



Junos[®] OS

Channelized Interfaces Feature Guide for Routing Devices

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Documentation and Release Notes

To obtain the most current version of all Juniper Networks[®] technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

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

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

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

- M Series
- MX Series
- T 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.xml;
    }
  }
}
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.xml; }
```


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 [CLI Explorer](#).

Documentation Conventions

[Table 1 on page xxi](#) 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.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

[Table 2 on page xxii](#) 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
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	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 <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> 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)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i> >;
(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 (<i>string1</i> <i>string2</i> <i>string3</i>)
# (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)	Encloses a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

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

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> 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 provide feedback by using either of the following methods:

- Online feedback rating system—On any page of the Juniper Networks TechLibrary site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <http://www.juniper.net/techpubs/feedback/>.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service 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: <http://kb.juniper.net/InfoCenter/>
- 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

- [Channelized Interfaces Overview on page 3](#)

CHAPTER 1

Channelized Interfaces Overview

- [Channelized Interfaces Overview on page 3](#)
- [Channelized Interface Capabilities on page 4](#)
- [Data-Link Connection Identifiers on Channelized Interfaces on page 6](#)
- [Clock Sources on Channelized Interfaces on page 8](#)
- [Channel Scaling Numbers of Channelized SONET/SDH OC3/STM1 \(Multi-Rate\) MICs with SFP on page 12](#)
- [Channel Scaling Numbers of DS3/E3 MIC on page 13](#)
- [Channelized IQ and IQE Interfaces Properties on page 14](#)
- [Structure of Channelized IQ and Channelized IQE PICs on page 16](#)

Channelized Interfaces Overview

Channelized interfaces enable you to configure a number of individual channels that subdivide the bandwidth of a larger interface and minimize the number of Physical Interface Cards (PICs) that an installation requires.



NOTE: Channelized intelligent queuing (IQ) and channelized enhanced intelligent queuing (IQE) interfaces require M Series Enhanced Flexible PIC Concentrators (FPCs) and MX Series Enhanced Flexible PIC Concentrators (FPCs).

Wherever Junos configuration guides refer to channelized interfaces and PICs without the “intelligent queuing IQ or IQE” descriptor, they are referring to the original channelized interfaces and PICs.

On M40e routers, all supported interface types support a maximum number of 784 traffic-bearing interfaces that can be created per interface port and includes ports on channelized PICs.

MX Series routers support two Type 2 Channelized IQ PICs: OC12/STM4 IQE PIC with SFP and OC48/STM16 IQE PIC with SFP. Each channelized OC12/STM4 PIC supports 4 ports, and the channelized OC48/STM16 PIC supports one port.

T640 and TX Matrix routers support Type 3 Channelized IQE PICs: 4xCOC12 IQE PIC with SFP.

Channelized 4xCOC12 IQE PICs support deep-channelization of up to six OC slices (STS1) per port. For example, only six OC slices can be channelized to CT1/T1 or CE1/E1.

Channelized COC48 IQE PICs support deep-channelization of up to six OC slices (STS1) in a block of 12 contiguous OC slices. For example, only six OC slices out of OC slice 1-12 can be channelized to CT1/T1 or CE1/E1. The PIC supports deep-channelization of maximum 24 OC slices in this way.

Channelized OC48 IQE PICs do not support STS-48 clear-channel mode.

IQ and IQE PICs do not support aggregated SONET (link bonding).

For channelized IQ and IQE logical interfaces, you can configure class of service (CoS). For more information, see the *Class of Service Feature Guide for Routing Devices*.

Related Documentation • [Channelized Interface Capabilities on page 4](#)

Channelized Interface Capabilities

You can configure each port of a channelized IQ PIC or channelized IQE PIC as a single interface that uses the entire available bandwidth, or partition each port into smaller data channels. In either case, you start with a channelized interface (designated by a **c** in the interface name, as in **coc12**). From the channelized interfaces, you configure data channels. Following are the channelized interface names and data-channel interface names associated with channelized IQ and IQE PICs.

Channelized Interface Names

This section lists the channelized interface names.

- ***coc48-fpc/pic/port***—Channelized OC48 IQE interface. Configure on a Channelized OC48 IQE PIC.
- ***coc12-fpc/pic/port***—Channelized OC12 interface. Configure on Channelized OC12 IQ or IQE PICs.
- ***coc3-fpc/pic/port:channel***—Channelized OC3 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE PICs.
- ***coc1-fpc/pic/port:channel***—Channelized OC1 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, or Channelized OC48 IQE PICs.
- ***ct3-fpc/pic/port:channel***—Channelized T3 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- ***cstm16-fpc/pic/port***—Channelized STM16 interface. Configure on a Channelized OC48 IQE PIC in SDH mode.
- ***cstm4-fpc/pic/port***—Channelized STM4 interface. Configure on a Channelized OC12 IQ or IQE PIC in SDH mode.
- ***cstm1-fpc/pic/port***—Channelized STM1 interface. Configure on a Channelized STM1 IQ or IQE PIC.
- ***cau4-fpc/pic/port:channel***—Channelized AU-4 IQ interface. Configure on Channelized STM1 IQ or IQE, Channelized OC48 IQE, or Channelized OC12 IQE PICs.
- ***ct1-fpc/pic/port:channel***—Channelized T1 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized T1 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- ***ce1-fpc/pic/port:channel***—Channelized E1 interface. Configure on Channelized E1 IQ or IQE, Channelized STM1 IQ or IQE, Channelized OC48/STM16 IQE, or Channelized OC12/STM4 IQE PICs.

Data-Channel Interface Names

This section lists the data-channel interface names.

- ***e1-fpc/pic/port:channel***—E1 channel. Configure on Channelized E1 IQ or IQE, Channelized STM1 IQ or IQE, Channelized OC12/STM4 IQE, or Channelized OC48/STM16 IQE PICs.
- ***e3-fpc/pic/port:channel***—E3 channel. Configure on Channelized OC3/STM1 IQE, or Channelized OC12/STM4 IQE, Channelized OC48 IQE, or Channelized/Clear channel DS3E3 IQE or E3 IQ PICs.
- ***ds-fpc/pic/port:channel***—NxDS0 channel. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48/STM16 IQE, Channelized STM1 IQ or IQE, Channelized DS3 IQ or IQE, Channelized T1 IQ, or Channelized E1 IQ or IQE PICs.
- ***so-fpc/pic/port:channel***—SONET/SDH channel. Configure one OC3 channel on a Channelized OC3 IQ or IQE, four OC3 channels on a Channelized OC12 IQ or IQE, one OC12 channel on a Channelized OC12 IQ or IQE, four OC12 channels on Channelized OC48 IQE, or one STM1 channel on a Channelized STM1 IQ or IQE PICs.

- **t1-fpc/pic/port:channel**—T1 channel. Configure on Channelized T1 IQ or IQE, Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- **t3-fpc/pic/port:channel**—T3 channel. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, Clear Channel DS3E3 IQE, or Channelized DS3 IQ or IQE PICs.

**Related
Documentation**

- [Channelized Interfaces Overview on page 3](#)

Data-Link Connection Identifiers on Channelized Interfaces

If you use Frame Relay encapsulation on a channelized interface, see [Table 3 on page 6](#) for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.

If you use a per-unit-scheduler configuration on a channelized interface, see [Table 4 on page 7](#) for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.



NOTE: The actual number of DLCIs you can configure for each channel is determined by the capabilities of your system, such as the number and types of PICs installed. If the number of DLCIs in the configuration exceeds the capabilities of your system, the router might not be able to support the maximum DLCI values shown in [Table 3 on page 6](#). To determine the capabilities of your system, please contact Juniper Networks customer support.

Table 3: Frame Relay DLCI Limitations for Channelized Interfaces

PIC Types	Number of DLCIs per Level	Range
Original Channelized PICs		
DS0 level channels	3 for sparse mode	1–1022 for sparse mode (0 is reserved for the Local Management Interface [LMI])
T3 and T1 level channels	63 for regular mode	1–63 for regular mode
	3 for sparse mode	1–1022 for sparse mode (0 is reserved for the LMI)
Channelized IQ and IQE PICs		
DS0 level channels (Channelized DS3 IQ or IQE, Channelized STM1 IQ or IQE, Channelized E1 IQ or IQE, Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PICs)	16	1–1022 (0 is reserved for the LMI)

Table 3: Frame Relay DLCI Limitations for Channelized Interfaces (*continued*)

PIC Types	Number of DLCIs per Level	Range
E1 level channels (Channelized E1 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
E1 level channels (Channelized STM1 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
OC3 level channels (Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)
OC12 level channels (Channelized OC12 IQ or IQE, Channelized OC48/STM16 IQE PICs, and (per port on) OC12 ports on 4xOC12/STM4 IQE PICs)	1022	1–1022 (0 is reserved for the LMI)
STM1 level channel (Channelized STM1 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)
T1 level channels (Channelized DS3 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
T1 level channels (Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
T3 level channel (Channelized DS3 IQ or IQE, Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)

Table 4: Per Unit Scheduler DLCI Limitations for Channelized Interfaces

PIC Types	Number of DLCIs per Level			
	Non M40e Platforms		M40e Platform Only	
	With Per-Unit-Scheduler	Without Per-Unit-Scheduler	With Per-Unit-Scheduler	Without Per-Unit-Scheduler
DS0 level channels	64	64	16	16
T1/E1 level channels	64	64	64	64
DS3/E3 level channels	975	† Protocol family combinations apply	256	256
SONET	975	† Protocol family combinations apply	975	† Protocol family combinations apply

† In these router, PIC, and scheduler configurations, combining multiple protocol families per PIC changes the number of Frame Relay DLCIs as shown in [Table 5 on page 8](#).

Table 5: Protocol Family Combinations

Protocol Family Combinations	Number of DLCIs per PIC
inet	3600
inet6	3600
mpls	3000
inet, inet6	2400
inet, mpls	2000
inet6, mpls	2000
inet, inet6, mpls	1550

Related Documentation • [Channelized Interfaces Overview on page 3](#)

Clock Sources on Channelized Interfaces

Channelized interfaces, channelized IQ interfaces, and channelized IQE interfaces have different clocking capabilities. For channelized IQ and IQE interfaces, you can configure clocking on each interface independently by including the **clocking (internal | external)** statement at the **[edit interfaces interface-name]** hierarchy level.

For channelized IQ and IQE interfaces, clocking is provided as follows:

- For all channelized IQ and IQE PICs, the **clocking** statement is supported on all channels. To configure clocking on individual interfaces, include the **clocking** statement at the **[edit interfaces type-fpc/pic/port:channel]** hierarchy level. If you do not include the **clocking** statement, the individual interfaces use internal clocking by default.
- SONET/SDH-level clocking is provided at the root controller interface at the **[edit interfaces type-fpc/pic/port]** hierarchy level.
- Configure T3-level clocking by including the **clocking** statement at the **[edit interfaces ct3-fpc/pic/port]** hierarchy level.
- Configure T1-level clocking by including the **clocking** statement at the **[edit interfaces t1-fpc/pic/port:channel]** hierarchy level.
- Configure E1-level clocking by including the **clocking** statement at the **[edit interfaces ce1-fpc/pic/port]** hierarchy level.
- Configure clocking for all NxDSO channels by including the **clocking** statement at the **[edit interfaces ct1-fpc/pic/port:channel]** or **[edit interfaces ce1-fpc/pic/port]** hierarchy level.

- The **clocking** statement is ignored if you include it at the **[edit interfaces coc1-fpc/pic/port:channel]** or **[edit interfaces cau4-fpc/pic/port:channel]** hierarchy level.
- SONET/SDH level clocking is applicable only at the controller interfaces for channelized IQ and IQE PICs. Clocking configuration is not effective at the **so-fpc/pic/port** or **so-fpc/pic/port:channel** for channelized IQ and IQE PICs.

For non-IQ and non-IQE channelized interfaces, clocking at each channel level is provided as follows:

- For Channelized OC12, DS3, and E1 PICs, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of other channels. The clock source configured for channel 0 applies to all channels on these channelized interfaces.
- For the Channelized STM1 PIC, the **clocking** statement is supported on channels 0 through 62. To configure clocking on the STM1 interface, include the **loop-timing** statement at the **[edit interfaces e1-fpc/pic/port:0 sonet-options]** hierarchy level. To configure clocking on individual E1 interfaces, include the **clocking** statement at the **[edit interfaces e1-fpc/pic/port:channel]** hierarchy level. The channel number can be 0 through 62. If you do not include the **clocking** statement, the individual E1 interfaces use internal clocking by default.
- For channelized STM1 interfaces, you should configure the clock source at one side of the connection to be internal and configure the other side of the connection to be external.
- When you configure the clock source for a channelized interface—**t3-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.

Table 6 on page 9 lists the clocking capabilities for each channelized PIC.

Table 6: Clocking Capabilities by Channelized PIC Type

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized PICs			
Channelized DS3 and Multichannel DS3	Not applicable.	The loop-timing statement is supported at the [edit interfaces t1-fpc/pic/port:0 t3-options] or [edit interfaces fpc/pic/port:0:0 t3-options] hierarchy level.	The clocking statement is supported at the [edit interfaces t1-fpc/pic/port:0] or [edit interfaces ds-fpc/pic/port:0:0] hierarchy level.
Channelized E1	Not applicable.	Not applicable.	The clocking statement is supported at the [edit interfaces e1-fpc/pic/port:0] or [edit interfaces ds-fpc/pic/port:0] hierarchy level.
Channelized OC12	Not configurable.	The clocking statement is supported at the [edit interfaces t3-fpc/pic/port:0] hierarchy level.	Not applicable.

Table 6: Clocking Capabilities by Channelized PIC Type (*continued*)

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized STM1	Not configurable.	Not applicable.	The clocking statement is supported at the [edit interfaces e1-fpc/pic/port:[0-62]] hierarchy level.
Channelized IQ and IQE PICs			
Channelized DS3 IQ or IQE	Not applicable.	<p>The clocking statement is supported at the [edit interfaces ct3-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces t3-fpc/pic/port] hierarchy level.</p>	<p>For T1 channels, the clocking statement is supported at the [edit interfaces t1-fpc/pic/port:[1-28]] hierarchy level.</p> <p>For NxDS0 channels, the clocking statement is supported at the [edit interfaces ct1-fpc/pic/port:[1-28]] hierarchy level.</p>
Channelized E1 IQ	Not applicable.	Not applicable.	<p>For E1 and NxDS0 channels, the clocking statement is supported at the [edit interfaces ce1-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces e1-fpc/pic/port] hierarchy level.</p>
Channelized OC3 IQ or IQE	<p>The clocking statement is supported at the [edit interfaces coc3-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces so-fpc/pic/port] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces t3-fpc/pic/port:[1-12]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces coc1-fpc/pic/port:channel] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces ct1-fpc/pic/port:[1-12]:[1-28]] and [edit interfaces t1-fpc/pic/port:[1-12]:[1-28]] hierarchy levels.</p>
Channelized OC12 IQ or IQE	<p>The clocking statement is supported at the [edit interfaces coc12-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces so-fpc/pic/port] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces t3-fpc/pic/port:[1-12]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces coc1-fpc/pic/port:channel] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces ct1-fpc/pic/port:[1-12]:[1-28]] and [edit interfaces t1-fpc/pic/port:[1-12]:[1-28]] hierarchy levels.</p>

Table 6: Clocking Capabilities by Channelized PIC Type (*continued*)

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized OC48 IQE	<p>The clocking statement is supported at the [edit interfaces coc48-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces so-fpc/pic/port] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces t3-fpc/pic/port:[1-48]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces coc1-fpc/pic/port:channel] hierarchy level.</p>	<p>The clocking statement is supported at the [edit interfaces ct1fpc/pic/port:[1-48]:[1-28]] and [edit interfaces t1-fpc/pic/port:[1-48]:[1-28]] hierarchy levels.</p>
Channelized STM1 IQ or IQE	<p>The clocking statement is supported at the [edit interfaces cstm1-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces cau4-fpc/pic/port:channel] or [edit interfaces so-fpc/pic/port] hierarchy level.</p>	Not applicable.	<p>For E1 and NxDS0 channels, the clocking statement is supported at the [edit interfaces ce1-fpc/pic/port[1-63]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces e1-fpc/pic/port] hierarchy level.</p>
Channelized STM4 IQ or IQE	<p>The clocking statement is supported at the [edit interfaces cstm4-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces cau4-fpc/pic/port:channel] or [edit interfaces so-fpc/pic/port] hierarchy level.</p>	Not applicable.	<p>For E1 and NxDS0 channels, the clocking statement is supported at the [edit interfaces ce1-fpc/pic/port[1-4]:[1-63]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces e1-fpc/pic/port] hierarchy level.</p>
Channelized STM16 IQE	<p>The clocking statement is supported at the [edit interfaces cstm16-fpc/pic/port] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces cau4-fpc/pic/port:channel] or [edit interfaces so-fpc/pic/port] hierarchy level.</p>	Not applicable.	<p>For E1 and NxDS0 channels, the clocking statement is supported at the [edit interfaces ce1-fpc/pic/port[1-16]:[1-63]] hierarchy level.</p> <p>The clocking statement is ignored if you include it at the [edit interfaces e1-fpc/pic/port] hierarchy level.</p>

Related • [clocking on page 354](#)
Documentation

Channel Scaling Numbers of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP

There are two types of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP—the 8-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP (model number: MIC-3D-8CHOC3-4CHOC12), and the 4-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP (model number: MIC-3D-4CHOC3-2CHOC12). These MICs support POS/PDH interfaces on the MX80 3D Universal Edge Routers and other MX Series routers using the MX-MPC1-3D-Q, MX-MPC2-3D-Q, and MX-MPC2-3D-EQ MPCs to position a single device to meet multiservice edge requirements.

