAS                     116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SONET alarms : None
SONET defects : None
SONET vt:
  BIP-BIP2                  0            0
  REI-V                    25           25
  LOP-V                    93            1  OK
  AIS-V                     0            0  OK
  RDI-V                     0            0  OK
  UNEQ-V                    0            0  OK
  PLM-V                    93            1  OK
  ES-V                     93
  SES-V                    93
  UAS-V                    83
  ES-VFE                   25
```

```
  SES-VFE                  25
  UAS-VFE                   0
Received SONET overhead:
  V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
      Generation: 29
```

Meaning The sample output shows that there are no active alarms or active defects. If alarms or errors occur, you must troubleshoot the channel media or the SONET layer. For more information, see the topics that correspond to the media with which you are working.

When a major error (such as an AIS) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

PART 5

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Symbols

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