Channel scaling numbers of the 8-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP are listed in [Table 7 on page 12](#).

Table 7: Channel Scaling Numbers of MIC-3D-8CHOC3-4CHOC12

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
<ul style="list-style-type: none"> 4xSTS12c 16xSTS3c (when all ports are configured as channelized OC12) 8xSTS3c (when all ports are configured as channelized OC3) 	<ul style="list-style-type: none"> 4xSTM4 16xSTM1 (when all ports are configured as channelized STM4) 8xSTM1 (when all ports are configured as channelized STM1)
<ul style="list-style-type: none"> 48xDS3 (when all ports are configured as channelized OC12) 24xDS3 (when all ports are configured as channelized OC3) 	<ul style="list-style-type: none"> 48xE3 (when all ports are configured as channelized STM4) 24xE3 (when all ports are configured as channelized STM1)
<ul style="list-style-type: none"> 672xDS1 168xDS1 per channelized OC12 when the port is configured as channelized OC12 84xDS1 per channelized OC3 when the port is configured as channelized OC3 	<ul style="list-style-type: none"> 504xE1 126xE1 per channelized STM4 when the port is configured as channelized STM4 62xE1 per channelized STM1 when the port is configured as channelized STM1
<ul style="list-style-type: none"> 4044xDS0 1011xDS0 per channelized OC12 when the port is configured as channelized OC12 1011xDS0 per two channelized OC3 when the port is configured as channelized OC3 	<ul style="list-style-type: none"> 4044xDS0 1011xDS0 per channelized STM4 when the port is configured as channelized STM4 1011xDS0 per two channelized STM1 when the port is configured as channelized STM1

Channel scaling numbers of the 4-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP are listed in [Table 8 on page 12](#).

Table 8: Channel Scaling Numbers of MIC-3D-4CHOC3-2CHOC12

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
<ul style="list-style-type: none"> 2xSTS12c 8xSTS3c (when all ports are configured as channelized OC12) 4xSTS3c (when all ports are configured as channelized OC3) 	<ul style="list-style-type: none"> 2xSTM4 8xSTM1 (when all ports are configured as channelized STM4) 4xSTM1 (when all ports are configured as channelized STM1)

Table 8: Channel Scaling Numbers of MIC-3D-4CHOC3-2CHOC12 (*continued*)

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
<ul style="list-style-type: none"> 24xDS3 (when all ports are configured as channelized OC12) 12xDS3 (when all ports are configured as channelized OC3) 	<ul style="list-style-type: none"> 24xE3 (when all ports are configured as channelized STM4) 12xE3 (when all ports are configured as channelized STM1)
<ul style="list-style-type: none"> 336xDS1 168xDS1 per channelized OC12 when the port is configured as channelized OC12 84xDS1 per channelized OC3 when the port is configured as channelized OC3 	<ul style="list-style-type: none"> 252xE1 126xE1 per channelized STM4 when the port is configured as channelized STM4 62xE1 per channelized STM1 when the port is configured as channelized STM1
<ul style="list-style-type: none"> 2022xDS0 1011xDS0 per channelized OC12 when the port is configured as channelized OC12 1011xDS0 per two channelized OC3 when the port is configured as channelized OC3 	<ul style="list-style-type: none"> 2022xDS0 1011xDS0 per channelized STM4 when the port is configured as channelized STM4 1011xDS0 per two channelized STM1 when the port is configured as channelized STM1



NOTE: When a port is configured as channelized OC12, only six of the twelve OC1 slices can be deep-channelized from T1 through DS0. The remaining six OC1 slices can be channelized only to T3 or can be combined to form two OC3 slices. They cannot be channelized to T1 or DS0.

Related Documentation

- [Channel Scaling Numbers of DS3/E3 MIC on page 13](#)

Channel Scaling Numbers of DS3/E3 MIC

You can configure the DS3/E3 MIC (model number: MIC-3D-8DS3-E3) to function either in clear-channel mode or in channelized mode. When functioning in channelized mode, the DS3/E3 MIC supports PDH interfaces on the MX80 3D Universal Edge Router and MX Series routers that use MX-MPC1-3D-Q, MX-MPC2-3D-Q, or MX-MPC2-3D-EQ. When functioning in clear-channel mode, this MIC also supports PDH interfaces on the MX-MPC1-3D and MX-MPC2-3D MPCs.

Channel scaling numbers of the DS3/E3 MIC are listed in [Table 9 on page 13](#).

Table 9: Channel Scaling Numbers of MIC-3D-8DS3-E3

DS3	E3
8xDS3	8xE3
224xDS1	
2038xDS0	

- Related Documentation**
- [Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207](#)
 - [channelization on page 353](#)

Channelized IQ and IQE Interfaces Properties

On channelized IQ and IQE interfaces, you can specify options that are globally applied to all interface types associated with channelized IQ and IQE interfaces. For example, **e1-options** statements that you include at the **[edit interfaces ce1-fpc/pic/port]** hierarchy level apply globally to all E1 and NxDS0 interfaces that you create by partitioning **ce1-fpc/pic/port**. Likewise, **t3-options** statements that you include at the **[edit interfaces ct3-fpc/pic/port]** hierarchy level apply globally to all T1 and NxDS0 interfaces that you create by partitioning **ct3-fpc/pic/port**.

You can also apply interface options at the channel level. For example, you can include **t1-options** statements at the **[edit interfaces t1-fpc/pic/port <:channel>]** hierarchy level, and **ds0-options** statements at the **[edit interfaces ds-0/1/1<:channel>]** hierarchy level.

Only a subset of the interface options is valid on each type of channelized IQ interface. You configure all HDLC information at the end-data channel level, not at the parent level. For example, configure HDLC information at the **[edit interfaces ds-fpc/pic/port<:channel>]** hierarchy level, not at the **[edit interfaces ct1-fpc/pic/port<:channel>]** hierarchy level.

Automatic Protection Switching (APS) is supported on channelized OC3, OC12, STM1, and STM4 IQ interfaces. To configure APS, include the **aps** statement with options at the **[edit interfaces interface-name sonet-options]** hierarchy level. For information about configuring APS, see *Configuring Basic Automatic Protect Switching*.

In interchassis and intrachassis redundant LSQ configurations that use MLPPP and SONET APS, you can inhibit a router from sending PPP termination-request messages to the remote host if the link PIC fails. To inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails, include the **no-termination-request** statement at the **[edit interfaces interface-name ppp-options]** hierarchy level.

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. The supported PIC types are as follows:

- Channelized OC48/STM16 IQE PICs
- Channelized OC12/STM4 IQ and IQE PICs
- Channelized OC3 IQ and IQE PICs
- Channelized STM1 IQ and IQE PICs

Channelized IQ and IQE interfaces do not support receive buckets or transmit buckets.

For channelized IQ and IQE interfaces, there are some limitations on where you place certain statements in the configuration. When you configure clocking, bit error rate testing

(BERT), C-bit parity, and loopback statements on T3, T1, or DS0 channels, you must follow these guidelines:

- For T3 IQ interfaces, you can include the **loopback payload** statement at the **[edit interfaces ct3-fpc/pic/port]** and **[edit interfaces t3-fpc/pic/port:channel]** hierarchy levels. For T1 interfaces, you can include the **loopback payload** statement at the **[edit interfaces t1-fpc/pic/port:channel]** hierarchy level; it is ignored if included at the **[edit interfaces ct1-fpc/pic/port]** hierarchy level. For NxDS0 interfaces, payload and remote loopback are the same. If you configure one, the other is ignored. NxDS0 IQ interfaces do not support local loopback.
- If you include clocking, BERT, and C-bit parity configurations at both the **[edit interfaces ct3-fpc/pic/port<:channel> t3-options]** and **[edit interfaces t3-fpc/pic/port<:channel> t3-options]** hierarchy levels, the channelized T3-level statements are valid, and the T3-level statements are ignored.
- If you include clocking, BERT, and C-bit parity configurations at both the **[edit interfaces ct3-fpc/pic/port<:channel> t3-options]** and **[edit interfaces t1-fpc/pic/port<:channel> t1-options]** hierarchy levels, the channelized T3-level statements are operational for the T3 connections and the T1-level statements are operational for the T1 connections.
- Because DS0 channels do not have clocking capability, you must configure clocking at the **[edit interfaces ct1-fpc/pic/port<:channel> t1-options]** or **[edit interfaces ce1-fpc/pic/port<:channel> e1-options]** hierarchy level for channelized NxDS0 IQ interfaces.
- You can set BERT at the **[edit interfaces t3-fpc/pic/port<:channel> t3-options]** hierarchy level or on any partitioned channel of the channelized T3 interface. There are 12 BERT patterns available for NxDS0 channels and 28 BERT patterns for T1, channelized T1, T3, and channelized T3 interfaces within channelized IQ interfaces.
- For channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, cstm1). It is ignored for path-level interfaces **so-fpc/pic/port** or **so-fpc/pic/port:channel**.
- For channelized interfaces that use Frame Relay encapsulation, the number of configurable DLCIs varies by channelized interface type.
- For channelized interfaces, you can configure class of service (CoS) on channels, but not at the controller level.
- For original Channelized OC12 PICs, limited CoS functionality is supported. For more information, contact Juniper Networks customer support.
- CoS is not configurable on controller interfaces.



NOTE: On Channelized SONET/SDH PICs, if you set the parent (or the master) controller clock to external, then you must set the child controller clocks to the default value—that is, internal.

For example, on the Channelized STM1 PIC, if the clock on the Channelized STM1 interface (which is the master controller) is set to external, then you must not configure the CE1 interface (which is the child controller) clock to external. Instead you must configure the CE1 interface clock to internal.

Related Documentation

- [SONET/SDH Interfaces Overview](#)

Structure of Channelized IQ and Channelized IQE PICs

Figure 1 on page 16 through Figure 13 on page 21 show the structural organization of the channelized PICs, channelized IQ PICs, and channelized IQE PICs. Table 10 on page 22 through Table 12 on page 24 show the structure of channelized IQE PICs, channelized IQ PICs, and channelized PICs.

Figure 1: Channelized OC48/STM16 IQE PIC (in SONET Mode)

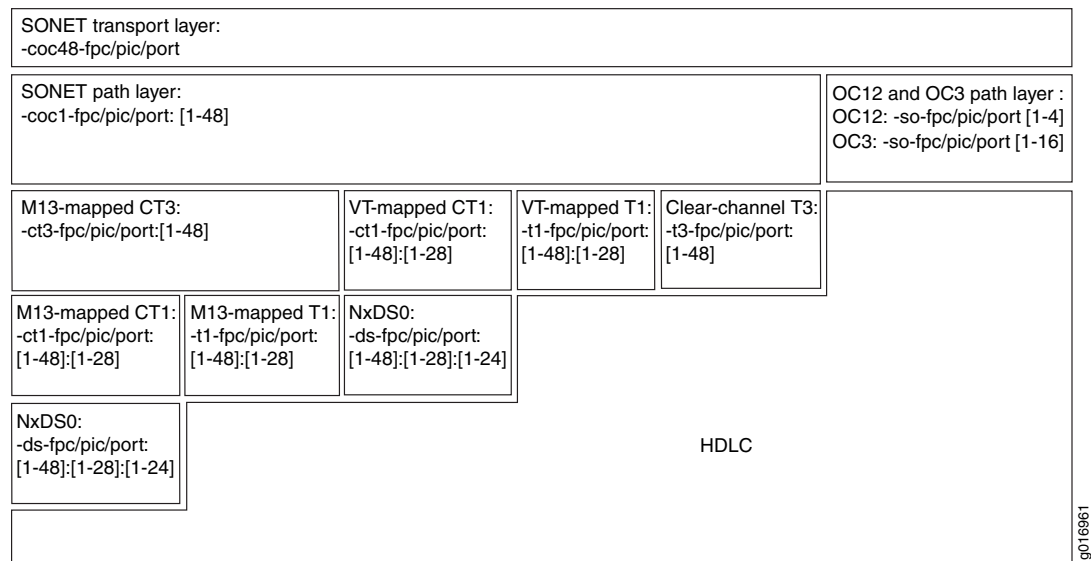


Figure 2: Channelized OC48/STM16 IQE PIC (in SDH Mode)

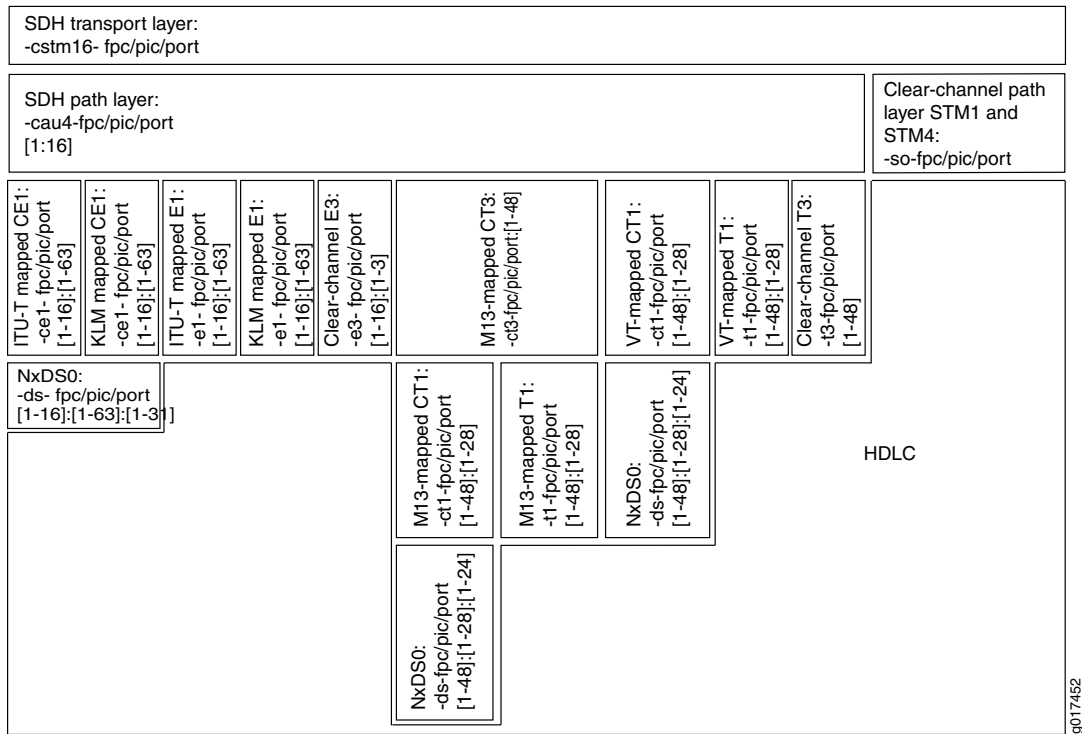


Figure 3: Channelized OC12 IQ PIC and Channelized OC12/STM4 IQE PIC (in SONET Mode)

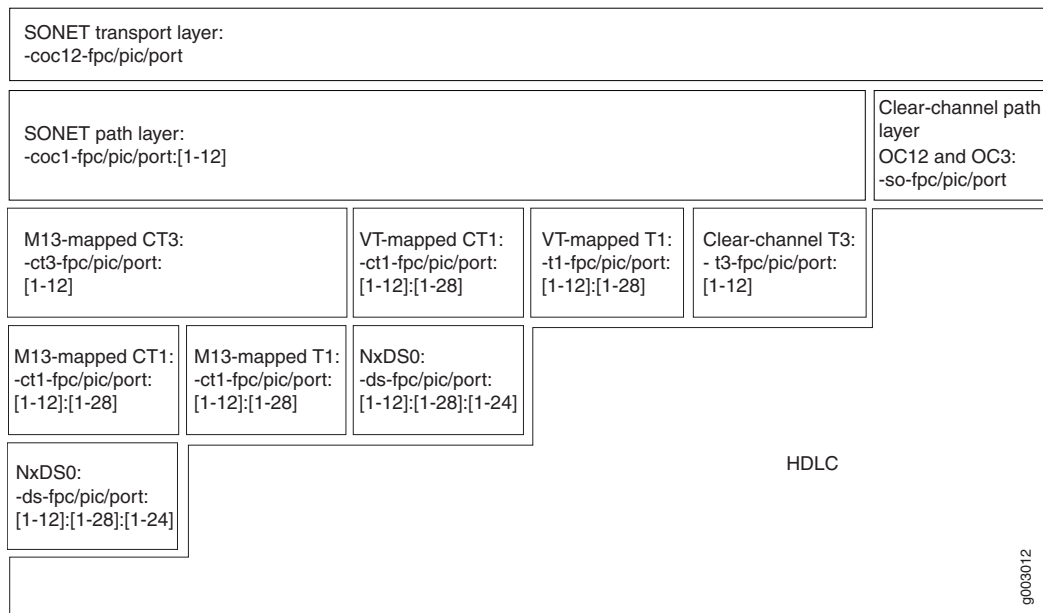


Figure 4: Channelized OC12/STM4 IQE PIC (in SDH Mode)

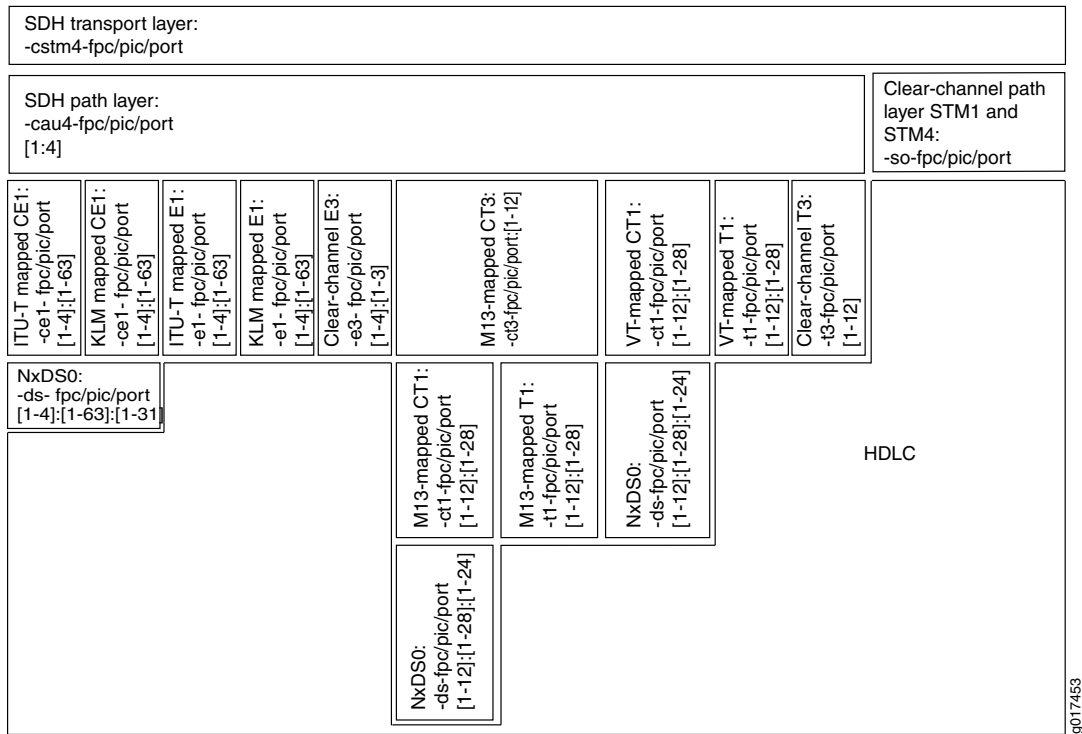


Figure 5: Channelized OC12/STM4 IQ PIC (in SDH Mode)

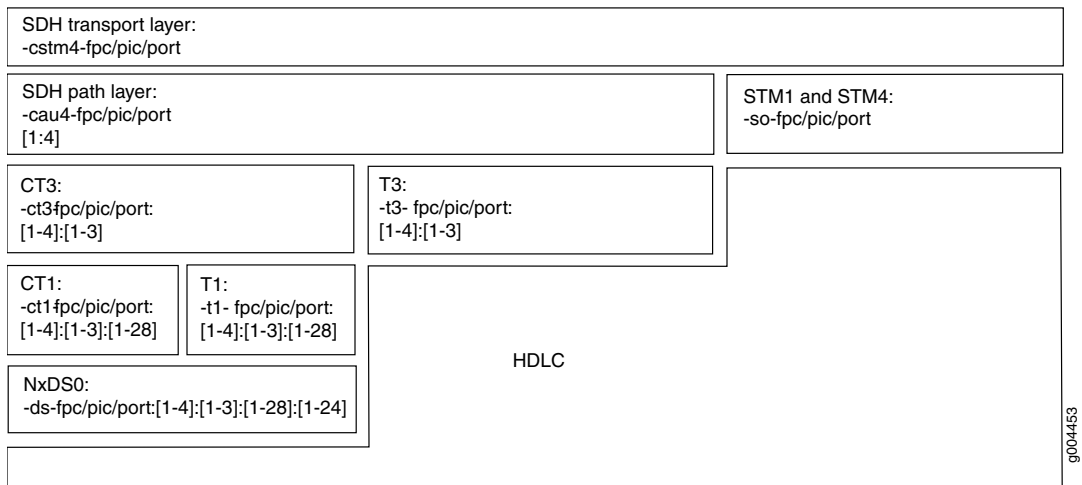


Figure 6: Channelized OC3 Ports (in SONET Mode) on Channelized OC3 IQ and Channelized OC3/STM1 IQE PICs

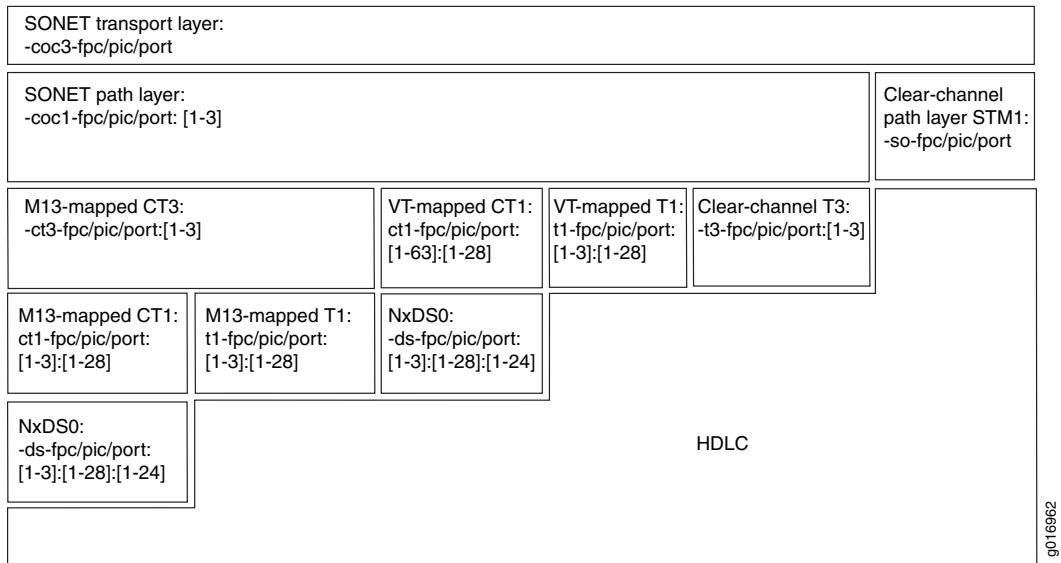


Figure 7: Channelized CSTM1 Ports (in SDH Mode) on Channelized OC3/STM1 IQE PIC

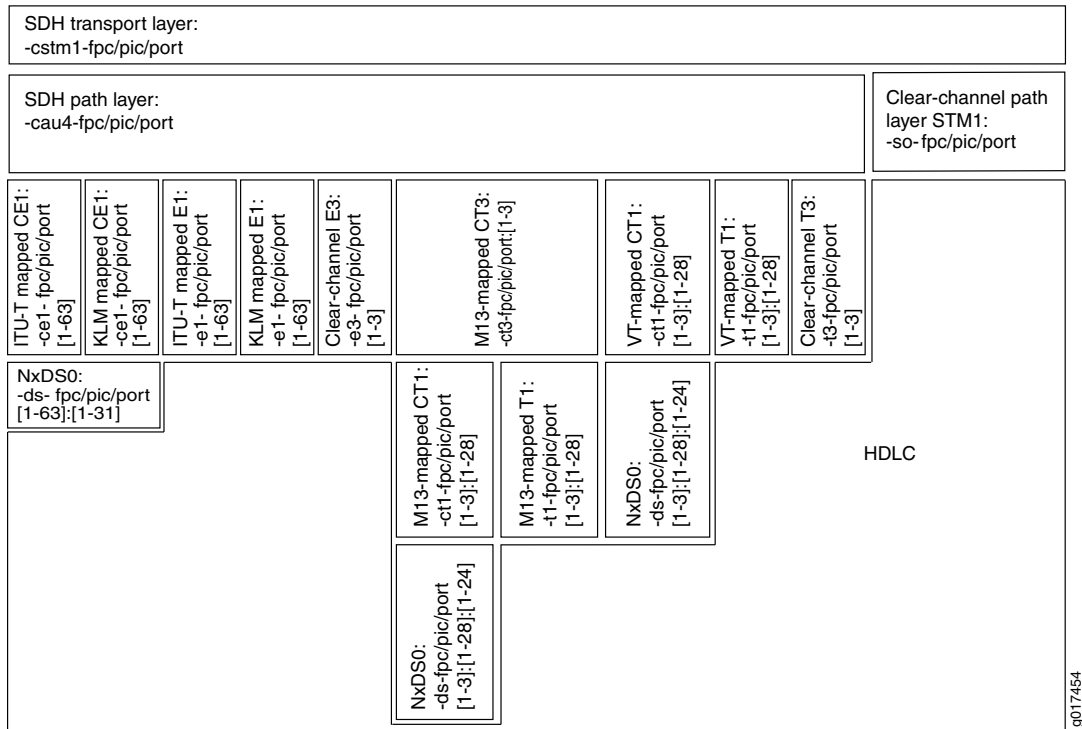


Figure 8: Channelized STM1 IQ PIC

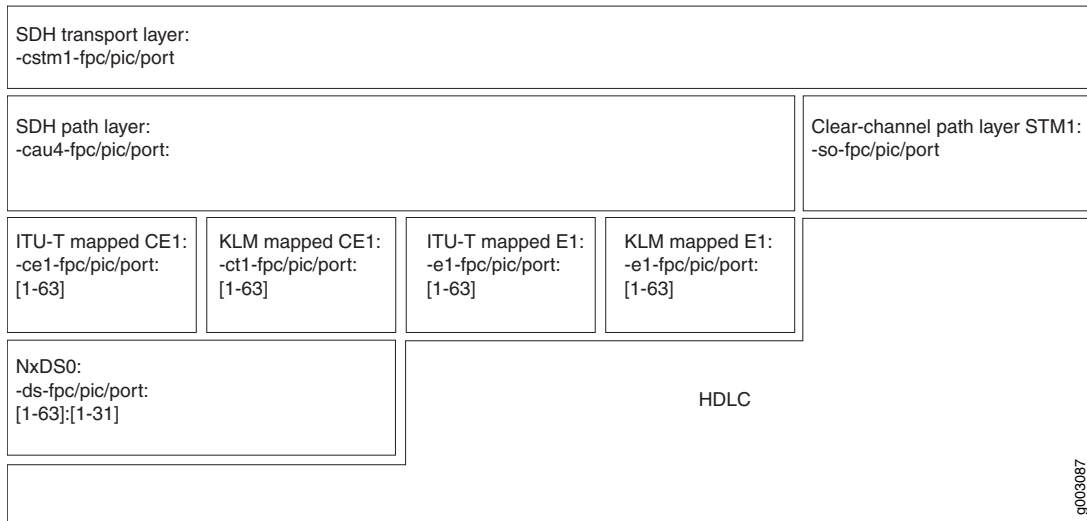


Figure 9: Channelized CDS3/E3 IQE PIC (in DS3 Mode)

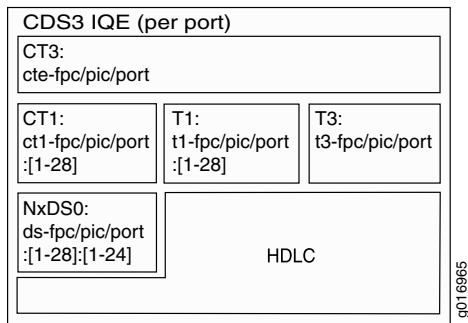


Figure 10: Channelized CDS3/E3 IQE PIC (in E3 Mode)

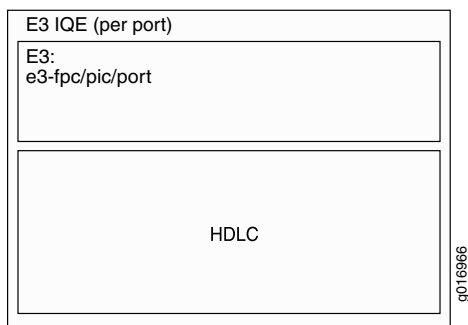


Figure 11: Channelized DS3 IQ PIC

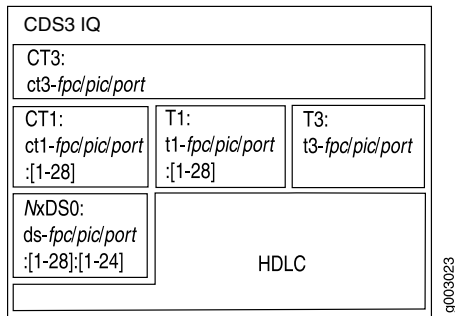


Figure 12: Channelized T1 IQ and IQE PIC

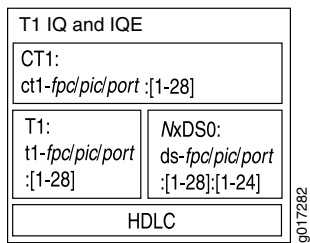


Figure 13: Channelized E1 IQ and IQE PIC

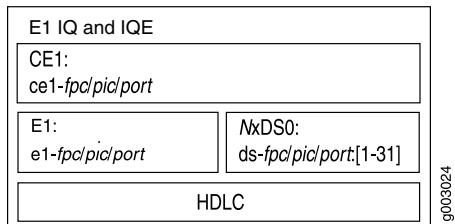


Table 10: Structural Differences: Channelized IQE PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized IQE PICs					
Channelized OC48/STM16 IQE (SONET Mode)	<i>coc48-fpc/pic/port</i>	<i>coc1-fpc/pic/port</i> :[1-48]	<i>ct3-fpc/pic/port</i> :[1-48]	<i>ct1-fpc/pic/port</i> :[1-48]:[1-28]	Not applicable.
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1-48]	<i>t1-fpc/pic/port</i> :[1-48]:[1-28]	
Channelized OC48/STM16 IQE (SDH Mode)	<i>cstm16-fpc/pic/port</i>	<i>cau4-fpc/pic/port</i> :[1-16]	<i>ct3-fpc/pic/port</i> :[1:16]:[1:3]	<i>ce1-fpc/pic/port</i> :[1-16]:[1-63]	<i>e3-fpc/pic/port</i> :[1-16]:[1-3]
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1:16]:[1:3]	<i>e1-fpc/pic/port</i> :[1-16]:[1-63]	
			<i>ct1-fpc/pic/port</i> :[1:16]:[1-84]	<i>ct1-fpc/pic/port</i> :[1:16]:[1-3]:[1-28]	
			<i>t1-fpc/pic/port</i> :[1:16]:[1-84]	<i>t1-fpc/pic/port</i> :[1:16]:[1-3]:[1-28]	
Channelized OC12 IQE (SONET Mode)	<i>coc12-fpc/pic/port</i>	<i>coc1-fpc/pic/port</i> :[1-12]	<i>ct3-fpc/pic/port</i> :[1-12]	<i>ct1-fpc/pic/port</i> :[1-12]:[1-28]	Not applicable.
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1-12]	<i>t1-fpc/pic/port</i> :[1-12]:[1-28]	
Channelized STM4 IQE (SDH Mode)	<i>cstm4-fpc/pic/port</i>	<i>cau4-fpc/pic/port</i> : [1-4]	<i>ct3-fpc/pic/port</i> :[1-4]:[1-3]	<i>ce1-fpc/pic/port</i> :[1-4]:[1-63]	<i>e3-fpc/pic/port</i> :[1-4]:[1-3]
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1-4]:[1-3]	<i>e1-fpc/pic/port</i> :[1-4]:[1-63]	
			<i>ct1-fpc/pic/port</i> :[1-4]:[1-84]	<i>ct1-fpc/pic/port</i> :[1-4]:[1-3]:[1-28]	
			<i>t1-fpc/pic/port</i> :[1-4]:[1-84]	<i>t1-fpc/pic/port</i> :[1-4]:[1-3]:[1-28]	
Channelized OC3 IQE (SONET)	<i>coc3-fpc/pic/port</i>	<i>coc1-fpc/pic/port</i> :[1-3]	<i>ct3-fpc/pic/port</i> :[1-3]	<i>ct1-fpc/pic/port</i> :[1-3]:[1-28]	Not applicable.
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1-3]	<i>t1-fpc/pic/port</i> :[1-3]:[1-28]	
Channelized STM1 IQE	<i>cstm1-fpc/pic/port</i>	<i>cau4-fpc/pic/port</i>	<i>ct3-fpc/pic/port</i> :[1-3]	<i>ce1-fpc/pic/port</i> :[1-63]	<i>e3-fpc/pic/port</i> :[1:3]]
		<i>so-fpc/pic/port</i>	<i>t3-fpc/pic/port</i> :[1-3]	<i>e1-fpc/pic/port</i> :[1-63]	
			<i>ct1-fpc/pic/port</i> :[1-84]	<i>ct1-fpc/pic/port</i> :[1-3]:[1-28]	
			<i>t1-fpc/pic/port</i> :[1-84]	<i>t1-fpc/pic/port</i> :[1-3]:[1-28]	

Table 10: Structural Differences: Channelized IQE PICs (*continued*)

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized DS3 IQE	Not applicable.	Not applicable.	<i>ct3-fpc/pic/port</i> <i>t3-fpc/pic/port</i>	<i>ct1-fpc/pic/port</i> :[1-28] <i>t1-fpc/pic/port</i> :[1-28]	Not applicable.
Channelized E3 IQE	Not applicable.	Not applicable.	Not applicable.	Not applicable.	<i>e3-fpc/pic/port</i> :[1:4]
Channelized T1 IQE	Not applicable.	Not applicable.	Not applicable.	<i>ct1-fpc/pic/port</i> <i>t1-fpc/pic/port</i>	Not applicable.
Channelized E1 IQE	Not applicable.	Not applicable.	Not applicable.	<i>ce1-fpc/pic/port</i> <i>e1-fpc/pic/port</i>	Not applicable.

Table 11: Structural Differences: Channelized IQ PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized IQ PICs					
Channelized OC12/STM4 IQ (SONET Mode)	<i>coc12-fpc/pic/port</i>	<i>coc1-fpc/pic/port</i> :[1-12] <i>so-fpc/pic/port</i>	<i>ct3-fpc/pic/port</i> :[1-4]:[1-3] <i>t3-fpc/pic/port</i> :[1-4]:[1-3]	<i>ct1-fpc/pic/port</i> :[1-3]:[1-28] <i>t1-fpc/pic/port</i> :[1-4]:[1-3]:[1-28]	Not applicable.
Channelized OC12/STM4 IQ (SDH Mode)	<i>cstm4-fpc/pic/port</i>	<i>cau4-fpc/pic/port</i> : [1-4] <i>so-fpc/pic/port</i>	<i>ct3-fpc/pic/port</i> :[1-4]:[1-3] <i>t3-fpc/pic/port</i> :[1-4]:[1-3]	<i>ct1-fpc/pic/port</i> :[1-3]:[1-28] <i>t1-fpc/pic/port</i> :[1-4]:[1-3]:[1-28]	Not applicable.
Channelized OC3 IQ (SONET)	<i>coc3-fpc/pic/port</i>	<i>coc1-fpc/pic/port</i> :[1-3] <i>so-fpc/pic/port</i>	<i>ct3-fpc/pic/port</i> :[1-3] <i>t3-fpc/pic/port</i> :[1-3]	<i>ct1-fpc/pic/port</i> :[1-3]:[1-28] <i>t1-fpc/pic/port</i> :[1-3]:[1-28]	Not applicable.
Channelized STM1 IQ (SDH)	Not applicable.	<i>cau4-fpc/pic/port</i> <i>so-fpc/pic/port</i>	Not applicable.	<i>ce1-fpc/pic/port</i> :[1-63] <i>e1-fpc/pic/port</i> :[1-63]	Not applicable.
Channelized DS3 IQ	Not applicable.	Not applicable.	<i>ct3-fpc/pic/port</i> <i>t3-fpc/pic/port</i>	<i>ct1-fpc/pic/port</i> :[1-28] <i>t1-fpc/pic/port</i> :[1-28]	Not applicable.

Table 11: Structural Differences: Channelized IQ PICs (*continued*)

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized E1 IQ	Not applicable.	Not applicable.	Not applicable.	<i>ce1-fpc/pic/port</i> <i>e1-fpc/pic/port</i>	Not applicable.

Table 12: Structural Differences: Channelized PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized PICs					
Channelized OC12	<i>t3-fpc/pic/port</i> :0	<i>t3-fpc/pic/port</i> :[0-11]	<i>t3-fpc/pic/port</i> :[0-11]	Not applicable.	Not applicable.
Channelized STM1	<i>e1-fpc/pic/port</i> :0	<i>e1-fpc/pic/port</i> :0	Not applicable.	<i>e1-fpc/pic/port</i> :[0-63]	Not applicable.
Channelized T3 and Multichannel T3	Not applicable.	Not applicable.	<i>t1-fpc/pic/port</i> :0	<i>t1-fpc/pic/port</i> :[0-27]	Not applicable.
Channelized E1	Not applicable.	Not applicable.	Not applicable.	<i>e1-fpc/pic/port</i> <i>ds-fpc/pic/port</i> :0	Not applicable.

Related Documentation • [Overview of Channelized IQ Interfaces on page 36](#)

PART 2

Configuring Channelized Interfaces

- [Configuring Channelized E1 Interfaces on page 27](#)
- [Configuring Channelized IQ Interfaces on page 35](#)
- [Configuring Channelized E1 PRI and T1 PRI Interfaces on page 113](#)
- [Configuring Channelized OC3 IQ and IQE Interfaces on page 121](#)
- [Configuring Channelized OC12/STM4 Interfaces on page 129](#)
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- [Configuring Channelized T1 Interfaces on page 201](#)
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CHAPTER 2

Configuring Channelized E1 Interfaces

- [Channelized E1 IQ and IQE Interfaces Overview on page 27](#)
- [Configuring Channelized E1 Interfaces on page 27](#)
- [Example: Configuring Channelized E1 Interfaces on page 30](#)
- [Configuring Channelized E1 IQ and IQE Interfaces on page 31](#)
- [Example: Configuring Channelized E1 IQ or IQE Interfaces on page 32](#)

Channelized E1 IQ and IQE Interfaces Overview

Each Channelized E1 PIC, Channelized E1 Intelligent Queuing (IQ) PIC and Channelized E1 Enhanced Intelligent Queuing (IQE) PIC has 10 E1 ports that you can channelize to the **NxDS0** level. Each E1 interface has 32 time slots (DS0), in which time slot 0 is reserved. You can combine one or more of these DS0 time slots (channels) to create a channel group **NxDS0**.

- Related Documentation**
- [Example: Channelized E1 IQ Interface Configuration on page 105](#)
 - [Channelized Interface Capabilities on page 4](#)

Configuring Channelized E1 Interfaces

By default, all the time slots on a channelized E1 interface are used. There can be a maximum of 24 channel groups per channelized E1 interface. Thus, you can configure a maximum of 240 channel groups per PIC.

To specify the DS0 channel group number in the interface name, include a colon (:) as a separator. For example, a Channelized E1 PIC might have the following physical and virtual interfaces:

`ds-0/0/0:x`

where **x** is a DS0 channel group from 0 through 23 (for more information about ranges, see [Table 13 on page 28](#)).

You can use any of the values within the range available for **x**; you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

- To configure the **e1-options** statement, you must set channel group **x** to **0**:
`ds-0/0/0:0`
- There are no restrictions on configuring the **ds0-options** statement.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

To configure the channel groups and time slots for a channelized E1 interface, include the following statements at the **[edit chassis]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    cel {
      e1 link-number {
        channel-group group-number;
        timeslots time-slot-range;
      }
    }
  }
}
```



NOTE: If you commit the interface name but do not include the **[edit chassis]** configuration, the Channelized E1 PIC behaves like a standard E1 PIC, and none of the DS0 functionality is accessible.

There are 32 time slots on an E1 interface; however, time slot 0 is reserved. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

Table 13 on page 28 shows the ranges you can specify.

Table 13: Ranges for Channelized E1 Configuration

Item	Option	Range
FPC slot	<i>slot-number</i>	0 through 7 (see note below)
PIC slot	<i>pic-number</i>	0 through 3
E1 link	<i>link-number</i>	0 through 9
DS0 channel group	<i>group-number</i>	0 through 23
Time slot	<i>time-slot-range</i>	0 through 31 (with time slot 0 reserved) (see note below)

The theoretical maximum number of channel groups possible per PIC is $10 * 24 = 240$. This is within the maximum bandwidth available.



NOTE: NxDS0 time slots configured on either a channelized STM1 IQ or IQE interface or channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots range from 2 to 32 (1 is reserved).

The FPC slot range depends on the router. For a routing matrix, the range is from 0 through 31. For M40, M40e, M160, M320, M120, and other T Series routers, the range is from 0 through 7. For M20 routers, the range is from 0 through 3. For M10 and M10i routers, the range is from 0 through 1. For M5 and M7i routers, the only applicable value is 0.

Configuring Channelized E1 Interface Properties

To configure channelized E1 interface properties, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
e1-options {
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (filler | shared);
}
```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  loopback payload;
  start-end-flag (filler | shared);
}
```

For DS0 channels on a channelized E1 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 E1 interface. The individual DS0 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” on page 8](#).

Only a subset of the E1 options is valid for the channelized configuration; you specify the time slots using the **[edit chassis]** configuration described in *Examples: Interface Naming*. For more information about the E1 and DS0 options, see *E1 Interfaces Overview* and *T1 Interfaces Overview*.

Each E1 interface has 32 time slots (DSOs), in which time slot 0 is reserved. You can combine one or more of these DSO time slots (channels) to create a channel group (NxDSO). There can be a maximum of 24 channel groups per E1 interface.

Related •
Documentation

Example: Configuring Channelized E1 Interfaces

The following configuration is sufficient to get the channelized E1 interface up and running:

Configuring an E1 Interface, E1 Options, and DSO Options

```
[edit chassis]
fpc 0 {
  pic 1 {
    ce1 {
      e1 0 {
        channel-group 0 timeslots 1;
        channel-group 1 timeslots 2;
        channel-group 5 timeslots 5-7;
      }
      e1 4 {
        channel-group 10 timeslots 11,17,28-31;
      }
    }
  }
}
[edit interfaces ds-0/1/0:0]
e1-options {
  fcs 32;
  framing g704-non-grc;
  loopback remote;
}
[edit interfaces ds-0/1/4:10]
ds0-options {
  byte-encoding nx56;
  start-end-flag filler;
}
```

The above configuration results in the following interfaces:

ds-0/1/0:1, with time slot 1 allocated
 ds-0/1/0:5, with time slots 5 through 7 allocated
 ds-0/1/4:10, with time slots 11, 17, and 28 through 31 allocated

The remaining ports (other than 0 and 4) remain as regular E1 interfaces (and follow the e1-0/1/x naming convention).

```
[edit chassis]
fpc 0 {
  pic 1 {
    ce1 {
      e1 0 {
        channel-group 1 timeslots 1;
        channel-group 5 timeslots 5-7;
      }
      e1 4 {
```

```

        channel-group 10 timeslots 11,17, 28-31;
    }
}
}

```

Use Time Slots 1 Through 10 [edit chassis fpc *slot-number* pic *pic-number* ce1 e1 *link-number*]
channel-group *group-number*;
timeslots 1-10;

Use Time Slots 1 Through 5, 10, and 24 [edit chassis fpc *slot-number* pic *pic-number* ce1 e1 *link-number*]
channel-group *group-number*;
timeslots 1-5,10,24;

Related Documentation • [Configuring Channelized E1 Interfaces on page 27](#)

Configuring Channelized E1 IQ and IQE Interfaces

- [Configuring E1 IQ and IQE Interfaces on page 31](#)
- [Configuring Fractional E1 IQ and IQE Interfaces on page 31](#)
- [Configuring NxDS0 IQ and IQE Interfaces on page 32](#)

Configuring E1 IQ and IQE Interfaces

To configure an E1 interface, include the **no-partition** and **interface-type** statements at the [edit interfaces ce1-fpc/pic/port] hierarchy level:

```

[edit interfaces ce1-fpc/pic/port]
no-partition interface-type e1;

```

This configuration creates interface **e1-fpc/pic/port**.

Configuring Fractional E1 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure a fractional E1 interface on a Channelized E1 IQ PIC, perform the following tasks:

1. Include the **no-partition** statement at the [edit interfaces ce1-fpc/pic/port] hierarchy level:

```

[edit interfaces ce1-fpc/pic/port]
no-partition interface-type e1;

```

This configuration creates interface **e1-fpc/pic/port**.

2. Configure the number of time slots allocated to the E1 IQ or IQE interface by including the **timeslots** statement at the [edit interfaces e1-fpc/pic/port e1-options] hierarchy level:

```

[edit interfaces e1-fpc/pic/port e1-options]
timeslots time-slot-range;

```

NxDS0 time slots configured on either a channelized STM1 IQ or IQE interface or a channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots are numbered from 2 to 32 (1 is reserved).

To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring Fractional E1 IQ and IQE Interfaces

Configure a fractional E1 interface that uses time slots 2 through 10:

```
[edit interfaces ce1-0/0/0]
no-partition interface-type e1;
[edit interfaces e1-0/0/0 e1-options]
timeslots 2-10;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring NxDS0 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure an NxDS0 IQ interface on a Channelized E1 IQ or IQE PIC, you must configure the number of time slots allocated to the NxDS0 IQ or IQE interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-fpc/pic/port]** hierarchy level, specifying the **ds** interface type:

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

For channelized E1 IQ and IQE interfaces, the partition number range is from 1 through 31.

For E1 IQ and IQE interfaces (**e1-fpc/pic/port**), the time-slot range is from 2 through 31.

For channelized E1 IQ and IQE interfaces (**ce1-fpc/pic/port**), the time-slot range is from 1 through 31. 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 about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring an NxDS0 IQ or IQE Interface

Configure an NxDS0 interface that uses time slots 2 through 10. This configuration creates the **ds-0/0/0:1:1** interface.

```
[edit interfaces ce1-0/0/0:1]
partition 1 timeslots 2-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Example: Configuring Channelized E1 IQ or IQE Interfaces

Configure a channelized E1 interface as an unpartitioned, clear channel:

Configuring an E1 Interface

```
[edit interfaces]
ce1-2/0/0 {
  no-partition interface-type e1; # e1-2/0/0
}
```

The following configuration is sufficient to get the channelized E1 IQ or IQE interface up and running:

Configuring Multiple Interface Types

```
[edit]
interfaces {
  ce1-1/2/3 {
    partition 1 timeslots 10 interface-type ds; # ds-1/2/3:1
    partition 2 timeslots 1-9 interface-type ds; # ds-1/2/3:2
  }
  ds-1/2/3:1 {
    unit 0 {
      family inet {
        address 10.25.1.2/24;
      }
    }
  }
  ds-1/2/3:2 {
    unit 0 {
      family inet {
        address 10.25.2.2/24;
      }
    }
  }
}
[edit]
interfaces {
  ce1-1/2/6 {
    no-partition interface-type e1; # e1-1/2/6
  }
  e1-1/2/6 {
    e1-options {
      timeslots 1-2;
    }
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
```

Related Documentation

- [Configuring Channelized E1 IQ and IQE Interfaces on page 31](#)

CHAPTER 3

Configuring Channelized IQ Interfaces

- Overview of Channelized IQ Interfaces on page 36
- Guidelines for Configuring Channelized IQ Interfaces on page 37
- Frame Relay DLCI Limitations for Channelized IQ Interfaces on page 40
- System Requirements for Channelized IQ Interfaces on page 42
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- Configuring a Clear Channel on a Channelized IQ Interface on page 43
- Configuring Single-Level Channels on a Channelized IQ Interface on page 44
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- Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface on page 46
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- Example: Channelized T1 IQ Interface Configuration on page 94
- Example: Channelized STM1 IQ Interface Configuration on page 98
- Example: Channelized E1 IQ Interface Configuration on page 105
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 109

Overview of Channelized IQ Interfaces

Channelized interfaces allow service providers to customize bandwidth to satisfy the needs of their customers. Whether the subscriber needs DS0, T1, fractional T1, E1, fractional E1, E3, T3, STM1, OC3, or OC12 service, a channelized interface can provide the necessary bandwidth today and can be reconfigured to support the customer's expanding network tomorrow. Standard channelized interfaces have been available on Juniper Networks routing platforms since JUNOS Release 3.4.

The original channelized interfaces for Juniper Networks M-series routers are available in the following models:

- 1-port Channelized OC12 PIC
- 10-port Channelized E1 PIC
- 1-port Channelized STM1 PIC
- 4-port Channelized DS3 PIC
- 1-port and 2-port multichannel Channelized DS3 PIC

These channelized interfaces provide a single level of channelization and require at both the **[edit chassis]** and the **[edit interfaces]** hierarchy levels. Most configuration options must be set on channel 0 and apply to all channels on these channelized interfaces.

The new channelized interfaces with intelligent queuing offer several advantages over the original channelized interfaces:

- Complete configuration tasks for channelized IQ interfaces are now centralized at the **[edit interfaces]** hierarchy level.
- Multiple levels of channelization are now possible with channelized IQ interfaces. For example, a channelized OC12 IQ interface can be divided into channelized OC1 interfaces, then subdivided into channelized T1 interfaces, and further split into NxDS0 channels.
- You can now configure interface statements, such as **clocking**, on individual channels rather than configuring them on channel 0 for all channels at the same hierarchy level.
- Class-of-service (CoS) processing now occurs on the PIC for channelized IQ interfaces rather than in the FPC.

The following M-series and T-series PICs support channelized interfaces with intelligent queuing:

- 1-port Channelized OC12 IQ PIC
- 1-port Channelized OC3 PIC
- 4-port Channelized DS3 IQ PIC
- 10-port Channelized T1 IQ PIC
- 10-port Channelized E1 IQ PIC
- 1-port Channelized STM1 IQ PIC

To determine which PIC is installed, issue the **show chassis hardware** command:

```
user@RouterA> show chassis hardware
Hardware inventory:
Item              Version  Part number  Serial number  Description
Chassis                               20070         M160
Midplane          REV 03   710-001245   AB4123
FPM CMB           REV 02   710-001642   AB3266
FPM Display       REV 02   710-001647   AB3038
CIP               REV 04   710-001593   AB3276
PEM 0             Rev 03   740-001243   KM28410        DC
PEM 1             Rev 03   740-001243   LF21558        Power Entry Module
PCG 0             REV 03   710-001568   AB3006
PCG 1             REV 02   710-001568   AB2992
Routing Engine 0  20000005dfae3a01  RE-2.0
MCS 0            REV 04   710-001226   AB3208
MCS 1            REV 04   710-001226   AB3212
SFM 0 SPP        REV 06   710-001228   AB3103
SFM 0 SPR        REV 01   710-002189   AB2936        Internet Processor II
SFM 1 SPP        REV 07   710-001228   AG2634
SFM 1 SPR        REV 03   710-002189   AE3503        Internet Processor II
SFM 2 SPP        REV 06   710-001228   AB2976
SFM 2 SPR        REV 01   710-002189   AB2938        Internet Processor II
SFM 3 SPP        REV 06   710-001228   AB5826
SFM 3 SPR        REV 01   710-002189   AB2917        Internet Processor II
FPC 0            REV 03   710-003947   HE0614        E-FPC Type 1
CPU              REV 01   710-004600   AT3217
PIC 0            REV 03   750-005636   BE1826        4x CHDS3 IQ

# This is the Channelized DS3 IQ PIC.

PIC 1            REV 07   750-003846   HG5572        1x 800M Crypto
PIC 2            REV 01   750-004507   BA5341        10x CE1-NxDS0
PIC 3            REV 06   750-003009   AM6929        4x CT3

# This is the original Channelized T3 PIC.

FPC 1            REV 03   710-003309   AD9434        E-FPC Type 2
CPU              REV 05   710-001217   AH2707
PIC 2            REV 05   750-001900   AD5738        1x OC-48 SONET, SMSR
PIC 3            REV 04   750-003737   BC1106        4x G/E, 1000 BASE-SX
```

- Related Documentation**
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
 - [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Guidelines for Configuring Channelized IQ Interfaces

When you configure channelized IQ interfaces, keep in mind these rules of thumb:

- You normally configure media-related statements and options at the physical interface level (also known as the controller level). This level is indicated by the **[edit interfaces cxx-fpc/pic/port]** hierarchy level.
- You should always configure HDLC-related statements (for example, **bytes**, **fcs**, **idle-cycle-flag**, **mtu**, **receive-bucket**, **start-end-flag**, and **transmit-bucket**) and logical

interfaces (for example, `[edit interfaces interface-name unit unit-number]`) on end channels such as DS0 and T1. Never configure these statements at the controller level.

- Pay attention to the channel numbering rules:
 - OC3 data channels configured on channelized OC12 IQ interfaces are numbered from 1 to 4.
 - T3 channels configured on a channelized OC12 IQ or channelized OC3 IQ interface are numbered from 1 to 12.
 - T1 channels on a channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, or channelized T1 IQ interface are numbered from 1 to 28.
 - E1 channels configured on a channelized STM1 IQ interface are numbered from 1 to 63.
 - NxDS0 time slots configured on a channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, or channelized T1 IQ interface are numbered from 1 to 24.
 - NxDS0 time slots configured on either a channelized STM1 IQ interface or channelized E1 IQ interface are numbered from 2 to 32 (1 is reserved).
- You can configure Automatic Protection Switching (APS) on channelized OC12 IQ interfaces and Multiplex Section Protection (MSP) on channelized STM1 IQ interfaces. The JUNOS implementation of APS and MSP allows you to protect against circuit failures between a SONET/SDH add/drop multiplexer (ADM) and one or more routers, and between multiple interfaces in the same router. When a device fails, a backup device immediately takes over.

You configure APS and MSP at the controller level only. To configure, include the **working-circuit** and **protect-circuit** statements at the `[edit interfaces coc12-fpc/pic/port sonet-options aps]` or `[edit interfaces coc3-fpc/pic/port sonet-options aps]` hierarchy level for APS and the `[edit interfaces cstm1-fpc/pic/port sonet-options aps]` hierarchy level for MSP.

When you enable the controller-level interface as the working circuit, all partitions under the working circuit are also enabled. This is the default behavior even when APS or MSP is not configured. When the backup circuit interface is disabled, all partitions under this protected circuit are also disabled. If the working circuit fails, the interfaces are switched: The working circuit and all its partitions are disabled, and the protect circuit and all its partitions are enabled. You can verify this behavior by entering the **show interfaces controller** command. The disabled interfaces are shown as “admin down” and the enabled interfaces are shown as “admin up.”

- You can delete several channelized interfaces simultaneously by using a single command and regular expressions. To delete sequential channelized interfaces, issue the **wildcard** command with the **delete** option at the `[edit]` hierarchy level. Specify the hierarchy level and the channelized interfaces to be summarized with a regular expression. For example, to delete channelized interfaces in the range of **ds-0/0/0:0** through **ds-0/0/0:23**, issue the following command:

```
user@router# wildcard delete interfaces ds-0/0/0:.*
```

- In JUNOS Release 6.2 and later, additional Frame Relay encapsulation types on physical interfaces and channels of channelized IQ interfaces are available:
 - Extended Frame Relay circuit cross-connect (CCC)—Allows you to assign any DLCI number from 1 to 1022 on Frame Relay CCC logical interfaces. To configure, include the **extended-frame-relay-ccc** statement at the **[edit interfaces interface-name encapsulation]** hierarchy level.
 - Extended Frame Relay translational cross-connect (TCC)—Allows you to assign any DLCI number from 1 to 1022 on Frame Relay TCC logical interfaces. To configure, include the **extended-frame-relay-tcc** statement at the **[edit interfaces interface-name encapsulation]** hierarchy level.
 - Flexible Frame Relay—Allows you to configure any DLCI number from 1 to 1022 and any combination of Frame Relay encapsulation types on logical interfaces. To configure, include the **flexible-frame-relay** statement at the **[edit interfaces interface-name encapsulation]** hierarchy level.
- When you configure clocking, bit error rate testing (BERT), C-bit parity, and loopback statements on T3, T1, or DS0 channels on channelized IQ interfaces, you must follow these guidelines:
 - If you include the statements at both the **[edit interfaces ct3-fpc /pic /port:channel t3-options]** and **[edit interfaces t3-fpc/pic/port:channel t3-options]** hierarchy levels, channelized T3-level statements are operational and T3-level statements are ignored.
 - If you include the statements at both the **[edit interfaces ct3-fpc/pic/port:channel t3-options]** and **[edit interfaces t1-fpc/pic/port:channel t1-options]** hierarchy levels, the channelized T3-level statements are operational for the T3 connections and the T1-level statements are operational for the T1 connections.
 - Because DS0 channels do not have a valid clocking option, you must configure clocking for all NxDS0s at the **[edit interfaces ct1-fpc /pic/port:channel t1-options]** hierarchy level.
 - You configure BERT at the **[edit interfaces ct3-fpc/pic/port:channel t3-options]** hierarchy level or on any partitioned subchannel of the channelized T3 interface. There are 12 BERT patterns available for DS0 channels and 28 BERT patterns for T1, channelized T1, T3, and channelized T3 channels within channelized IQ interfaces.
 - For Channelized OC3 IQ PICs, if you need a remote loopback on a far-end NxDS0 interface, and you are running a BERT test from the local NxDS0 interface, you must configure a remote loopback on the associated channelized T1 interface (**ct1**) for the far-end routing platform. To do this, include the **loopback remote** statement at the **[edit interfaces ct1-fpc/pic/port t1-options]** hierarchy level.
 - You can configure loopbacks at the **[edit interfaces ct3-fpc/pic/port:channel t3-options]** hierarchy level. Local loopbacks recirculate framing information within the local router. Remote loopbacks resend entire frames back to the remote sender.

A new loopback called a *payload loopback* is similar to a remote loopback, but it resends only the data portion of a frame back to the remote sender.

- You can configure C-bit parity at the **[edit interfaces ct3-fpc/ pic/port:channel t3-options]** hierarchy level or on any partitioned subchannel of the channelized T3 interface.
- In JUNOS Release 7.5 and later, you can increase the delay buffer for E1, T1, and NxDSO channels on all Channelized IQ PICs (except the Channelized OC12 IQ PIC) by including the **q-pic-large-buffer** statement at the **[edit chassis fpc fpc-slot pic pic-slot]** hierarchy level. By doing so, you enable the slower interfaces to handle bursts of traffic from faster upstream neighbors. As a result, any class-of-service (CoS) scheduler that you apply to an interface will inherit the larger delay buffer and the buffer is shared across all four CoS queues. For more information about increasing the delay buffer, see the *JUNOS Class of Service Configuration Guide*.



NOTE: If you configure the **q-pic-large-buffer** statement and APS in a multirouter topology, the Channelized IQ PIC resets and causes an APS switchover.

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Frame Relay DLCI Limitations for Channelized IQ Interfaces

If you use Frame Relay encapsulation on a channelized interface, see Table 7 on page 8 for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.



NOTE: The actual number of DLCIs you can configure for each channel is determined by the capabilities of your system, such as the number and type of PICs installed. If the number of DLCIs in the configuration exceeds the capabilities of your system, the router might not be able to support the maximum DLCI values shown in Table 7 on page 8. To determine the capabilities of your system, contact Juniper Networks customer support.

Table 14: Frame Relay DLCI Limitations for Channelized Interfaces

Channelized PIC Type	Number of DLCIs per Level	Range
Original Channelized PICs		

Table 14: Frame Relay DLCI Limitations for Channelized Interfaces (*continued*)

Channelized PIC Type		
T3 and T1 level channels	64 for regular mode 3 for sparse mode	0–63 for regular mode 1–1022 for sparse mode (0 is reserved for the Local Management Interface or LMI)
DS0 level channels	3 for sparse mode	1–1022 for sparse mode (0 is reserved for LMI)
Channelized IQ PICs	Number of DLCIs per Level	Range
OC12 level channels (Channelized OC12 IQ PIC)	64	1–1022 (0 is reserved for LMI)
OC3 level channels (Channelized OC12 IQ and Channelized OC3 IQ PICs)	64	1–1022 (0 is reserved for LMI)
T3 level channel (Channelized OC12 IQ, Channelized OC3 IQ, and Channelized DS3 IQ PICs)	256	1–1022 (0 is reserved for LMI)
STM1 level channel (Channelized STM1 IQ PIC)	64	1–1022 (0 is reserved for LMI)
E1 level channels (Channelized STM1 IQ and Channelized E1 IQ PICs)	64	1–1022 (0 is reserved for LMI)
T1 level channels (Channelized OC12 IQ, Channelized OC3 IQ, Channelized DS3 IQ, and Channelized T1 IQ PICs)	64	1–1022 (0 is reserved for LMI)
DS0 level channels (Channelized OC12 IQ, Channelized OC3 IQ, Channelized DS3 IQ, Channelized T1 IQ, Channelized STM1 IQ, and Channelized E1 IQ PICs)	16	1–1022 (0 is reserved for LMI)

- Related Documentation**
- [Overview of Channelized IQ Interfaces on page 36](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
 - [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

System Requirements for Channelized IQ Interfaces

To implement channelized IQ interfaces, your system must meet these requirements:

- JUNOS Release 8.0 or later for DLCI-level scheduler support on E1 channels configured on Channelized STM1 IQ PICs
- JUNOS Release 7.6 or later for converting a Channelized OC12 IQ PIC to a channelized STM4 SDH interface
- JUNOS Release 7.5 or later for increased delay buffers on channelized E1 IQ, channelized DS3 IQ, channelized OC3 IQ, channelized STM1 IQ, and channelized T1 IQ interfaces; support for rate limiting on physical interfaces; and support for channelized STM1 IQ interfaces on T-series platforms
- JUNOS Release 7.4 or later for channelized T1 IQ interfaces
- JUNOS Release 7.1 or later for channelized OC3 IQ interfaces
- JUNOS Release 6.3 or later for configuration of 256 DLCIs at the T3 channel level for channelized OC12 IQ interfaces
- JUNOS Release 6.2 or later for configuration of 64 DLCIs at the T1 channel level for channelized OC12 IQ interfaces, 64 DLCIs at the E1 channel level for channelized STM1 IQ interfaces, and 256 DLCIs at the T3 channel level for channelized DS3 IQ interfaces
- JUNOS Release 6.2 or later for configuration of flexible Frame Relay, extended Frame Relay CCC, and extended Frame Relay TCC encapsulation types
- JUNOS Release 6.2 or later for support of E3 IQ interfaces
- JUNOS Release 6.0 or later for logical interface-level class of service on channelized STM1 IQ interfaces, and APS/MSP on channelized OC12 IQ and channelized STM1 IQ interfaces
- JUNOS Release 5.7 or later for channelized STM1 IQ interfaces
- JUNOS Release 5.7 or later for logical interface-level class of service on the channelized DS3 IQ, channelized E1 IQ, and channelized OC12 IQ interfaces
- JUNOS Release 5.6 or later for channelized DS3 IQ, channelized E1 IQ, and channelized OC12 IQ interfaces
- Two Juniper Networks M-series or T-series routers equipped with an Enhanced Type 1 or Type 2 Flexible PIC Concentrator (FPC)

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Terms and Acronyms for Channelized IQ Interfaces

P

Performance Processor (QPP) ASIC	A next-generation processor that provides enhanced capabilities for channelized IQ interfaces.
---	--

Roadmap for Configuring Channelized IQ Interfaces

To configure a channelized IQ interface, you must perform one or more of the following procedures:

- Configure a clear channel. A clear channel consolidates the entire bandwidth of a channelized interface into a single unpartitioned stream that looks like a standard interface. For example, a channelized OC12 IQ interface configured as a clear channel appears to have an OC12 SONET interface.

See [“Configuring a Clear Channel on a Channelized IQ Interface” on page 43](#).

- Configure single-level channels. By configuring single-level channels, you subdivide a channelized interface into a set of large end channels.

See [“Configuring Single-Level Channels on a Channelized IQ Interface” on page 44](#).

- Configure multilevel channels. You can subdivide a channelized interface and then split these subchannelized interfaces into end channels. Creating small end channels might require you to configure multilevel channels.

See [“Configuring Multilevel Channels on a Channelized IQ Interface” on page 45](#).

- Configure class of service. On channelized IQ interfaces, you can apply class of service at the logical interface level for Frame Relay data-link connection identifiers (DLCIs).

See [“Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface” on page 46](#).

- | | |
|------------------------------|--|
| Related Documentation | <ul style="list-style-type: none"> • Overview of Channelized IQ Interfaces on page 36 • Roadmap for Channelized IQ Interface Configuration Examples on page 49 |
|------------------------------|--|

Configuring a Clear Channel on a Channelized IQ Interface

A clear channel consolidates the entire bandwidth of a channelized interface into a single unpartitioned stream that looks like a standard interface. For example, a channelized OC12 IQ interface configured as a clear channel appears to have an OC12 SONET interface. To configure a clear channel on a channelized IQ interface, include the **no-partition** statement at the **[edit interfaces cxx-fpc/pic/port]** hierarchy level. Include the **interface-type** option to set the channelized interface type. Once the interface is established, you can configure it the same way as a regular interface.

```
[edit]
interfaces {
  coc12-1/1/0 {
```

```

no-partition interface-type so; # This creates a SONET OC12 interface:
}
so-1/1/0 {
  unit 0 {
    family inet {
      address 10.245.1.1/30;
    }
  }
}
}

```

**Related
Documentation**

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Configuring Single-Level Channels on a Channelized IQ Interface

You can subdivide a channelized interface directly into a set of large end channels. To configure part of a channelized IQ interface as a channel, include the **partition** statement at the `[edit interfaces cxx-fpc/pic/port]` hierarchy level. On a channelized OC12 IQ interface, use the **oc-slice** option to create slice sizes corresponding to the desired bandwidth. On a channelized E1 IQ interface, use the **timeslots** option to define $N \times$ DS0 channels or channel groups. On all channelized IQ interfaces, use the **interface-type** option to set the interface type (such as SONET OC3 or T3). Once the channel interfaces are established, you can configure them the same way as regular interfaces.



NOTE: One **oc-slice** in a channelized OC12 IQ interface partition is equivalent to one OC1/DS3-sized channel. If you add three slices together in sequence as a triplet, these pieces become an OC3-sized interface. However, you can configure triplets only with the following sequential slices: 1–3, 4–6, 7–9, 10–12.

```

[edit]
interfaces {
  coc12-0/0/0 {
    partition 1 oc-slice 1-3 interface-type so; # Creates an OC3 SONET
  }
  so-0/0/0:1 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.0.2/30;
      }
    }
  }
}

```

**Related
Documentation**

- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Overview of Channelized IQ Interfaces on page 36](#)

- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Configuring Multilevel Channels on a Channelized IQ Interface

You can subdivide a channelized interface and then split these subchannelized interfaces into end channels. Creating small end channels might require multiple levels of channelization.

To configure a subdivided channelized interface within a partition of a channelized IQ interface, include the **partition** statement at the **[edit interfaces cxx-fpc/pic/port]** hierarchy level. On a channelized OC12 IQ interface, use the **oc-slice** option to create slice sizes corresponding to the desired bandwidth. On all channelized IQ interfaces, use the **interface-type** option to set the channelized interface type (such as channelized OC1).

On a channelized OC12 IQ interface, you can convert a subdivided channelized OC1 interface into a T3 or channelized T3 interface. To configure, include the **no-partition** statement at the **[edit interfaces coc1-fpc/pic/port:channel]** hierarchy level and set the **interface-type** to **ct3**. A **ct3-fpc/pic/port:channel** interface is the result. Such a conversion is known as M13 with C-bit parity mapping. T1 and DS0 channels created directly from a **coc-1** interface use VT mapping.

To further split your channelized interfaces into even smaller channelized interfaces, use the **partition** and **interface-type** statements at the **[edit interfaces cxx-fpc/pic/port:channel]** hierarchy level. You can create channelized OC1, channelized T3, and channelized T1 interfaces, depending on the PIC type.

Finally, you configure these “channels of channels” as end channels. To configure end channels on a segmented channelized IQ interface, include the **partition** statement at the **[edit interfaces cxx-fpc/pic/port:channel]** hierarchy level. The number of channels in the hierarchy depends on how finely you partition the channelized IQ interface. Use the **timeslots** option to select NxDS0 level channels and the **interface-type** option to set the interface type (such as T1 or NxDS0). Once the resulting channels have been established, you can configure them as regular interfaces.

```
[edit]
interfaces {
  coc12-0/0/0 {
    partition 2 oc-slice 4 interface-type coc1; # Creates channelized OC1
    partition 3 oc-slice 5 interface-type coc1; # interfaces: coc1-0/0/0:2,
    partition 4 oc-slice 6 interface-type coc1; # :3, and :4.
  }
  coc1-0/0/0:2 {
    no-partition interface-type t3; # Converts a channelized OC1 to
  }
  t3-0/0/0:2 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.0.6/30;
      }
    }
  }
}
```

```

coc1-0/0/0:3 {
    no-partition interface-type ct3; # Creates a channelized T3 interface:
}
ct3-0/0/0:3 {
    partition 1-28 interface-type t1; # Creates 28 T1 interfaces:
}
coc1-0/0/0:4 {
    partition 1 interface-type ct1; # Creates a channelized T1 interface:
}
ct1-0/0/0:4:1 {
    partition 1 timeslots 1 interface-type ds; # Creates a 1xDS0 interface:
    ...# ds-0/0/0:4:1:1.
    partition 24 timeslots 24 interface-type ds; # Creates a 1xDS0 interface:
}
t1-0/0/0:3:1 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.26/30;
        }
    }
}
...
}
ds-0/0/0:4:1:24 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.214/30;
        }
    }
}
}
}

```

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface

To configure a class-of-service scheduler map, include the **scheduler-map** statement at the **[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

To specify the amount of bandwidth allocated to the logical interface, you must also include the **shaping-rate** statement at the **[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. You can specify a peak bandwidth rate in bits per second (bps), either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000). The range is 1000 through 32,000,000,000 bps.

[edit]

```

class-of-service {
  interfaces {
    interface-name {
      unit logical-unit-number {
        scheduler-map map-name;
        shaping-rate rate;
      }
    }
  }
}

```

If you do not include the **shaping-rate** statement in the configuration, the logical interface might not be able to transmit traffic unless surplus bandwidth is available on the physical interface. The sum of the bandwidth you allocate to all the logical interfaces on a physical interface should not exceed the bandwidth of the physical interface.

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [System Requirements for Channelized IQ Interfaces on page 42](#)
- [Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 109](#)

Associating the Scheduler with a DLCI on a Channelized IQ Interface

For channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, channelized T1 IQ, channelized STM1 IQ, and channelized E1 IQ interfaces with Frame Relay encapsulation, you can associate a scheduler map name with a logical interface. To activate transmission scheduling on a DLCI, include the **per-unit-scheduler** statement at the **[edit interfaces *interface-name*]** hierarchy level.

```

[edit]
interfaces {
  interface-name {
    per-unit-scheduler;
  }
}

```

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 109](#)

Scheduler Limitations for Channelized IQ Interfaces

You can configure logical interface scheduling on up to 16 channelized interfaces per channelized IQ PIC. For channelized IQ interfaces, the number of schedulers you can apply varies by channel level. [Table 15 on page 48](#) shows the number of schedulers you can apply at each channel level.

Table 15: Scheduler Limitations for Channelized IQ Interfaces

Channelized IQ Interfaces	Number of Schedulable DLCIs per Level
Channelized OC12 IQ interfaces	63 for OC3 and OC12 channels, 255 for T3 channels
Channelized OC3 IQ interfaces	63 for OC3 channels, 255 for T3 channels, 63 for T1 channels
Channelized DS3 IQ interfaces	255 for T3 channels
Channelized T1 IQ interfaces	63 for T1 channels
Channelized STM1 IQ interfaces	63 for STM1 channels, 63 for E1 channels
Channelized E1 IQ interfaces	63 for E1 channels

You can associate up to four forwarding classes per physical interface. Keep in mind that you can configure either a physical interface scheduler or a logical interface scheduler, but not both on the same interface simultaneously.

If you use a Gigabit Ethernet IQ interface, you can apply schedulers on up to 768 VLANs per PIC. For more information on class of service for VLANs on a Gigabit Ethernet IQ interface, see the *JUNOS Network Interfaces Configuration Guide*.

Related Documentation

- [Overview of Channelized IQ Interfaces on page 36](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)

Verifying Class-of-Service Schedulers on Channelized IQ Interfaces

Purpose To verify the correct operation of class-of-service schedulers on channelized IQ interfaces.

Action Verify the correct operation of class-of-service schedulers on channelized interfaces:

- **show class of service forwarding-table**
- **show class-of-service interface**

```
user@router> show class-of-service interface t3-3/1/0
```

```
Physical interface: t3-3/1/0, Index: 169
```

```
Scheduler map: <default>, Index: 1
```

```
Logical interface: t3-3/1/0.0, Index: 68
```

Object	Name	Type	Index
Scheduler-map	sched-0		11204
Rewrite	exp-default	exp	2
Classifier	ipprec-compatibility	ip	5

```
Logical interface: t3-3/1/0.1, Index: 69
```

Object	Name	Type	Index
Scheduler-map	sched-1		7038

Rewrite Classifier	exp-default ipprec-compatibility	exp ip	2 5
--------------------	-------------------------------------	-----------	--------

- Related Documentation**
- [Overview of Channelized IQ Interfaces on page 36](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)
 - [Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 109](#)

Roadmap for Channelized IQ Interface Configuration Examples

The following examples give typical topologies and configurations for some of the more common channelized IQ interface configurations:

- [Example: OC12 Clear Channel on a Channelized OC12 IQ Interface on page 50](#)
- [Example: Complex Configuration for a Channelized OC12 IQ Interface on page 54](#)
- [Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface on page 75](#)
- [Example: Channelized OC3 IQ Interface Configuration on page 81](#)
- [Example: Channelized DS3 IQ Interface Configuration on page 88](#)
- [Example: Channelized T1 IQ Interface Configuration on page 94](#)
- [Example: Channelized STM1 IQ Interface Configuration on page 98](#)
- [Example: Channelized E1 IQ Interface Configuration on page 105](#)
- [Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 109](#)

- Related Documentation**
- [Overview of Channelized IQ Interfaces on page 36](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Merging Examples

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

```

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.xml; }

```

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

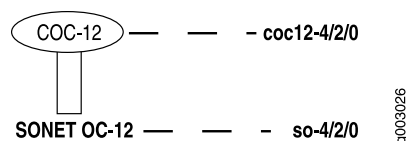
```

Related Documentation

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

Example: OC12 Clear Channel on a Channelized OC12 IQ Interface

Figure 14: OC12 Clear Channel on a Channelized OC12 IQ Interface



The key to this simple example is to remove all partitions from the channelized interface. To configure a clear channel on a channelized IQ interface, include the **no-partition** statement at the **[edit interfaces coc12-fpc/pic/0]** hierarchy level and select the interface type. After you commit this part of the configuration, the clear channel is set and you can configure the resulting SONET interface normally.

```
Router A [edit]
interfaces {
  coc12-4/2/0 {
    no-partition interface-type so;
  }
  so-4/2/0 {
    unit 0 {
      family inet {
        address 10.245.1.1/30;
      }
    }
  }
}
```

Verifying Your Work

To verify correct operation of a channelized OC12 IQ interface configured as a clear channel, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized OC12 IQ interface and the clear channel OC12 interface configured on the channelized IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller
Controller                               Admin Link
coc12-4/2/0                             up    up

# This is the physical channelized OC12 IQ interface.

so-4/2/0                                up    up

# This is the resulting SONET OC12 interface.
```

To view information about the physical channelized interface, include the **cxx-fpc/pic/0** option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive coc12-4/2/0

Physical interface: coc12-4/2/0, Enabled, Physical link is Up
Interface index: 74, SNMP ifIndex: 1269, Generation: 73
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     : None
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-09 10:56:45 PDT (05:14:39 ago)
```

```

Statistics last cleared: Never
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
  HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
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       10      55
  SEF          0       0 OK
  LOS          0       0 OK
  LOF          0       0 OK
  ES-S         10
  SES-S        0
  SEFS-S       0
SONET line:
  BIP-B2       10      144
  REI-L        0       0
  RDI-L        3       1 OK
  AIS-L        0       0 OK
  BERR-SF      0       0 OK
  BERR-SD      1       1 OK
  ES-L         10
  SES-L        0
  UAS-L        0
  ES-LFE       3
  SES-LFE      3
  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

```

To view information about the clear channel SONET interface, include the *so-fpc/pic/0* (interface name) option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive so-4/2/0
```

```

Physical interface: so-4/2/0, Enabled, Physical link is Up
  Interface index: 261, SNMP ifIndex: 2000, Generation: 260
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC12, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-4/2/0 (Index 74)
  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 : 37 (last seen 00:00:04 ago)
    Output: 36 (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

```



```

Last flapped   : 2002-10-09 16:04:18 PDT (00:07:26 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          80461791          7435000 bps
  Output bytes  :          81637408          7502352 bps
  Input packets :          34017          275 pps
  Output packets:          34298          278 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Giants: 0,
Bucket drops: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
  HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets
0 best-effort      34129          34129          0
1 expedited-fo      0              0              0
2 assured-forw      0              0              0
3 network-cont      0              0              0
SONET alarms       : None
SONET defects      : None
SONET path:
  BIP-B3           0              0
  REI-P            0              0
  LOP-P            0              0 OK
  AIS-P            0              0 OK
  RDI-P            0              0 OK
  UNEQ-P           0              0 OK
  PLM-P            0              0 OK
  ES-P             0
  SES-P            0
  UAS-P            0
  ES-PFE           0
  SES-PFE          0
  UAS-PFE          0
Received SONET overhead:
  C2       : 0xcf, C2(cmp) : 0xcf, F2       : 0x00, Z3       : 0x00
  Z4       : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2       : 0xcf, F2       : 0x00, Z3       : 0x00, Z4       : 0x00
Received path trace: RouterB so-2/2/0
  61 72 6d 61 67 6e 61 63 20 73 6f 2d 32 2f 32 2f RouterB so-2/2/0
  30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a .....
Transmitted path trace: RouterA so-4/2/0
  74 69 6d 6d 65 73 73 71 75 61 72 65 20 73 6f 2d RouterA so-4/2/0
  34 2f 32 2f 30 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 0, Runt threshold: 0
Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 4 (0x00)
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      bytes
0 best-effort             95      590976000 95          0      low      none
3 network-control          5      31104000  5          0      low      none
Logical interface so-4/2/0.0 (Index 7) (SNMP ifIndex 2001) (Generation 12)

```

Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
 Protocol inet, MTU: 4470, Generation: 18, Route table: 0
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 10.245.1.0/30, Local: 10.245.1.1, Broadcast: Unspecified, Generation: 21

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Complex Configuration for a Channelized OC12 IQ Interface

Figure 15: Complex Configuration for a Channelized OC12 IQ Interface

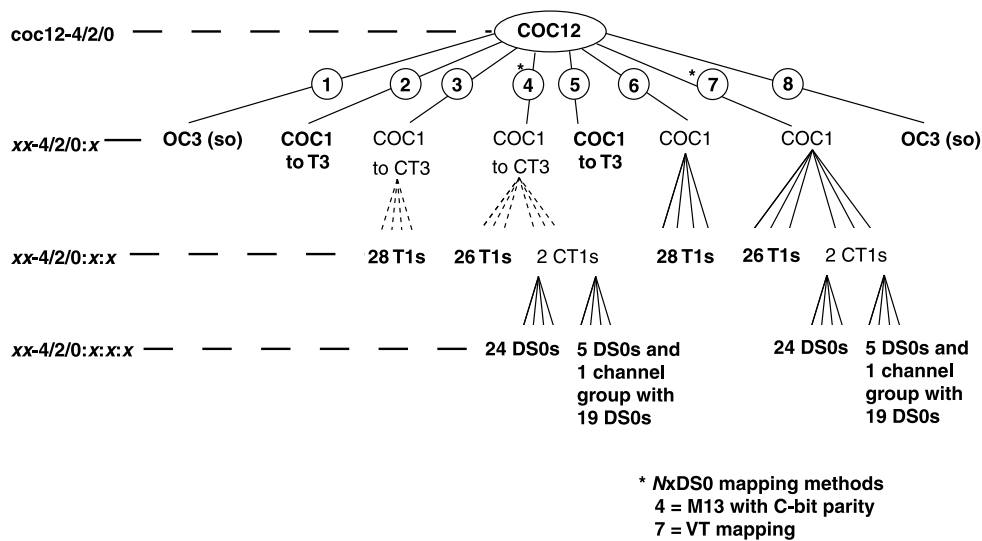


Table 16: Complex Channelization for a Channelized OC12 IQ Interface

Partition	Slices	Interface Type	Interface Level 2	Interface Level 3
1	1–3	OC3	–	–
2	4	Channelized OC1 converted to T3	–	–
3	5	Channelized OC1 converted to channelized T3	28 T1s	–
4	6	Channelized OC1 converted to channelized T3	26 T1s	–
–	–	–	2 CT1s	24 DS0s
–	–	–	–	5 DS0s and 1 channel group of 19 DS0s

Table 16: Complex Channelization for a Channelized OC12 IQ Interface (*continued*)

Partition	Slices	Interface Type	Interface Level 2	Interface Level 3
5	7	Channelized OC1 converted to T3	–	–
6	8	Channelized OC1	28 T1s	–
7	9	Channelized OC1	26 T1s	–
–	–	–	2 CT1s	24 DS0s
–	–	–	–	5 DS0s and 1 channel group of 19 DS0s
8	10–12	OC3	–	–

Figure 15 on page 54 and Table 16 on page 54 show a complex channelization structure that you might encounter if you use the full capabilities of a channelized OC12 IQ interface. Partitions 1 and 8 create an OC3 interface, while Partitions 2 and 5 create T3 interfaces out of channelized OC1 interfaces. Partition 3 (channelized OC1 converted to channelized T3) and Partition 6 (channelized OC1) are channelized interfaces that each subdivide into 28 T1 interfaces. Finally, Partition 4 (channelized OC1 converted to channelized T3) and Partition 7 (channelized OC1) are channelized interfaces that each split into 2 channelized T1 interfaces and 26 T1 interfaces. The first channelized T1 splits into 24 DS0 time slots, whereas the second channelized T1 subdivides into 5 DS0 channels and 1 channel group comprised of 19 DS0 channels.

This example shows two *N*×DS0 mapping methods. Partition 4 uses M13 mapping for North American T-carrier equipment and Partition 7 uses VT mapping for SONET/SDH equipment.

This example also assumes corresponding interfaces. For example, for every sublevel T1 interface you configure on Router A, assume you have configured a matching sublevel or physical T1 interface on a neighboring router.

```

Router A [edit]
interfaces {
  coc12-4/2/0 {
    partition 1 oc-slice 1-3 interface-type coc1; # Creates OC3 interface so-4/2/0:1.
    partition 2 oc-slice 4 interface-type coc1; # Creates interface coc1-4/2/0:2.
    partition 3 oc-slice 5 interface-type coc1; # Creates interface coc1-4/2/0:3.
    partition 4 oc-slice 6 interface-type coc1; # Creates interface coc1-4/2/0:4.
    partition 5 oc-slice 7 interface-type coc1; # Creates interface coc1-4/2/0:5.
    partition 6 oc-slice 8 interface-type coc1; # Creates interface coc1-4/2/0:6.
    partition 7 oc-slice 9 interface-type coc1; # Creates interface coc1-4/2/0:7.
    partition 8 oc-slice 10-12 interface-type so; # Creates an OC3 SONET interface:
  }                                     # so-4/2/0:8.
  so-4/2/0:1 {
    encapsulation ppp;
  }
}

```

```

    unit 0 {
        family inet {
            address 10.255.0.2/30;
        }
    }
}
coc1-4/2/0:2 {
    no-partition interface-type t3; # This converts the coc1 interface into a
}                                     # T3 interface: t3-4/2/0:2.
t3-4/2/0:2 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.6/30;
        }
    }
}
coc1-4/2/0:3 {
    no-partition interface-type ct3; # This converts the coc1 interface into a
}                                     # channelized T3 interface: ct3-4/2/0:3.
ct3-4/2/0:3 {
    partition 1-28 interface-type t1; # This converts the channelized T3 interface
}                                     # into 28 T1 channels: t1-4/2/0:3:1 through t1-4/2/0:3:28.
coc1-4/2/0:4 {
    no-partition interface-type ct3; # This converts the coc1 interface into a
}                                     # channelized T3 interface: ct3-4/2/0:4.
ct3-4/2/0:4 {
    partition 1-2 interface-type ct1; # This creates ct1-4/2/0:4:1 and ct1-4/2/0:4:2.
    partition 3-28 interface-type t1; # This creates t1-4/2/0:4:3 through
}                                     # t1-4/2/0:4:28.
coc1-4/2/0:5 {
    no-partition interface-type t3; # This converts the coc1 interface to a T3:
}                                     # t3-4/2/0:5.
t3-4/2/0:5 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.1.90/30;
        }
    }
}
coc1-4/2/0:6 {
    partition 1-28 interface-type t1; # This converts the channelized OC1 interface
}                                     # into 28 T1s: t1-4/2/0:6:1 through t1-4/2/0:6:28.
coc1-4/2/0:7 {
    partition 1-2 interface-type ct1; # This creates ct1-4/2/0:7:1 and :2.
    partition 3-28 interface-type t1; # This creates t1-4/2/0:7:3 through :28.
}
so-4/2/0:8 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.2.174/30;
        }
    }
}
}

```

```

t1-4/2/0:3:1 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.10/30;
        }
    }
}
...
t1-4/2/0:3:28 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.118/30;
        }
    }
}
}
ct1-4/2/0:4:1 {
    partition 1 timeslots 1 interface-type ds; # This creates 24 DSO channels:
    partition 2 timeslots 2 interface-type ds; # ds-4/2/0:4:1:1 through
    partition 3 timeslots 3 interface-type ds; # ds-4/2/0:4:1:24.
    partition 4 timeslots 4 interface-type ds;
    partition 5 timeslots 5 interface-type ds;
    partition 6 timeslots 6 interface-type ds;
    partition 7 timeslots 7 interface-type ds;
    partition 8 timeslots 8 interface-type ds;
    partition 9 timeslots 9 interface-type ds;
    partition 10 timeslots 10 interface-type ds;
    partition 11 timeslots 11 interface-type ds;
    partition 12 timeslots 12 interface-type ds;
    partition 13 timeslots 13 interface-type ds;
    partition 14 timeslots 14 interface-type ds;
    partition 15 timeslots 15 interface-type ds;
    partition 16 timeslots 16 interface-type ds;
    partition 17 timeslots 17 interface-type ds;
    partition 18 timeslots 18 interface-type ds;
    partition 19 timeslots 19 interface-type ds;
    partition 20 timeslots 20 interface-type ds;
    partition 21 timeslots 21 interface-type ds;
    partition 22 timeslots 22 interface-type ds;
    partition 23 timeslots 23 interface-type ds;
    partition 24 timeslots 24 interface-type ds;
}
ds-4/2/0:4:1:1 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.122/30;
        }
    }
}
...
ds-4/2/0:4:1:24 {
    encapsulation ppp;
    unit 0 {
        family inet {

```

```

        address 10.255.0.214/30;
    }
}
}
ct1-4/2/0:4:2 {
    partition 1 timeslots 1-19 interface-type ds; # This creates a channel group.
    partition 2 timeslots 20 interface-type ds; # ds-4/2/0:4:2:2 through
    partition 3 timeslots 21 interface-type ds; # ds-4/2/0:4:2:6 are single 64-Kbps
    partition 4 timeslots 22 interface-type ds; # NxDS0 channels.
    partition 5 timeslots 23 interface-type ds;
    partition 6 timeslots 24 interface-type ds;
}
ds-4/2/0:4:2:1 { # This is a channel group with 19 DS0s bundled as one.
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.0.218/30;
        }
    }
}
ds-4/2/0:4:2:2 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.120.0.222/30;
        }
    }
}
...
ds-4/2/0:4:2:6 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.120.0.238/30;
        }
    }
}
t1-4/2/0:4:3 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.120.0.242/30;
        }
    }
}
...
t1-4/2/0:4:28 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.1.86/30;
        }
    }
}
t1-4/2/0:6:1 {
    encapsulation ppp;

```

```

unit 0 {
    family inet {
        address 10.255.1.94/30;
    }
}
...
tl-4/2/0:6:28 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.1.202/30;
        }
    }
}
ct1-4/2/0:7:1 {
    partition 1 timeslots 1 interface-type ds; # This creates 24 DS0 channels:
    partition 2 timeslots 2 interface-type ds; # ds-4/2/0:7:1:1 through
    partition 3 timeslots 3 interface-type ds; # ds-4/2/0:7:1:24.
    partition 4 timeslots 4 interface-type ds;
    partition 5 timeslots 5 interface-type ds;
    partition 6 timeslots 6 interface-type ds;
    partition 7 timeslots 7 interface-type ds;
    partition 8 timeslots 8 interface-type ds;
    partition 9 timeslots 9 interface-type ds;
    partition 10 timeslots 10 interface-type ds;
    partition 11 timeslots 11 interface-type ds;
    partition 12 timeslots 12 interface-type ds;
    partition 13 timeslots 13 interface-type ds;
    partition 14 timeslots 14 interface-type ds;
    partition 15 timeslots 15 interface-type ds;
    partition 16 timeslots 16 interface-type ds;
    partition 17 timeslots 17 interface-type ds;
    partition 18 timeslots 18 interface-type ds;
    partition 19 timeslots 19 interface-type ds;
    partition 20 timeslots 20 interface-type ds;
    partition 21 timeslots 21 interface-type ds;
    partition 22 timeslots 22 interface-type ds;
    partition 23 timeslots 23 interface-type ds;
    partition 24 timeslots 24 interface-type ds;
}
ds-4/2/0:7:1:1 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.1.206/30;
        }
    }
}
...
ds-4/2/0:7:1:24 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.255.2.42/30;
        }
    }
}

```

```

    }
  }
  ct1-4/2/0:7:2 {
    partition 1 timeslots 1-19 interface-type ds; # This is a channel group.
    partition 2 timeslots 20 interface-type ds; # ds-4/2/0:7:2:2 through
    partition 3 timeslots 21 interface-type ds; # ds-4/2/0:7:2:6 are single 64-Kbps
    partition 4 timeslots 22 interface-type ds; # NxDS0 channels.
    partition 5 timeslots 23 interface-type ds;
    partition 6 timeslots 24 interface-type ds;
  }
  ds-4/2/0:7:2:1 { # This is a channel group with 19 DS0s bundled as one.
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.46/30;
      }
    }
  }
  ds-4/2/0:7:2:2 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.50/30;
      }
    }
  }
  ...
  ds-4/2/0:7:2:6 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.66/30;
      }
    }
  }
  t1-4/2/0:7:3 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.70/30;
      }
    }
  }
  ...
  t1-4/2/0:7:28 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.170/30;
      }
    }
  }
}

```


Verifying Your Work

To verify correct operation of a channelized OC12 IQ interface configured for complex channelization, use the following commands:

- **show interfaces controller**
- **show interfaces**
- **show interfaces interval** (for OC12, channelized OC12, OC3, T3, channelized T3, T1, and channelized T1 channels)

To view the names of the resulting interfaces and channelized interfaces configured on a channelized OC12 IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller
Controller
coc12-4/2/0
  so-4/2/0:1
  t3-4/2/0:2
  ct3-4/2/0:3
    t1-4/2/0:3:1
    t1-4/2/0:3:2
    t1-4/2/0:3:3
    t1-4/2/0:3:4
    t1-4/2/0:3:5
    t1-4/2/0:3:6
    t1-4/2/0:3:7
    t1-4/2/0:3:8
    t1-4/2/0:3:9
    t1-4/2/0:3:10
    t1-4/2/0:3:11
    t1-4/2/0:3:12
    t1-4/2/0:3:13
    t1-4/2/0:3:14
    t1-4/2/0:3:15
    t1-4/2/0:3:16
    t1-4/2/0:3:17
    t1-4/2/0:3:18
    t1-4/2/0:3:19
    t1-4/2/0:3:20
    t1-4/2/0:3:21
    t1-4/2/0:3:22
    t1-4/2/0:3:23
    t1-4/2/0:3:24
    t1-4/2/0:3:25
    t1-4/2/0:3:26
    t1-4/2/0:3:27
    t1-4/2/0:3:28
  ct3-4/2/0:4
    ct1-4/2/0:4:1
      ds-4/2/0:4:1:1
      ds-4/2/0:4:1:2
      ds-4/2/0:4:1:3
      ds-4/2/0:4:1:4
      ds-4/2/0:4:1:5
      ds-4/2/0:4:1:6
      ds-4/2/0:4:1:7
      ds-4/2/0:4:1:8
```

	Admin	Link
coc12-4/2/0	up	up
so-4/2/0:1	up	up
t3-4/2/0:2	up	up
ct3-4/2/0:3	up	up
t1-4/2/0:3:1	up	up
t1-4/2/0:3:2	up	up
t1-4/2/0:3:3	up	up
t1-4/2/0:3:4	up	up
t1-4/2/0:3:5	up	up
t1-4/2/0:3:6	up	up
t1-4/2/0:3:7	up	up
t1-4/2/0:3:8	up	up
t1-4/2/0:3:9	up	up
t1-4/2/0:3:10	up	up
t1-4/2/0:3:11	up	up
t1-4/2/0:3:12	up	up
t1-4/2/0:3:13	up	up
t1-4/2/0:3:14	up	up
t1-4/2/0:3:15	up	up
t1-4/2/0:3:16	up	up
t1-4/2/0:3:17	up	up
t1-4/2/0:3:18	up	up
t1-4/2/0:3:19	up	up
t1-4/2/0:3:20	up	up
t1-4/2/0:3:21	up	up
t1-4/2/0:3:22	up	up
t1-4/2/0:3:23	up	up
t1-4/2/0:3:24	up	up
t1-4/2/0:3:25	up	up
t1-4/2/0:3:26	up	up
t1-4/2/0:3:27	up	up
t1-4/2/0:3:28	up	up
ct3-4/2/0:4	up	up
ct1-4/2/0:4:1	up	up
ds-4/2/0:4:1:1	up	up
ds-4/2/0:4:1:2	up	up
ds-4/2/0:4:1:3	up	up
ds-4/2/0:4:1:4	up	up
ds-4/2/0:4:1:5	up	up
ds-4/2/0:4:1:6	up	up
ds-4/2/0:4:1:7	up	up
ds-4/2/0:4:1:8	up	up

ds-4/2/0:4:1:9	up	up
ds-4/2/0:4:1:10	up	up
ds-4/2/0:4:1:11	up	up
ds-4/2/0:4:1:12	up	up
ds-4/2/0:4:1:13	up	up
ds-4/2/0:4:1:14	up	up
ds-4/2/0:4:1:15	up	up
ds-4/2/0:4:1:16	up	up
ds-4/2/0:4:1:17	up	up
ds-4/2/0:4:1:18	up	up
ds-4/2/0:4:1:19	up	up
ds-4/2/0:4:1:20	up	up
ds-4/2/0:4:1:21	up	up
ds-4/2/0:4:1:22	up	up
ds-4/2/0:4:1:23	up	up
ds-4/2/0:4:1:24	up	up
ct1-4/2/0:4:2	up	up
ds-4/2/0:4:2:1	up	up
ds-4/2/0:4:2:2	up	up
ds-4/2/0:4:2:3	up	up
ds-4/2/0:4:2:4	up	up
ds-4/2/0:4:2:5	up	up
ds-4/2/0:4:2:6	up	up
t1-4/2/0:4:3	up	up
t1-4/2/0:4:4	up	up
t1-4/2/0:4:5	up	up
t1-4/2/0:4:6	up	up
t1-4/2/0:4:7	up	up
t1-4/2/0:4:8	up	up
t1-4/2/0:4:9	up	up
t1-4/2/0:4:10	up	up
t1-4/2/0:4:11	up	up
t1-4/2/0:4:12	up	up
t1-4/2/0:4:13	up	up
t1-4/2/0:4:14	up	up
t1-4/2/0:4:15	up	up
t1-4/2/0:4:16	up	up
t1-4/2/0:4:17	up	up
t1-4/2/0:4:18	up	up
t1-4/2/0:4:19	up	up
t1-4/2/0:4:20	up	up
t1-4/2/0:4:21	up	up
t1-4/2/0:4:22	up	up
t1-4/2/0:4:23	up	up
t1-4/2/0:4:24	up	up
t1-4/2/0:4:25	up	up
t1-4/2/0:4:26	up	up
t1-4/2/0:4:27	up	up
t1-4/2/0:4:28	up	up
t3-4/2/0:5	up	up
coc1-4/2/0:6	up	up
t1-4/2/0:6:1	up	up
t1-4/2/0:6:2	up	up
t1-4/2/0:6:3	up	up
t1-4/2/0:6:4	up	up
t1-4/2/0:6:5	up	up
t1-4/2/0:6:6	up	up
t1-4/2/0:6:7	up	up
t1-4/2/0:6:8	up	up
t1-4/2/0:6:9	up	up
t1-4/2/0:6:10	up	up

t1-4/2/0:6:11	up	up
t1-4/2/0:6:12	up	up
t1-4/2/0:6:13	up	up
t1-4/2/0:6:14	up	up
t1-4/2/0:6:15	up	up
t1-4/2/0:6:16	up	up
t1-4/2/0:6:17	up	up
t1-4/2/0:6:18	up	up
t1-4/2/0:6:19	up	up
t1-4/2/0:6:20	up	up
t1-4/2/0:6:21	up	up
t1-4/2/0:6:22	up	up
t1-4/2/0:6:23	up	up
t1-4/2/0:6:24	up	up
t1-4/2/0:6:25	up	up
t1-4/2/0:6:26	up	up
t1-4/2/0:6:27	up	up
t1-4/2/0:6:28	up	up
coc1-4/2/0:7	up	up
ct1-4/2/0:7:1	up	up
ds-4/2/0:7:1:1	up	up
ds-4/2/0:7:1:2	up	up
ds-4/2/0:7:1:3	up	up
ds-4/2/0:7:1:4	up	up
ds-4/2/0:7:1:5	up	up
ds-4/2/0:7:1:6	up	up
ds-4/2/0:7:1:7	up	up
ds-4/2/0:7:1:8	up	up
ds-4/2/0:7:1:9	up	up
ds-4/2/0:7:1:10	up	up
ds-4/2/0:7:1:11	up	up
ds-4/2/0:7:1:12	up	up
ds-4/2/0:7:1:13	up	up
ds-4/2/0:7:1:14	up	up
ds-4/2/0:7:1:15	up	up
ds-4/2/0:7:1:16	up	up
ds-4/2/0:7:1:17	up	up
ds-4/2/0:7:1:18	up	up
ds-4/2/0:7:1:19	up	up
ds-4/2/0:7:1:20	up	up
ds-4/2/0:7:1:21	up	up
ds-4/2/0:7:1:22	up	up
ds-4/2/0:7:1:23	up	up
ds-4/2/0:7:1:24	up	up
ct1-4/2/0:7:2	up	up
ds-4/2/0:7:2:1	up	up
ds-4/2/0:7:2:2	up	up
ds-4/2/0:7:2:3	up	up
ds-4/2/0:7:2:4	up	up
ds-4/2/0:7:2:5	up	up
ds-4/2/0:7:2:6	up	up
t1-4/2/0:7:3	up	up
t1-4/2/0:7:4	up	up
t1-4/2/0:7:5	up	up
t1-4/2/0:7:6	up	up
t1-4/2/0:7:7	up	up
t1-4/2/0:7:8	up	up
t1-4/2/0:7:9	up	up
t1-4/2/0:7:10	up	up
t1-4/2/0:7:11	up	up
t1-4/2/0:7:12	up	up

t1-4/2/0:7:13	up	up
t1-4/2/0:7:14	up	up
t1-4/2/0:7:15	up	up
t1-4/2/0:7:16	up	up
t1-4/2/0:7:17	up	up
t1-4/2/0:7:18	up	up
t1-4/2/0:7:19	up	up
t1-4/2/0:7:20	up	up
t1-4/2/0:7:21	up	up
t1-4/2/0:7:22	up	up
t1-4/2/0:7:23	up	up
t1-4/2/0:7:24	up	up
t1-4/2/0:7:25	up	up
t1-4/2/0:7:26	up	up
t1-4/2/0:7:27	up	up
t1-4/2/0:7:28	up	up
so-4/2/0:8	up	up

To verify that your channelized IQ interfaces are working as expected, use the **show interfaces** command. Use the **show interfaces controller** command to find the name of the channelized interface you want to view; then include this channelized name (for example, **ct3-4/2/0:4**) as an option with the **show interfaces** command.

The next sections provide sample **show interfaces** output for each of the major interface types configured in this example:

- [Channelized OC12 on page 64](#)
- [SONET OC3 on page 65](#)
- [T3 on page 66](#)
- [Channelized T3 on page 68](#)
- [Channelized OC1 on page 70](#)
- [Channelized T1 on page 72](#)
- [T1 on page 73](#)
- [DS0 on page 74](#)

Channelized OC12

```
user@RouterA> 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     : None
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-09 17:45:15 PDT (00:14:38 ago)
Statistics last cleared: Never
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
  HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
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       14      83
  SEF          0       0 OK
  LOS          0       0 OK
  LOF          0       0 OK
  ES-S         14
  SES-S        0
  SEFS-S       0
SONET line:
  BIP-B2       14      162
  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         14
  SES-L        0
  UAS-L        0
  ES-LFE       3
  SES-LFE      3
  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

```

SONET OC3

user@RouterA> show interfaces extensive so-4/2/0:8

```

Physical interface: so-4/2/0:8, Enabled, Physical link is Up
Interface index: 440, SNMP ifIndex: 2640, Generation: 787
Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3, Loopback: None, FCS: 16,
Payload scrambler: Enabled, Parent: coc12-4/2/0 (Index 266)
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 : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Conf-ack-sent
NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
CHAP state: Not-configured
Last flapped : 2002-10-09 17:45:18 PDT (00:11:45 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 5967 56 bps
  Output bytes : 12672 128 bps
  Input packets: 351 0 pps
  Output packets: 704 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,

```

```

HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets
0 best-effort      704                0                0
1 expedited-fo      0                0                0
2 assured-forw      0                0                0
3 network-cont      0                0                0
SONET alarms   : None
SONET defects  : None
SONET path:
  BIP-B3        0                0
  REI-P         0                0
  LOP-P         0                0 OK
  AIS-P         0                0 OK
  RDI-P         0                0 OK
  UNEQ-P        0                0 OK
  PLM-P         0                0 OK
  ES-P          0
  SES-P         0
  UAS-P         0
  ES-PFE        0
  SES-PFE       0
  UAS-PFE       0
Received SONET overhead:
  C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2      : 0xcf, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
Received path trace: RouterB so-2/2/0:8
  61 72 6d 61 67 6e 61 63 20 73 6f 2d 32 2f 32 2f  RouterB so-2/2/
  30 3a 38 00 00 00 00 00 00 00 00 00 00 00 00 00  0:8.....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a  .....
Transmitted path trace: RouterA so-4/2/0:8
  74 69 6d 6d 65 73 73 71 75 61 72 65 20 73 6f 2d  RouterA so-
  34 2f 32 2f 30 3a 38 00 00 00 00 00 00 00 00 00  4/2/0:8.....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 0, Runt threshold: 0
Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 4 (0x2a)
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      bytes
0 best-effort             95      147744000  95      0      low  none
3 network-control          5      7776000    5      0      low  none
Logical interface so-4/2/0:8.0 (Index 180) (SNMP ifIndex 2641) (Generation 512)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 519, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.255.2.172/30, Local: 10.255.2.174, Broadcast: Unspecified, Generation: 1029

```

T3

```
user@RouterA> show interfaces extensive t3-4/2/0:2
```

```

Physical interface: t3-4/2/0:2, Enabled, Physical link is Up
  Interface index: 274, SNMP ifIndex: 1982, Generation: 609
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:None,
FCS: 16,
Mode: C/Bit parity, Parent: coc12-4/2/0 (Index 266)
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 : 85 (last seen 00:00:00 ago)
  Output: 82 (last sent 00:00:01 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
CHAP state: Not-configured
Last flapped   : 2002-10-09 17:45:15 PDT (00:13:24 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :           2546           56 bps
  Output bytes  :           2732           56 bps
  Input packets:           170           0 pps
  Output packets:          171           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
Queue counters:
  Queued packets  Transmitted packets  Dropped packets
0 best-effort      171              171              0
1 expedited-fo      0                0                0
2 assured-forw      0                0                0
3 network-cont      0                0                0
Active alarms   : None
Active defects  : None
DS3 media:
  Seconds      Count  State
  PLL Lock      0      0 OK
  Reframing      0      0 OK
  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            1     6827
  CCV            0      0
  LES            0
  PES            1
  PSES           1
  CES            0
  CSES           0
  SEFS           0
  UAS            0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 0
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
SONET alarms   : None
SONET defects  : None
SONET path:
  BIP-B3          0          0
  REI-P           0          0
  LOP-P           0          0 OK
  AIS-P           0          0 OK
  RDI-P           0          0 OK
  UNEQ-P          0          0 OK
  PLM-P           0          0 OK
  ES-P            0
  SES-P           0
  UAS-P           0
  ES-PFE          0
  SES-PFE         0
  UAS-PFE         0
Received SONET overhead:
  C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2      : 0x04, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
Received path trace:
  5d 14 d6 ef 81 93 78 71 98 ec 55 27 35 84 3a 2c   ].Vo..xq.1U'5.:,
Transmitted path trace: t3-4/2/0:2
  74 33 2d 34 2f 32 2f 30 3a 32 00 00 00 00 00 00   t3-4/2/0:2.....
Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 4 (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
Logical interface t3-4/2/0:2.0 (Index 10) (SNMP ifIndex 1983) (Generation 340)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Bandwidth: 0
Protocol inet, MTU: 4470, Generation: 347, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.255.0.4/30, Local: 10.255.0.6, Broadcast: Unspecified, Generation: 685

```

Channelized T3

```
user@RouterA> show interfaces extensive ct3-4/2/0:4
```

```

Physical interface: ct3-4/2/0:4, Enabled, Physical link is Up
Interface index: 304, SNMP ifIndex: 2409, Generation: 639
Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3, Loopback: None, FCS: 16,
Mode: C/Bit parity, Parent: coc12-4/2/0 (Index 266)
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-09 17:45:16 PDT (00:12:56 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: 0, Errors: 0, Drops: 0, Aged packets: 0
Active alarms : None
Active defects : None
DS3 media:
  Seconds      Count  State
  PLL Lock      0        0 OK
  Reframing      0        0 OK
  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            1        1
  CCV            1        1
  LES            0
  PES            1
  PSES           0
  CES            1
  CSES           0
  SEFS           0
  UAS            0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 0, Runt threshold: 0
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
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         14        83
  SEF            0        0 OK
  LOS            0        0 OK
  LOF            0        0 OK
  ES-S           14
  SES-S          0
  SEFS-S         0
SONET line:
  BIP-B2         14        162
  REI-L          0
  RDI-L          3        1 OK
  AIS-L          0        0 OK
  BERR-SF        0        0 OK
  BERR-SD        0        0 OK
  ES-L           14
  SES-L          0
  UAS-L          0

```

```

ES-LFE          3
SES-LFE          3
UAS-LFE          0
SONET path:
BIP-B3          0      0
REI-P           0      0
LOP-P           0      0 OK
AIS-P           0      0 OK
RDI-P           0      0 OK
UNEQ-P          0      0 OK
PLM-P           0      0 OK
ES-P            0
SES-P            0
UAS-P            0
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
Transmitted SONET overhead:
F1   : 0x00, J0   : 0x00, K1   : 0x00, K2   : 0x00
S1   : 0x00, C2   : 0x04, F2   : 0x00, Z3   : 0x00
Z4   : 0x00
Received path trace:
39 b8 27 50 44 b6 5f c3 f3 de 27 9a a0 31 40 5c 98'PD6-Cs^'. 1@\
Transmitted path trace: RouterA ct3-4/2/0:4
74 69 6d 6d 65 73 73 71 75 61 72 65 20 63 74 33 RouterA ct3
Packet Forwarding Engine configuration:
Destination slot: 0 (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

```

Channelized OC1

```
user@RouterA> 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
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-09 17:45:31 PDT (00:12:11 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, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
HS link FIFO overflows: 0
Output errors:

```

Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0

SONET alarms : None

SONET defects : None

SONET section:

BIP-B1	14	83	
SEF	0	0	OK
LOS	0	0	OK
LOF	0	0	OK
ES-S	14		
SES-S	0		
SEFS-S	0		

SONET line:

BIP-B2	14	162	
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	14		
SES-L	0		
UAS-L	0		
ES-LFE	3		
SES-LFE	3		
UAS-LFE	0		

SONET path:

BIP-B3	0	0	
REI-P	0	0	
LOP-P	0	0	OK
AIS-P	0	0	OK
RDI-P	0	0	OK
UNEQ-P	3	1	OK
PLM-P	3	1	OK
ES-P	3		
SES-P	3		
UAS-P	0		
ES-PFE	0		
SES-PFE	0		
UAS-PFE	0		

Received SONET overhead:

F1	: 0x00, J0	: 0x00, K1	: 0x00, K2	: 0x00
S1	: 0x00, C2	: 0x00, C2(cmp)	: 0x00, F2	: 0x00
Z3	: 0x00, Z4	: 0x00, S1(cmp)	: 0x00	

Transmitted SONET overhead:

F1	: 0x00, J0	: 0x01, K1	: 0x00, K2	: 0x00
S1	: 0x00, C2	: 0x00, F2	: 0x00, Z3	: 0x00
Z4	: 0x00			

Received path trace:

a0 6a b2 b6 97 aa 25 5e 54 e3 59 2a 80 84 dd fa	j26.*%^TcY*..]z
af ec 42 d3 21 45 5d 48 f4 5a dd e5 1c be e7 65	/lBS!E]HtZ]e.>ge
e7 f2 94 71 f1 d7 d7 86 98 83 d5 e2 ec 67 1d db	gr.qqWW...Ub1g.[
5b 72 29 b3 b9 97 98 c9 c1 a3 af e2 ab db d0 be	[r)39..IA#/b+[P>

Transmitted path trace: RouterA coc1-4/2/0:7

74 69 6d 6d 65 73 73 71 75 61 72 65 20 63 6f 63	RouterA coc
31 2d 34 2f 32 2f 30 3a 37 00 00 00 00 00 00 00	1-4/2/0:7.....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

HDLC configuration:

Policing bucket: Disabled

Shaping bucket : Disabled

Giant threshold: 0, Runt threshold: 0

Packet Forwarding Engine configuration:

Destination slot: 0 (0x00)						
CoS transmit queue	Bandwidth		Buffer	Priority	Limit	
	%	bps				
0 best-effort	95	49248000	95	0	low	none
3 network-control	5	2592000	5	0	low	none

Channelized T1

user@RouterA> show interfaces extensive ct1-4/2/0:4:1

```
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: ct3-4/2/0:4 (Index 304)
Device flags      : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags       : None
Hold-times       : Up 0 ms, Down 0 ms
Last flapped    : 2002-10-09 17:45:19 PDT (00:16:49 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, 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: 0, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms       : None
DS1 defects      : None
T1 media:
Seconds          Count  State
SEF              1      1 OK
BEE              1      1 OK
AIS              0      0 OK
LOF              1      1 OK
LOS              0      0 OK
YELLOW           0      0 OK
BPV              0      0
EXZ              0      0
LCV              0      0
PCV              0      0
CS               0      0
LES             1
ES              1
SES             2
SEFS            2
BES             0
UAS             0
HDLC configuration:
Policing bucket: Disabled
Shaping bucket  : Disabled
Giant threshold: 0, Runt threshold: 0
Timeslots      : All active
Line encoding: B8ZS, Byte encoding: Nx64K
Buildout       : 0 to 132 feet
Data inversion: Disabled
DS1 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
```

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
 Packet Forwarding Engine configuration:
 Destination slot: 0 (0x00)

CoS transmit queue		Bandwidth			Buffer	Priority	Limit
	%	bps	%	bytes			
0 best-effort	95	1459200	95	0	low	none	
3 network-control	5	76800	5	0	low	none	

T1

user@RouterA> show interfaces extensive t1-4/2/0:7:3

Physical interface: t1-4/2/0:7:3, Enabled, Physical link is Up
 Interface index: 414, SNMP ifIndex: 2587, Generation: 761
 Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16, Framing:ESF,
 Parent: coc1-4/2/0:7 (Index 381)
 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 : 0 (last seen: never)
 Output: 0 (last sent: never)
 LCP state: Conf-ack-sent
 NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
 CHAP state: Not-configured
 Last flapped : 2002-10-09 17:45:34 PDT (00:10:33 ago)
 Statistics last cleared: Never
 Traffic statistics:
 Input bytes : 10778 112 bps
 Output bytes : 11412 128 bps
 Input packets: 634 0 pps
 Output packets: 634 0 pps
 Input errors:
 Errors: 0, Drops: 0, Framing errors: 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
 Queue counters:

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	633	633	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

DS1 alarms : None
 DS1 defects : None
 T1 media:

	Seconds	Count	State
SEF	1	1	OK
BEE	1	1	OK
AIS	3	1	OK
LOF	17	1	OK
LOS	0	0	OK
YELLOW	0	0	OK
BPV	0	0	
EXZ	0	0	
LCV	0	0	
PCV	0	0	
CS	0	0	
LES	17		
ES	17		

```

SES                      34
SEFS                     34
BES                       0
UAS                      14
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
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms   : None
SONET defects  : None
SONET vt:
  BIP-BIP2      648      0
  REI-V         651      1
  LOP-V         0        0 OK
  AIS-V         0        0 OK
  RDI-V         651      1 Defect Active
  UNEQ-V        0        0 OK
  PLM-V         0        0 OK
  ES-V          651
  SES-V         3
  UAS-V         0
  ES-VFE        0
  SES-VFE       0
  UAS-VFE       0
Received SONET overhead:
  V5           : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5           : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 4 (0x24)
  CoS transmit queue      Bandwidth      Buffer Priority Limit
                           %      bps      %      bytes
  0 best-effort           95      1459200 95      0      low  none
  3 network-control       5       76800  5       0      low  none
Logical interface t1-4/2/0:7:3.0 (Index 152) (SNMP ifIndex 2588)
(Generation 484)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 491, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.255.2.68/30, Local: 10.255.2.70, Broadcast: Unspecified, Generation: 973

```

DS0

```
user@RouterA> show interfaces extensive ds-4/2/0:4:1:1
```

```

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: ct1-4/2/0:4:1 (Index 305)
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 : 98 (last seen 00:00:01 ago)
  Output: 100 (last sent 00:00:00 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
CHAP state: Not-configured
Last flapped   : 2002-10-09 17:45:15 PDT (00:16:20 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          3013          0 bps
  Output bytes :          3228          0 bps
  Input packets:           201          0 pps
  Output packets:          202          0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC 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      202                202                0
1 expedited-fo       0                 0                 0
2 assured-forw       0                 0                 0
3 network-cont       0                 0                 0
Interface transmit queues:
      B/W  WRR    Packets      Bytes      Drops      Errors
Queue0    0    0         0         0         0         0
Queue1    0    0         0         0         0         0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : 1
  Byte encoding: Nx64K, Data inversion: Disabled
  Idle cycle flag: flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 4 (0x07)
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      bytes
0 best-effort             95      60800  95         0    low  none
3 network-control         5       3200   5         0    low  none
Logical interface ds-4/2/0:4:1:1.0 (Index 39) (SNMP ifIndex 2412)
(Generation 369)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 376, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.255.0.120/30, Local: 10.255.0.122, Broadcast: Unspecified, Generation: 743

```

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface

The JUNOS software allows you to convert a Channelized OC12 IQ PIC into a channelized STM4 IQ interface. The conversion process enables the Channelized OC12 IQ PIC to

interconnect with European SDH telecommunications equipment at the STM4 and STM1 levels, then channelize the data into North American T3, T1, and NxDSO interfaces. To place the Channelized OC12 IQ PIC in SDH mode, include the **sdh** option at the **[edit chassis fpc slot-number pic pic-number framing]** hierarchy level.

Figure 16: Channelized OC12 IQ Interface in SDH Mode Example

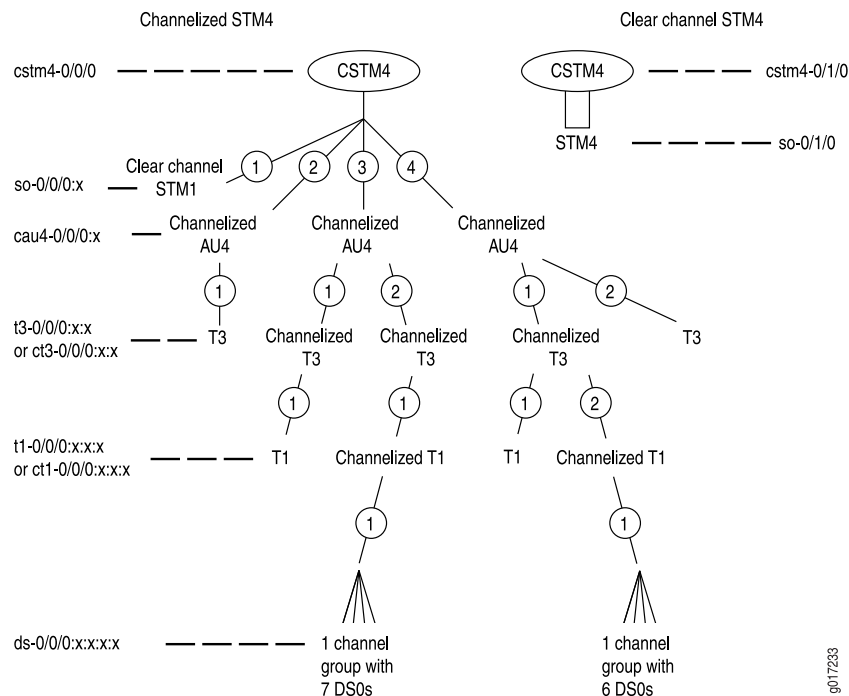


Figure 16 on page 76 and the following configuration example show how the converted channelized STM4 IQ interface can be turned into a clear channel STM4 (VC4-4c) SDH interface, or further subdivided into STM1 (VC4) interfaces and channelized administrative unit 4 (CAU4) interfaces, T3 and channelized T3 interfaces, T1 and channelized T1 interfaces, and NxDSO channels.

```
Router A [edit]
chassis {
  fpc 0 {
    pic 0 {
      framing sdh; # Converts the Channelized OC12 IQ PIC
    } # into a channelized STM4 SDH interface.
  }
}
interfaces {
  cstm4-0/0/0 {
    partition 1 oc-slice 1-3 interface-type so; # Creates an STM1 SDH interface.
    partition 2 oc-slice 4-6 interface-type cau4; # Partitions 2, 3, and 4 create
    partition 3 oc-slice 7-9 interface-type cau4; # three channelized AU4 channels.
    partition 4 oc-slice 10-12 interface-type cau4;
  }
  so-0/0/0:1 { # A clear channel STM1 SDH (VC4) interface.
    encapsulation frame-relay;
    unit 0 {
```



```

        dlci 16;
        family inet {
            address 10.0.0.1/30;
        }
        family inet6 {
            address abcd::10.0.0.1/126;
        }
    }
}
cau4-0/0/0:2 {
    partition 1 interface-type t3; # Creates a T3 interface from the
    # channelized AU4 interface.
}
t3-0/0/0:2:1 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.5/30;
        }
        family inet6 {
            address abcd::10.0.0.5/126;
        }
    }
}
cau4-0/0/0:3 {
    partition 1 interface-type ct3; # Creates channelized T3 interfaces from the
    partition 2 interface-type ct3; # second channelized AU4.
}
ct3-0/0/0:3:1 {
    partition 1 interface-type t1; # Creates a T1 interface from the channelized T3.
}
t1-0/0/0:3:1:1 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.9/30;
        }
        family inet6 {
            address abcd::10.0.0.9/126;
        }
    }
}
ct3-0/0/0:3:2 {
    partition 1 interface-type ct1; # Creates a channelized T1 interface
    # from the channelized T3.
}
ct1-0/0/0:3:2:1 {
    partition 1 timeslots 1,3-7,24 interface-type ds; # Creates an NxDSO channel
    # group with seven time slots.
}
ds-0/0/0:3:2:1:1 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.13/30;
        }
    }
}

```

```

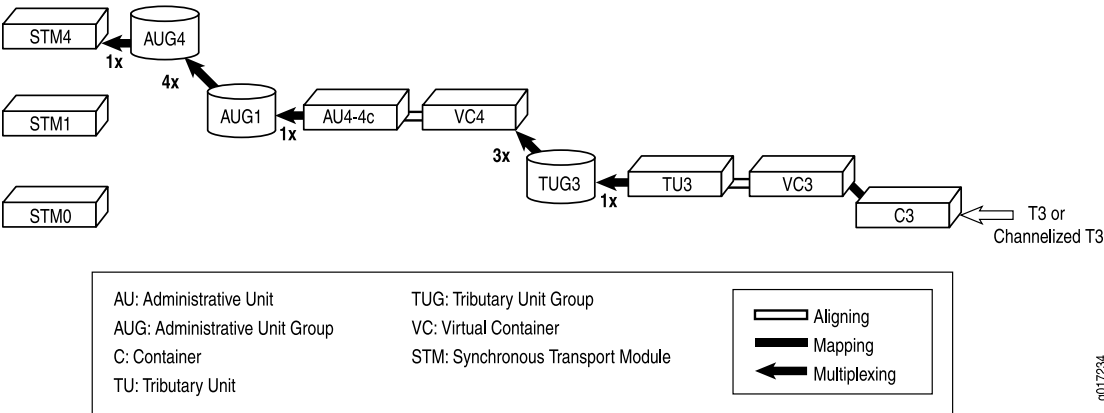
        family inet6 {
            address abcd::10.0.0.13/126;
        }
    }
}
cau4-0/0/0:4 {
    partition 2 interface-type t3; # Creates a T3 interface.
    partition 1 interface-type ct3; # Creates a channelized T3 interface
}      # from the channelized AU4.
ct3-0/0/0:4:1 {
    partition 1 interface-type t1; # Creates a T1 interface.
    partition 2 interface-type ct1; # Creates a channelized T1 interface
}      # from the channelized T3.
t1-0/0/0:4:1:1 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.21/30;
        }
        family inet6 {
            address abcd::10.0.0.21/126;
        }
    }
}
ct1-0/0/0:4:1:2 {
    partition 1 timeslots 6,8-11,7 interface-type ds; # Creates an NxDS0 channel
}      # group with six time slots.
ds-0/0/0:4:1:2:1 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.25/30;
        }
        family inet6 {
            address abcd::10.0.0.25/126;
        }
    }
}
}
t3-0/0/0:4:2 {
    encapsulation frame-relay;
    unit 0 {
        dlci 16;
        family inet {
            address 10.0.0.17/30;
        }
        family inet6 {
            address abcd::10.0.0.17/126;
        }
    }
}
}
cstm4-0/1/0 {
    no-partition interface-type so; # Creates a clear channel SDH STM4 interface.
}
so-0/1/0 { # This is the clear channel SDH STM4 (VC4-4c) interface so-0/1/0.

```

```
unit 0 {
  family inet {
    address 10.22.22.1/30;
  }
}
```

Figure 17 on page 79 shows a visual representation of the T3/channelized T3-to-STM4 SDH mapping method used by the JUNOS Software for channelized OC12 IQ interfaces configured in SDH mode.

Figure 17: Converted Channelized OC12 IQ Interface SDH Mapping Method



Verifying Your Configuration

To verify correct operation of a Channelized OC12 IQ PIC converted to a channelized STM4 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized STM4 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** and **show interfaces terse** commands:

```
user@host> show interfaces controller cstm4-0/0/0
Controller
cstm4-0/0/0
  so-0/0/0:1
  cau4-0/0/0:2
    t3-0/0/0:2:1
  cau4-0/0/0:3
    ct3-0/0/0:3:1
      t1-0/0/0:3:1:1
    ct3-0/0/0:3:2
      ct1-0/0/0:3:2:1
        ds-0/0/0:3:2:1:1
  cau4-0/0/0:4
    ct3-0/0/0:4:1
      t1-0/0/0:4:1:1
      ct1-0/0/0:4:1:2
```

	Admin	Link
cstm4-0/0/0	up	up
so-0/0/0:1	up	up
cau4-0/0/0:2	up	up
t3-0/0/0:2:1	up	up
cau4-0/0/0:3	up	up
ct3-0/0/0:3:1	up	up
t1-0/0/0:3:1:1	up	up
ct3-0/0/0:3:2	up	up
ct1-0/0/0:3:2:1	up	up
ds-0/0/0:3:2:1:1	up	up
cau4-0/0/0:4	up	up
ct3-0/0/0:4:1	up	up
t1-0/0/0:4:1:1	up	up
ct1-0/0/0:4:1:2	up	up

```

ds-0/0/0:4:1:2:1
t3-0/0/0:4:2
up up
up up

```

```
user@host> show interfaces terse *-0/0/0*
```

Interface	Admin	Link	Proto	Local	Remote
cstm4-0/0/0	up	up			
so-0/0/0:1	up	up			
so-0/0/0:1.0	up	up	inet inet6	10.0.0.1/30 abcd::a00:1/126 fe80::2a0:a5ff:fe5c:15a6/64	
cau4-0/0/0:2	up	up			
t3-0/0/0:2:1	up	up			
t3-0/0/0:2:1.0	up	up	inet inet6	10.0.0.5/30 abcd::a00:5/126 fe80::2a0:a5ff:fe5c:15a6/64	
cau4-0/0/0:3	up	up			
ct3-0/0/0:3:1	up	up			
t1-0/0/0:3:1:1	up	up			
t1-0/0/0:3:1:1.0	up	up	inet inet6	10.0.0.9/30 abcd::a00:9/126 fe80::2a0:a5ff:fe5c:15a6/64	
ct3-0/0/0:3:2	up	up			
ct1-0/0/0:3:2:1	up	up			
ds-0/0/0:3:2:1:1	up	up			
ds-0/0/0:3:2:1:1.0	up	up	inet inet6	10.0.0.13/30 abcd::a00:d/126 fe80::2a0:a5ff:fe5c:15a6/64	
cau4-0/0/0:4	up	up			
ct3-0/0/0:4:1	up	up			
t1-0/0/0:4:1:1	up	up			
t1-0/0/0:4:1:1.0	up	up	inet inet6	10.0.0.21/30 abcd::a00:15/126 fe80::2a0:a5ff:fe5c:15a6/64	
ct1-0/0/0:4:1:2	up	up			
ds-0/0/0:4:1:2:1	up	up			
ds-0/0/0:4:1:2:1.0	up	up	inet inet6	10.0.0.25/30 abcd::a00:19/126 fe80::2a0:a5ff:fe5c:15a6/64	
t3-0/0/0:4:2	up	up			
t3-0/0/0:4:2.0	up	up	inet inet6	10.0.0.17/30 abcd::a00:11/126 fe80::2a0:a5ff:fe5c:15a6/64	

Related Documentation

- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Channelized OC3 IQ Interface Configuration

Figure 18: Channelized OC3 IQ Interface Example

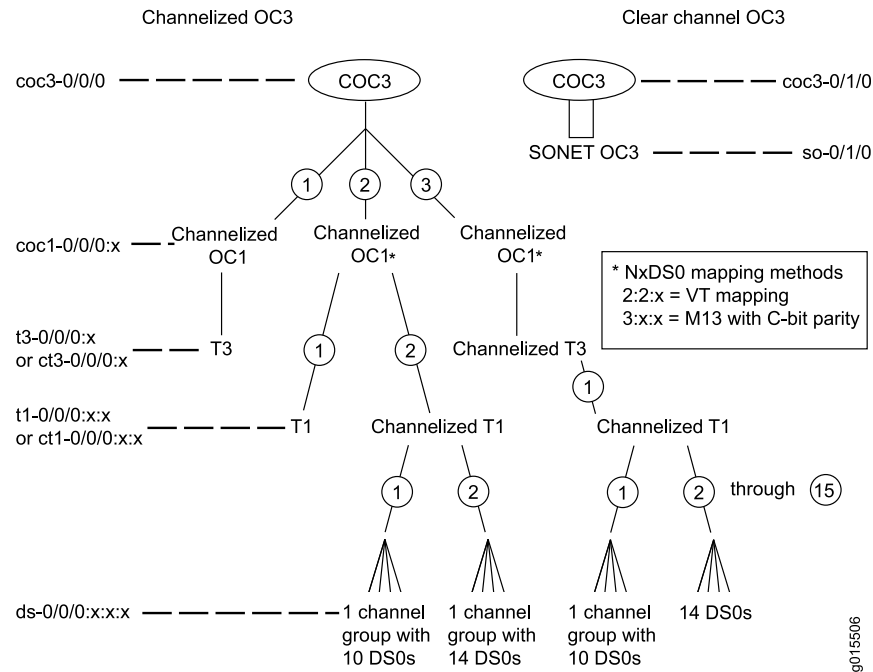


Figure 18 on page 81 shows a sample channelization structure for a channelized OC3 IQ interface. Top-level partitions 1, 2, and 3 create channelized OC1 interfaces. The first channelized OC1 interface, **coc1-0/0/0:1**, is converted directly into the T3 interface **t3-0/0/0:1**. The second channelized OC1 interface, **coc1-0/0/0:2**, is partitioned into a T1 interface and a channelized T1 interface. The channelized T1 interface, **t1-0/0/0:2:2**, is then further subdivided into two NxDS0 channel groups: **ds-0/0/0:2:2:1** and **ds-0/0/0:2:2:2**.

The remaining channelized OC1 interface, **coc1-0/0/0:3**, is converted to a channelized T3 interface, then to a channelized T1 interface, and ultimately to 14 individual NxDS0 channels and a channel group containing 10 NxDS0 channels. Additionally, channelized OC3 IQ interface **coc3-0/1/0** uses the **no-partition** statement at the **[edit interface interface-name]** hierarchy level to create a clear channel SONET OC3 interface **so-0/1/0**. This example shows two NxDS0 mapping methods. Partition 2:x:x uses VT mapping for SONET/SDH equipment, while partition 3:x:x uses M13 mapping for North American T-carrier equipment.

This example also assumes corresponding interfaces. For example, for every sublevel T1 interface you configure on Router A, assume you have configured a matching sublevel or physical T1 interface on a neighboring router.

```
Router A [edit]
interfaces {
  coc3-0/0/0 {
    partition 1 oc-slice 1 interface-type coc1; # Creates three channelized OC1
    partition 2 oc-slice 2 interface-type coc1; # interfaces: coc1-0/0/0:1 through
```

```

    partition 3 oc-slice 3 interface-type coc1; # coc1-0/0/0:3.
}
coc1-0/0/0:1 {
    no-partition interface-type t3; # This converts the COC1 interface into
}    # T3 interface t3-0/0/0:1.
t3-0/0/0:1 {
    no-keepalives;
    encapsulation cisco-hdlc;
    t3-options {
        fcs 32;
        feac-loop-respond;
    }
    unit 0 {
        family inet {
            address 10.21.21.2/30;
        }
    }
}
coc1-0/0/0:2 {
    partition 1 interface-type t1; # Creates the T1 interface t1-0/0/0:2:1.
    partition 2 interface-type ct1; # Creates the channelized T1 interface
}    # ct1-0/0/0:2:2.
t1-0/0/0:2:1 {
    no-keepalives;
    encapsulation cisco-hdlc;
    t1-options {
        fcs 32;
    }
    unit 0 {
        family inet {
            address 10.12.12.2/30;
        }
    }
}
ct1-0/0/0:2:2 {
    partition 1 timeslots 1-10 interface-type ds; # This converts the channelized T1
    partition 2 timeslots 11-24 interface-type ds; # interface into two channel
}    # groups: ds-0/0/0:2:2:1 and ds-0/0/0:2:2:2.
ds-0/0/0:2:2:1 { # This is a channel group with 10 NxDSOs bundled as one.
    no-keepalives;
    encapsulation cisco-hdlc;
    unit 0 {
        family inet {
            address 10.13.13.2/30;
        }
    }
}
ds-0/0/0:2:2:2 { # This is a channel group with 14 NxDSOs bundled as one.
    encapsulation frame-relay;
    unit 0 {
        dlci 10;
        family inet {
            address 10.14.14.2/30;
        }
    }
}
}

```

```

coc1-0/0/0:3 {
    partition 1 interface-type ct3; # Creates the channelized T3 interface
}
# ct3-0/0/0:3.
ct1-0/0/0:3:1 {
    partition 1 timeslots 1-10 interface-type ds; # Creates a channel group.
    partition 2 timeslots 11 interface-type ds; # Creates single NxDS0 channels.
    partition 3 timeslots 12 interface-type ds;
    partition 4 timeslots 13 interface-type ds;
    partition 5 timeslots 14 interface-type ds;
    partition 6 timeslots 15 interface-type ds;
    partition 7 timeslots 16 interface-type ds;
    partition 8 timeslots 17 interface-type ds;
    partition 9 timeslots 18 interface-type ds;
    partition 10 timeslots 19 interface-type ds;
    partition 11 timeslots 20 interface-type ds;
    partition 12 timeslots 21 interface-type ds;
    partition 13 timeslots 22 interface-type ds;
    partition 14 timeslots 23 interface-type ds;
    partition 15 timeslots 24 interface-type ds;
}
ds-0/0/0:3:1:1 { # This is a channel group with 10 NxDS0s bundled as one.
    no-keepalives;
    encapsulation cisco-hdlc;
    unit 0 {
        family inet {
            address 10.31.31.2/30;
        }
    }
}
ds-0/0/0:3:1:2 { # ds-0/0/0:3:1:2 through :15 are single NxDS0s channels.
    encapsulation frame-relay;
    unit 0 {
        dlci 10;
        family inet {
            address 10.32.32.2/30;
        }
    }
}
# Assume ds-0/0/0:3:1:3 through :14 are configured here.
ds-0/0/0:3:1:15 { # ds-0/0/0:3:1:2 through :15 are single NxDS0s channels.
    encapsulation frame-relay;
    unit 0 {
        dlci 10;
        family inet {
            address 10.45.45.2/30;
        }
    }
}
coc3-0/1/0 {
    no-partition interface-type so; # Creates a clear channel SONET OC3 interface.
}
so-0/1/0 { # This is the clear channel SONET OC3 interface so-0/1/0.
    dce;
    encapsulation frame-relay;
    unit 1 {
        dlci 11;
    }
}

```

```

        family inet {
            address 10.22.22.1/30;
        }
    }
}

```

Verifying Your Work

To verify correct operation of a channelized OC3 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for channelized OC3, OC3, T3, channelized T3, T1, and channelized T1 channels)

To view the interface names of the physical channelized OC3 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```

user@host> show interfaces controller coc3-0/0/0
Controller
coc3-0/0/0
    coc1-0/0/0:1
    t3-0/0/0:1
    coc1-0/0/0:2
        t1-0/0/0:2:1
        ct1-0/0/0:2:2
            ds-0/0/0:2:2:1
            ds-0/0/0:2:2:2
    coc1-0/0/0:3
    ct3-0/0/0:3
        ct1-0/0/0:3:1
            ds-0/0/0:3:1:1
            ds-0/0/0:3:1:2
            ds-0/0/0:3:1:3
            ds-0/0/0:3:1:4
            ds-0/0/0:3:1:5
            ds-0/0/0:3:1:6
            ds-0/0/0:3:1:7
            ds-0/0/0:3:1:8
            ds-0/0/0:3:1:9
            ds-0/0/0:3:1:10
            ds-0/0/0:3:1:11
            ds-0/0/0:3:1:12
            ds-0/0/0:3:1:13
            ds-0/0/0:3:1:14
            ds-0/0/0:3:1:15

```

	Admin	Link
coc3-0/0/0	up	up
coc1-0/0/0:1	up	up
t3-0/0/0:1	up	up
coc1-0/0/0:2	up	up
t1-0/0/0:2:1	up	up
ct1-0/0/0:2:2	up	up
ds-0/0/0:2:2:1	up	up
ds-0/0/0:2:2:2	up	up
coc1-0/0/0:3	up	up
ct3-0/0/0:3	up	up
ct1-0/0/0:3:1	up	up
ds-0/0/0:3:1:1	up	up
ds-0/0/0:3:1:2	up	up
ds-0/0/0:3:1:3	up	up
ds-0/0/0:3:1:4	up	up
ds-0/0/0:3:1:5	up	up
ds-0/0/0:3:1:6	up	up
ds-0/0/0:3:1:7	up	up
ds-0/0/0:3:1:8	up	up
ds-0/0/0:3:1:9	up	up
ds-0/0/0:3:1:10	up	up
ds-0/0/0:3:1:11	up	up
ds-0/0/0:3:1:12	up	up
ds-0/0/0:3:1:13	up	up
ds-0/0/0:3:1:14	up	up
ds-0/0/0:3:1:15	up	up

To verify that your channelized IQ interfaces are working as expected, use the **show interfaces** command. Use the **show interfaces controller** command to find the name of the channelized interface you want to view; then include this channelized name (for example, **ct3-0/0/0:3**) as an option with the **show interfaces** command.

The next sections provide sample **show interfaces** output for each of the major interface types configured in this example:

- [Channelized OC3 on page 85](#)
- [Channelized OC1 on page 85](#)
- [T3 on page 85](#)
- [Channelized T3 on page 86](#)
- [T1 on page 86](#)
- [Channelized T1 on page 87](#)
- [NxDS0 on page 87](#)
- [Clear Channel SONET OC3 on page 87](#)

Channelized OC3

```
user@host> show interfaces coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 1954
  Link-level type: Controller, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2005-02-15 20:35:24 PST (22:10:54 ago)
  SONET alarms   : None
  SONET defects  : None
```

Channelized OC1

```
user@host> show interfaces coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Up
  Interface index: 226, SNMP ifIndex: 1957
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,
  Loopback: None,
  Parent: coc3-0/0/0 Interface index 138
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-11-04 10:55:50 PST (05:38:36 ago)
  SONET alarms   : None
  SONET defects  : None
```

T3

```
user@host> show interfaces t3-0/0/0:1
Physical interface: t3-0/0/0:1, Enabled, Physical link is Up
  Interface index: 227, SNMP ifIndex: 43
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
  None, FCS: 16, Mode: C/Bit parity,
  Parent: coc1-0/0/0:1 Interface index 226
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  CoS queues     : 4 supported
```

```
Last flapped      : Never
Input rate       : 0 bps (0 pps)
Output rate      : 0 bps (0 pps)
Active alarms    : None
Active defects   : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0
Logical interface t3-0/0/0:1.0 (Index 69) (SNMP ifIndex 1960)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.21.21.0/30, Local: 10.21.21.2, Broadcast: 10.21.21.3
```

Channelized T3

```
user@host> show interfaces ct3-0/0/0:3
Physical interface: ct3-0/0/0:3, Enabled, Physical link is Up
  Interface index: 234, SNMP ifIndex: 2218
  Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
Mode: C/Bit parity,
  Parent: coc1-0/0/0:3 Interface index 233
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  Active alarms  : None
  Active defects : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0
```

T1

```
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: 229, SNMP ifIndex: 2091
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 32, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 228
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  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 70) (SNMP ifIndex 2092)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.12.12.0/30, Local: 10.12.12.2, Broadcast: 10.12.12.3
```

Channelized T1

```
user@host> show interfaces ct1-0/0/0:2:2
Physical interface: ct1-0/0/0:2:2, Enabled, Physical link is Up
  Interface index: 230, SNMP ifIndex: 13985
  Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 228
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  DS1 alarms     : None
  DS1 defects    : None
  SONET alarms   : None
  SONET defects  : None
```

NxDSO

```
user@host> show interfaces ds-0/0/0:2:1
Physical interface: ds-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 231, SNMP ifIndex: 14016
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 640kbps,
Loopback: None, FCS: 16,
  Parent: ct1-0/0/0:2:2 Interface index 230
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  CoS queues     : 8 maximum usable queues, 4 in use
  Egress queues  : 8 supported, 4 in use4 supported
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DSO 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-0/0/0:2:1.0 (Index 71) (SNMP ifIndex 20889)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.13.13.0/30, Local: 10.13.13.2, Broadcast: 10.13.13.3
```

Clear Channel SONET OC3

```
user@host> show interfaces so-0/1/0
Physical interface: so-0/1/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 15684
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode, Speed:
OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled
  Parent: coc3-0/1/0 Interface index 142
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-11-04 10:53:54 PST (05:51:04 ago)
  Input rate     : 0 bps (0 pps)
```

```

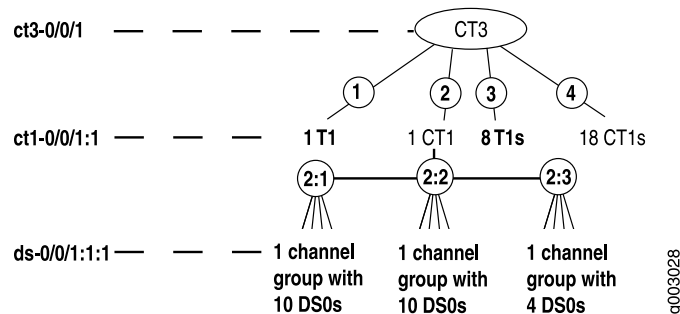
Output rate      : 0 bps (0 pps)
SONET alarms    : PLM-P
SONET defects    : PLM-P
Logical interface so-0/1/0.0 (Index 67) (SNMP ifIndex 15686)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.22.22.0/30, Local: 10.22.22.1, Broadcast: 10.22.22.3

```

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Channelized DS3 IQ Interface Configuration

Figure 19: Channelized DS3 IQ Interface Example



This example shows how to configure a channelized DS3 IQ interface. [Figure 19 on page 88](#) shows the breakdown of a DS3 interface into a variety of channels. The path that leads to $N \times$ DS0 channels is similar to the M13 with C-bit parity method seen previously in the complex OC12 configuration example (see “[Example: Complex Configuration for a Channelized OC12 IQ Interface](#)” on page 54). This method breaks the channelized DS3 IQ interface into channelized T1s before additional splits create DS0 time slots.

To create T1 channels, include the **partition** statement at the [edit interfaces **ct3-fpc/pic/port**] hierarchy level with the **interface-type t1** option. To create channelized T1 channels, include the **partition** statement at the [edit interfaces **ct3-fpc/pic/port**] hierarchy level with the **interface-type ct1** option.

After you have established a channelized T1 channel, you can split it into a maximum of 24 $N \times$ DS0 channels. To configure $N \times$ DS0 channels, include the **partition** statement at the [edit interfaces **ct1-fpc/pic/port:channel**] hierarchy level with the **timeslots** and **interface-type ds** options to create the desired number of $N \times$ DS0 channels or channel groups.

Although it is not part of the example shown, you can also create a clear channel T3 or a fractional T3 interface on a channelized DS3 IQ interface. To configure a clear channel T3 or fractional T3 interface, include the **no-partition** statement at the [edit interfaces **ct3-fpc/pic/port**] hierarchy level. After you commit this part of the configuration, a clear

channel T3 interface is established. You can configure standard T3 options on this interface. To fractionalize the T3 interface, include the **timeslots** statement at the **[edit interfaces t3-fpc/pic/port t3-options]** hierarchy level.

```
Router A [edit]
interfaces {
  ct3-0/0/1 { # This is the controller level for the channelized DS3 IQ interface.
    partition 1 interface-type t1; # This creates the t1-0/0/1:1 channel.
    partition 2 interface-type ct1; # This creates the ct1-0/0/1:2 channel.
    partition 3-10 interface-type t1; # This creates channels t1-0/0/1:3 through :10.
    partition 11-28 interface-type ct1; # This creates channels ct1-0/0/1:11 to :28.
  }
  t1-0/0/1:1 {
    ...
  }
  ct1-0/0/1:2 {
    partition 1 timeslots 1-10 interface-type ds; # These statements create
    partition 2 timeslots 11-20 interface-type ds; # three channel groups.
    partition 3 timeslots 21-24 interface-type ds;
  }
  ds-0/0/1:2:1 { # This channel group contains 10 NxDS0s.
    unit 0 {
      family inet {
        address 10.25.1.2/24;
      }
    }
  }
  ds-0/0/1:2:2 { # This channel group contains 10 NxDS0s.
    unit 0 {
      family inet {
        address 10.25.2.2/24;
      }
    }
  }
  ds-0/0/1:2:3 { # This channel group contains 4 NxDS0s.
    unit 0 {
      family inet {
        address 10.25.3.2/24;
      }
    }
  }
  t1-0/0/1:3 {
    ...
  }
  t1-0/0/1:10 {
    ...
  }
  ct1-0/0/1:11 {
    ...
  }
  ct1-0/0/1:28 {
    ...
  }
}
```

Verifying Your Work

To verify correct operation of a channelized DS3 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for T3, channelized T3, T1, and channelized T1 channels)

To view the interface names of the physical channelized DS3 IQ interface and the channels configured on this interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller ct3-0/0/1
Controller
ct3-0/0/1
# This is the physical channelized DS3 (channelized T3) IQ interface.
  ct1-0/0/1:1
# Channel 1 is a channelized T1 interface.
  ct1-0/0/1:2
    ds-0/0/1:2:1
    ds-0/0/1:2:2
    ds-0/0/1:2:3
  ct1-0/0/1:3
  ct1-0/0/1:4
  ct1-0/0/1:5
  ct1-0/0/1:6
  ct1-0/0/1:7
  ct1-0/0/1:8
  ct1-0/0/1:9
  ct1-0/0/1:10
# Channels 3 through 10 are T1 interfaces.
  ct1-0/0/1:11
  ct1-0/0/1:12
  ct1-0/0/1:13
  ct1-0/0/1:14
  ct1-0/0/1:15
  ct1-0/0/1:16
  ct1-0/0/1:17
  ct1-0/0/1:18
  ct1-0/0/1:19
  ct1-0/0/1:20
  ct1-0/0/1:21
  ct1-0/0/1:22
  ct1-0/0/1:23
  ct1-0/0/1:24
  ct1-0/0/1:25
  ct1-0/0/1:26
  ct1-0/0/1:27
  ct1-0/0/1:28
# Channels 11 through 28 are channelized T1 interfaces.
```

Controller	Admin	Link
ct3-0/0/1	up	up
ct1-0/0/1:1	up	up
ct1-0/0/1:2	up	up
ds-0/0/1:2:1	up	up
ds-0/0/1:2:2	up	up
ds-0/0/1:2:3	up	up
ct1-0/0/1:3	up	down
ct1-0/0/1:4	up	up
ct1-0/0/1:5	up	up
ct1-0/0/1:6	up	up
ct1-0/0/1:7	up	up
ct1-0/0/1:8	up	up
ct1-0/0/1:9	up	up
ct1-0/0/1:10	up	up
ct1-0/0/1:11	up	up
ct1-0/0/1:12	up	up
ct1-0/0/1:13	up	up
ct1-0/0/1:14	up	up
ct1-0/0/1:15	up	up
ct1-0/0/1:16	up	up
ct1-0/0/1:17	up	up
ct1-0/0/1:18	up	up
ct1-0/0/1:19	up	up
ct1-0/0/1:20	up	up
ct1-0/0/1:21	up	up
ct1-0/0/1:22	up	up
ct1-0/0/1:23	up	up
ct1-0/0/1:24	up	up
ct1-0/0/1:25	up	up
ct1-0/0/1:26	up	up
ct1-0/0/1:27	up	up
ct1-0/0/1:28	up	up

To view information about the physical channelized interface, include the **ct3-fpc/pic/port** option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
Interface index: 30, SNMP ifIndex: 317, Generation: 29
Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
```

```

Device flags      : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags       : None
Hold-times       : Up 0 ms, Down 0 ms
Last flapped     : 2002-10-04 10:24:18 PDT (01:40:40 ago)
Statistics last cleared: 2002-10-04 11:47:27 PDT (00:17:31 ago)
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: 0, Errors: 0, Drops: 0, Aged packets: 0
Active alarms    : None
Active defects   : None
DS3 media:
Seconds          Count  State
PLL Lock         0       0 OK
Reframing        0       0 OK
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
HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 0, Runt threshold: 0
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
Packet Forwarding Engine configuration:
Destination slot: 0 (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

```

To view information about a channelized T1 channel, include the **ct1-fpc/pic/port:channel** option with the **show interfaces** command:

```

user@RouterA> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
Interface index: 175, SNMP ifIndex: 1505, Generation: 174

```

```

Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-04 12:08:23 PDT (00:05:57 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, 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: 0, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms   : None
DS1 defects  : AIS, LOF
T1 media:
  Seconds      Count  State
  SEF          0       0 OK
  BEE          1       1 OK
  AIS         355       1 Defect Active
  LOF         355       1 Defect Active
  LOS          0       0 OK
  YELLOW       0       0 OK
  BPV          0       0
  EXZ          0       0
  LCV          0       0
  PCV          0       0
  CS           0       0
  LES         355
  ES          355
  SES         355
  SEFS        355
  BES         0
  UAS         0
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
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)
  CoS transmit queue      Bandwidth      Buffer Priority Limit
                           %      bps      %      bytes
  0 best-effort           95      1459200  95      0      low  none
  3 network-control       5       76800   5       0      low  none

```


To view information about an NxDSO interface, include the **ds-fpc/pic/port:channel** option with the **show interfaces** command. In this case, the speed is 640 Kbps because this channel contains 10 DSOs ($64 \times 10 = 640$).

```

user@RouterA> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2 (Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-04 12:09:06 PDT (00:05:54 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, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC 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           0                0                0
    1 expedited-fo         0                0                0
    2 assured-forw         0                0                0
    3 network-cont         0                0                0

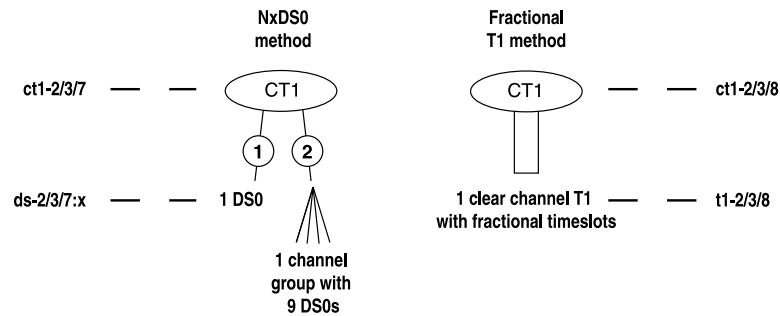
  Interface transmit queues:
    B/W  WRR  Packets  Bytes  Drops  Errors
  Queue0  0   0      0      0      0      0
  Queue1  0   0      0      0      0      0
  HDLC configuration:
    Giant threshold: 0, Runt threshold: 0
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x10)
    CoS transmit queue  Bandwidth  Buffer Priority  Limit
                        %      bps      %      bytes
    0 best-effort       95      608000  95      0      low  none
    3 network-control   5       32000   5       0      low  none

```

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Channelized T1 IQ Interface Configuration

Figure 20: Channelized T1 IQ Interface Example



The following example shows two ways to configure a channelized T1 IQ interface. Figure 20 on page 94 shows a fractional T1 method and the NxDSO method seen previously in the complex OC12 configuration example (see “[Example: Complex Configuration for a Channelized OC12 IQ Interface](#)” on page 54). The NxDSO method breaks the channelized T1 IQ interface into discrete DS0 blocks, whereas the fractional method creates a clear channel T1 that is segmented by time slots.

To configure NxDSO channels, include the **partition** statement at the **[edit interfaces ct1-fpc/pic/port]** hierarchy level. Include the **timeslots** and **interface-type ds** options to create the desired number of NxDSO interfaces in time slots 1 through 24.

To configure a clear channel T1 on a channelized T1 IQ interface, include the **no-partition** statement with the **interface-type t1** option at the **[edit interfaces ct1-fpc/pic/port]** hierarchy level. After you commit this configuration, you can create a fractional T1 on the clear channel T1 interface. To do so, include the **timeslots** statement at the **[edit interfaces t1-fpc/pic/port t1-options]** hierarchy level and specify the number of DS0 blocks to be allowed in the fractional T1 interface. The minimum number of 64-Kbps DS0 blocks you can configure is 1 and the maximum is 24.

Usually, you configure loopback statements at the controller level for all IQ-based channelized interfaces. One exception for channelized T1 IQ interfaces is that you must configure a payload loopback on a T1 IQ interface instead of the controller-level channelized T1 IQ interface. To configure, include the **payload** option at the **[edit interfaces t1-fpc/pic/port t1-options loopback]** hierarchy level.

```
Router A—NxDSO Method
[edit]
interfaces {
  ct1-2/3/7 {
    partition 1 timeslots 10 interface-type ds; # Creates NxDSO channel ds-2/3/7:1.
    partition 2 timeslots 1-9 interface-type ds; # Creates a channel group with
  } # 9 NxDSOs.
  ds-2/3/7:1 {
    unit 0 {
      family inet {
        address 10.25.1.2/24;
      }
    }
  }
}
```

```

ds-2/3/7:2 {
  unit 0 {
    family inet {
      address 10.25.2.2/24;
    }
  }
}

```

Router A—Fractional T1 Method

```

[edit]
interfaces {
  ct1-2/3/8 {
    no-partition interface-type t1; # This creates a single T1 channel: t1-2/3/8.
  }
  t1-2/3/8 {
    t1-options {
      timeslots 1-2; # This statement enables only 2 of the 24 NxDS0 time slots
    } # available on t1-2/3/8.
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}

```

Verifying Your Work

To verify correct operation of a channelized T1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized T1 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```

user@RouterA> show interfaces controller ct1-2/3/7
Controller                               Admin Link
ct1-2/3/7                                up      up
      ds-2/3/7:1                          up      up
      ds-2/3/7:2                          up      up
# ct1-2/3/7 is the physical channelized T1 IQ interface, and ds-2/3/7:1 and
ds-2/3/7:2 are the resulting N xDS0 interfaces.
user@RouterA> show interfaces controller ct1-2/3/8
Controller                               Admin Link
ct1-2/3/8                                up      up
t1-2/3/8                                  up      up
# ct1-2/3/8 is the physical channelized T1 IQ interface, and t1-2/3/8 is the
resulting T1 interface.

```

To view information about the physical channelized interface, include the **ct1-fpc/pic/port** option with the **show interfaces** command:

```

user@RouterA> show interfaces ct1-2/3/7

```

```
Physical interface: ct1-2/3/7, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128, Generation: 27
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags : None
  Hold-times : Up 0 ms, Down 0 ms
  CoS queues : 4 supported
  Last flapped : 2005-08-01 18:00:12 PDT (1d 00:31 ago)
  Input rate : 0 bps (0 pps)
  Output rate : 0 bps (0 pps)
  Statistics last cleared: Never
  DS1 alarms : None
  DS1 defects : None
  Line encoding: B8ZS
```

```
user@RouterA> show interfaces ct1-2/3/8
```

```
Physical interface: ct1-2/3/8, Enabled, Physical link is Up
  Interface index: 25, SNMP ifIndex: 1134, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
  FCS: 16, Framing: G704, Parent: None
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags : None
  Hold-times : Up 0 ms, Down 0 ms
  CoS queues : 4 supported
  Last flapped : 2005-08-01 18:00:11 PDT (1d 00:30 ago)
  Input rate : 0 bps (0 pps)
  Output rate : 0 bps (0 pps)
  Statistics last cleared: Never
  DS1 alarms : None
  DS1 defects : None
  Line encoding: B8ZS
```

To view information about an NxDS0 interface, include the ***ds-fpc/pic/port:channel*** option with the **show interfaces** command:

```
user@RouterA> show interfaces ds-2/3/7:1 detail
```

```
Physical interface: ds-2/3/7:1, Enabled, Physical link is Up
  Interface index: 73, SNMP ifIndex: 1202, Generation: 325
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback: None,
  FCS: 16, Parent: ct1-2/3/7 Interface index 18
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 : 11 (last seen 00:00:02 ago)
    Output: 10 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Opened, mpls: Not-configured
  CHAP state: Not-configured
  CoS queues : 4 supported
  Last flapped : 2005-08-03 12:30:37 PDT (00:10:26 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 559 56 bps
    Output bytes : 656 56 bps
```

```

Input packets:          33          0 pps
Output packets:         36          0 pps
Queue counters:         Queued packets  Transmitted packets  Dropped packets
0 best-effort           40             40             0
1 expedited-fo           0             0             0
2 assured-forw           0             0             0
3 network-cont          0             0             0
Logical interface ds-2/3/7:1.0 (Index 36) (SNMP ifIndex 1266) (Generation 153)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 352, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.25.1/24, Local: 10.25.1.2, Broadcast: 10.25.1.255,
Generation: 445
Protocol iso, MTU: 1500, Generation: 353, Route table: 0
Flags: Is-Primary
Protocol inet6, MTU: 1500, Generation: 354, Route table: 0
Flags: Is-Primary
Addresses, Flags: Is-Preferred
Destination: fe80::/64, Local: fe80::2a0:a5ff:fe3d:ac6, Broadcast: Unspecified,
Generation: 446
Addresses, Flags: Is-Preferred Is-Primary
Destination: feee::10:25:1:0/126, Local: feee::10:25:1:2,
Broadcast: Unspecified, Generation: 448

```

To view information about a T1 or fractional T1 interface, include the **t1-*fpc/pic/port*** option with the **show interfaces** command. The **Speed:** field shows if the interface is a full T1(T1) or a fractional T1 (increments of 64 Kbps). In this case, **t1-2/3/8** is a fractional T1 using two 64-Kbps time slots for a total speed of 128 Kbps.

```

user@RouterA> show interfaces t1-2/3/8 detail
Physical interface: t1-2/3/8, Enabled, Physical link is Up
Interface index: 89, SNMP ifIndex: 1278, Generation: 341
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 128kbps,
Loopback: None, FCS: 16, Parent: ct1-2/3/8 Interface index 25
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
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 : 4 (last seen 00:00:05 ago)
Output: 3 (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 : 2005-08-03 12:30:37 PDT (01:17:36 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :          189          0 bps
Output bytes :          478          0 bps
Input packets:          13          0 pps
Output packets:         28          0 pps
Queue counters:         Queued packets  Transmitted packets  Dropped packets
0 best-effort           28             28             0
1 expedited-fo           0             0             0

```

2	assured-forw	0	0	0
3	network-cont	0	0	0

DS1 alarms : None

DS1 defects : None

Logical interface t1-2/3/8.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)

Flags: Point-To-Point SNMP-Traps Encapsulation: PPP

Protocol inet, MTU: 1500, Generation: 401, Route table: 0

Flags: None

Addresses, Flags: Is-Preferred Is-Primary

Destination: 10.255.126/24, Local: 10.255.126.2,

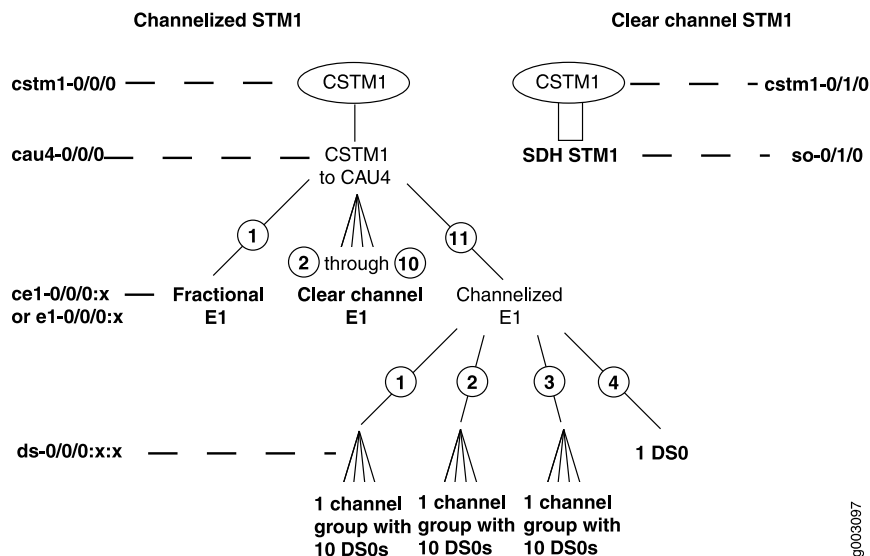
Broadcast: 10.255.126.255, Generation: 525

Related Documentation

- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
- [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Channelized STM1 IQ Interface Configuration

Figure 21: Channelized STM1 IQ Interface Example



This example shows how to configure a channelized STM1 IQ interface on M-series or T-series routing platforms. [Figure 21 on page 98](#) shows the breakdown of one channelized STM1 IQ interface into a variety of channels and the conversion of the second interface into a clear channel STM1.

For the first interface, you must first convert the STM1 interface into a channelized Administrative Unit 4 (AU-4) interface with the **no-partition** and **interface-type cau-4** statements at the `[edit interfaces cstm1-fpc/pic/port]` hierarchy level. You must specify KLM or ITU-T AU-4 formatting with the **vtmapping** statement at the `[edit interfaces cau4-fpc/pic/port sonet-options]` hierarchy level. From the channelized AU-4 interface, you can create E1 channels or channelized E1 channels. The channelized E1 channels can be further broken into DS0 time slots.

To create E1 channels, include the **partition** statement at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level with the **interface-type e1** option. To create channelized E1 channels, include the **partition** statement at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level with the **interface-type ce1** option.

After you have established a channelized E1 channel, you can split it into a maximum of 31 NxDSO channels. To create the desired number of NxDSO channels, include the **partition** statement with the **timeslots** and **interface-type ds** options at the **[edit interfaces ce1-fpc/pic/port:channel]** hierarchy level. Time slot 1 is reserved in an NxDSO-based channelized E1 channel, so you can use time slots 2 through 32.

To create an NxDSO channel group, include a range of time slots after the **timeslots** option.

You can also create fractional E1 interfaces on a channelized STM1 IQ interface. To configure a fractional E1 interface, include the **partition** statement at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level and select the **interface-type e1** option. After you commit this part of the configuration, a clear channel E1 interface is established. You can configure standard E1 options on this interface. To fractionalize the E1 interface, include the **timeslots** statement at the **[edit interfaces e1-fpc/pic/port e1-options]** hierarchy level. Time slot 1 is reserved in a fractional E1 channel, so you can use time slots 2 through 32.

In the second interface shown in [Figure 21 on page 98](#), you convert the channelized STM1 IQ interface into a clear channel STM1 interface. To configure, include the **no-partition** and **interface-type so** statements at the **[edit interfaces cstm1-fpc/pic/port]** hierarchy level.

```
[edit]
interfaces {
  cau4-0/0/0 {
    partition 1-10 interface-type e1; # Creates interfaces e1-0/0/0:1 through :10.
    partition 11 interface-type ce1; # Creates a single channelized E1 interface:
    sonet-options {          # e1-0/0/0:11.
      vtmapping itu-t; # This selects ITU-T as the VT mapping frame format.
    }
  }
  cstm1-0/0/0 {
    no-partition interface-type cau4; # Creates a channelized AU-4 interface:
    } # cau4-0/0/0.
  e1-0/0/0:1 { # Channel e1-0/0/0:1 is a fractional E1 interface.
    encapsulation ppp;
    e1-options {
      timeslots 2-21; # Setting time slots on an E1 channel makes a fractional E1.
    }
    unit 0 {
      family inet {
        address 10.133.0.1/30;
      }
    }
  }
  e1-0/0/0:2 { # Channels e1-0/0/0:2 through :10 are standard E1 interfaces.
    encapsulation ppp;
    unit 0 {
      family inet {
```

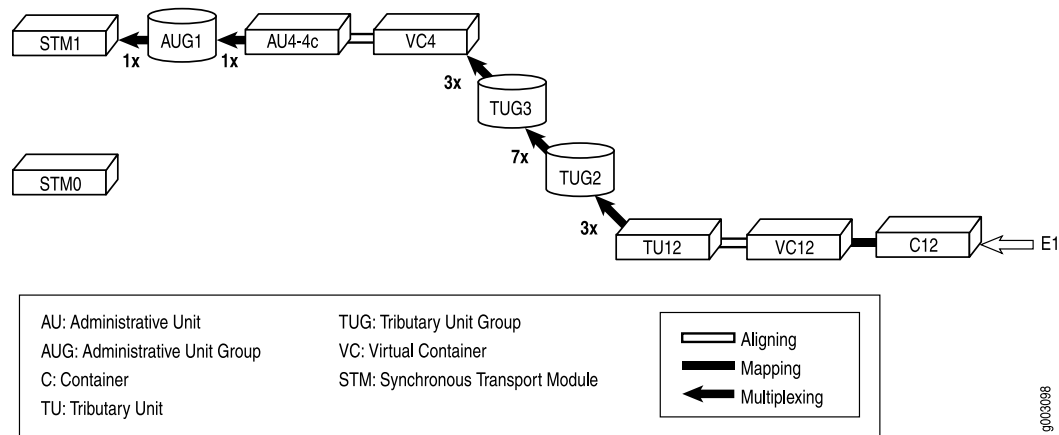
```

        address 10.133.0.5/30;
    }
}
...
e1-0/0/0:10 {
    encapsulation ppp;
    unit 0 {
        family inet {
            address 10.133.0.37/30;
        }
    }
}
ce1-0/0/0:11 { # Channel ce1-0/0/0:11 is a channelized E1 interface.
    partition 1 timeslots 2-11 interface-type ds; # These statements
    partition 2 timeslots 12-21 interface-type ds; # create channel groups.
    partition 3 timeslots 22-31 interface-type ds;
    partition 4 timeslots 32 interface-type ds; # This statement creates a single NXDSO
    channel.
}
ds-0/0/0:11:1 { # This channel group contains 10 DS0s.
    unit 0 {
        family inet {
            address 10.134.1.1/30;
        }
    }
}
ds-0/0/0:11:2 { # This channel group contains 10 DS0s.
    unit 0 {
        family inet {
            address 10.134.2.1/30;
        }
    }
}
ds-0/0/0:11:3 { # This channel group contains 10 DS0s.
    unit 0 {
        family inet {
            address 10.134.3.1/30;
        }
    }
}
ds-0/0/0:11:4 { # Channel ds-0/0/0:11:4 is a standard DS0 interface.
    unit 0 {
        family inet {
            address 10.134.4.1/30;
        }
    }
}
}

```

[Figure 22 on page 101](#) shows a visual representation of the E1-to-STM1 SDH mapping method used by Juniper Networks in its channelized STM1 IQ interface.

Figure 22: Channelized STM1 IQ Interface SDH Mapping Method



Verifying Your Work

To verify correct operation of a channelized STM1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for channelized STM1, E1, and channelized E1 channels)

To view the interface names of the physical channelized STM1 IQ interface and the channels configured on this interface, use the **show interfaces controller** command:

```

user@router> show interfaces controller cstm1-0/0/0
Controller
cstm1-0/0/0
cau4-0/0/0
  e1-0/0/0:1
  e1-0/0/0:2
  e1-0/0/0:3
  e1-0/0/0:4
  e1-0/0/0:5
  e1-0/0/0:6
  e1-0/0/0:7
  e1-0/0/0:8
  e1-0/0/0:9
  e1-0/0/0:10
  ce1-0/0/0:11
    ds-0/0/0:11:1
    ds-0/0/0:11:2
    ds-0/0/0:11:3
    ds-0/0/0:11:4

```

Controller	Admin	Link
cstm1-0/0/0	up	up
cau4-0/0/0	up	up
e1-0/0/0:1	up	up
e1-0/0/0:2	up	up
e1-0/0/0:3	up	up
e1-0/0/0:4	up	up
e1-0/0/0:5	up	up
e1-0/0/0:6	up	up
e1-0/0/0:7	up	up
e1-0/0/0:8	up	up
e1-0/0/0:9	up	up
e1-0/0/0:10	up	up
ce1-0/0/0:11	up	up
ds-0/0/0:11:1	up	up
ds-0/0/0:11:2	up	up
ds-0/0/0:11:3	up	up
ds-0/0/0:11:4	up	up

To view information about the physical channelized interface, include the **cstm1-fpc/pic/port** option with the **show interfaces** command:

```

user@router> show interfaces cstm1-0/0/0
Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 35
Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: None

```

```

Device flags    : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags     : None
Last flapped   : 2003-02-06 15:01:56 PST (07:15:06 ago)
SDH alarms    : None
SDH defects    : None

```

To view information about the channelized AU-4 channel, include the **cau4-fpc/pic/port** option with the **show interfaces** command:

```

user@router> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
  Interface index: 147, SNMP ifIndex: 36
  Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: cstm1-0/0/0 Interface index 146
  Device flags    : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 19:36:31 PST (02:40:42 ago)
  SDH alarms    : None
  SDH defects    : None

```

To view information about an E1 channel, include the **e1-fpc/pic/port:channel** option with the **show interfaces** command. In this case, the fractional E1 appears as channel **e1-0/0/0:1** and the normal E1 appears as channel **e1-0/0/0:2**.

```

user@router> show interfaces e1-0/0/0:1
Physical interface: e1-0/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 33
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 1280kbps ,
# Because the fractional E1 uses 20 time slots, 20 x 64 Kbps = 1280 Kbps.
Loopback: None, FCS: 16, Framing: G704,
  Parent: cau4-0/0/0 Interface index 147
  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: 1055 (00:00:03 ago), Output: 1059 (00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 16 bps (0 pps)
  Output rate    : 16 bps (0 pps)
  DS1 alarms    : None
  DS1 defects    : None
  SDH alarms    : None
  SDH defects    : None
Logical interface e1-0/0/0:1.0 (Index 67) (SNMP ifIndex 169)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.133.0.0/30, Local: 10.133.0.1

```

```

user@router> show interfaces e1-0/0/0:2
Physical interface: e1-0/0/0:2, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 34
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,

```

```

Loopback: None, FCS: 16, Framing: G704,
Parent: cau4-0/0/0 Interface index 147
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: 917 (00:00:05 ago), Output: 915 (00:00:01 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Not-configured
Last flapped : Never
Input rate : 16 bps (0 pps)
Output rate : 16 bps (0 pps)
DS1 alarms : None
DS1 defects : None
SDH alarms : None
SDH defects : None
Logical interface e1-0/0/0:2.0 (Index 68) (SNMP ifIndex 170)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Bandwidth: 0
Protocol inet, MTU: 1500
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.133.0.4/30, Local: 10.133.0.5

```

To view information about a CE1 channel, include the **ce1-fpc/pic/port:channel** option with the **show interfaces** command:

```

user@router> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
Interface index: 169, SNMP ifIndex: 288
Link-level type: Controller, Clocking: Internal, Speed: E1, Loopback: None,
Framing: G704, Parent: cau4-0/0/0 Interface index 147
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags : None
Last flapped : 2003-02-06 22:05:23 PST (00:13:45 ago)
DS1 alarms : None
DS1 defects : None
SDH alarms : None
SDH defects : None

```

To view information about an NxDS0 interface, include the **ds-fpc/pic/port:channel:channel** option with the **show interfaces** command. For channel group **ds-0/0/0:11:1**, the speed of the link is 640 Kbps because it contains 10 DS0s ($64 \times 10 = 640$). For single DS0 channel **ds-0/0/0:11:4**, the speed of the link is the standard 64 Kbps.

```

user@router> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
Interface index: 170, SNMP ifIndex: 289
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
Loopback: Illegal, FCS: 16,
Parent: ce1-0/0/0:11 Interface index 169
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: 0 (never), Output: 0 (never)
LCP state: Conf-req-sent
NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:

```

```

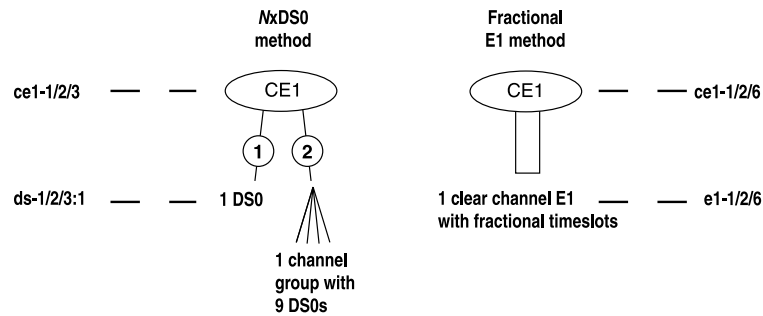
Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.134.1.0/30, Local: 10.134.1.1
user@router> show interfaces ds-0/0/0:11:4
Physical interface: ds-0/0/0:11:4, Enabled, Physical link is Up
  Interface index: 173, SNMP ifIndex: 295
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback:
Illegal, FCS: 16,
  Parent: ce1-0/0/0:11 Interface index 169
  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: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DSO 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-0/0/0:11:4.0 (Index 80) (SNMP ifIndex 296)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.134.4.0/30, Local: 10.134.4.1

```

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: Channelized E1 IQ Interface Configuration

Figure 23: Channelized E1 IQ Interface Example



This example shows two ways to configure a channelized E1 IQ interface.

Figure 23 on page 105 shows a fractional E1 method and the NxDS0 method seen previously in the complex OC12 configuration example (see “[Example: Complex Configuration for a Channelized OC12 IQ Interface](#)” on page 54). The NxDS0 method breaks the channelized E1 IQ interface into discrete DS0 blocks, whereas the fractional method creates a clear channel E1 that is segmented by time slots.

To configure NxDS0 channels, include the **partition** statement at the **[edit interfaces ce1-fpc/pic/port]** hierarchy level. Include the **timeslots** and **interface-type ds** options to create the desired number of NxDS0 interfaces in time slots 2 through 32.

To configure a fractional E1 on a channelized E1 IQ interface, include the **no-partition** statement at the **[edit interfaces ce1-fpc/pic/port]** hierarchy level. After you commit this configuration, configure standard E1 options on the clear channel E1 interface. Include the **timeslots** statement at the **[edit interfaces e1-fpc/pic/port e1-options]** hierarchy level. Time slot 1 is reserved; use time slots 2 through 32.

Router A—NxDS0 Method

```
[edit]
interfaces {
  ce1-1/2/3 {
    partition 1 timeslots 11 interface-type ds; # Creates NxDS0 channel ds-1/2/3:1.
    partition 2 timeslots 2-10 interface-type ds; # Creates a channel group with
  } # 9 NxDS0s.
  ds-1/2/3:1 {
    unit 0 {
      family inet {
        address 10.25.1.2/24;
      }
    }
  }
  ds-1/2/3:2 {
    unit 0 {
      family inet {
        address 10.25.2.2/24;
      }
    }
  }
}
```

```

    }
  }
}

Router A—Fractional E1
Method
[edit]
interfaces {
  ce1-1/2/6 {
    no-partition interface-type e1; # This creates a single E1 channel: e1-1/2/6.
  }
  e1-1/2/6 {
    e1-options {
      timeslots 2-3; # This statement enables only 2 of the 31 NxDS0 time slots
    } # available on e1-1/2/6. You can use time slots 2 through 32.
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
}

```

Verifying Your Work

To verify correct operation of a channelized E1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for E1 and channelized E1 channels)

To view the interface names of the physical channelized E1 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```

user@RouterA> show interfaces controller ce1-1/2/3
Controller
ce1-1/2/3
# This is the physical channelized E1 IQ interface.
ds-1/2/3:1
ds-1/2/3:2
# These are the resulting N xDS0 interfaces.
user@RouterA> show interfaces controller ce1-1/2/6
Controller
ce1-1/2/6
# This is the physical channelized E1 IQ interface.
e1-1/2/6
# This is the resulting E1 interface.

```

	Admin Link
	up up
	up up
	up up
	up up

To view information about the physical channelized interface, include the **ce1-fpc/pic/port** option with the **show interfaces** command:

```

user@RouterA> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
Interface index: 18, SNMP ifIndex: 1128
Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704, Parent: None
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps

```

```

Link flags      : None
Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
DS1 alarms     : None
DS1 defects    : None
user@RouterA> show interfaces ce1-1/2/6
Physical interface: ce1-1/2/6, Enabled, Physical link is Up
  Interface index: 25, SNMP ifIndex: 1134
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:
  None,
  FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2002-10-04 17:52:51 PDT (00:34:49 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms     : None
  DS1 defects    : None

```

To view information about an NxDSO interface, include the **ds-fpc/pic/port:channel** option with the **show interfaces** command:

```

user@RouterA> show interfaces ds-1/2/3:1 detail

Physical interface: ds-1/2/3:1, Enabled, Physical link is Up
  Interface index: 73, SNMP ifIndex: 1202, Generation: 325
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback: None,
  FCS: 16, Parent: ce1-1/2/3 (Index 18)
  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 : 11 (last seen 00:00:02 ago)
    Output: 10 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Opened, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-04 18:24:32 PDT (00:01:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :          559          56 bps
    Output bytes  :          656          56 bps
    Input packets :           33           0 pps
    Output packets:           36           0 pps
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets
    0 best-effort   40                  40                0
    1 expedited-fo  0                   0                0
    2 assured-forw  0                   0                0
    3 network-cont  0                   0                0
  Logical interface ds-1/2/3:1.0 (Index 36) (SNMP ifIndex 1266) (Generation 153)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 352, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.25.1/24, Local: 10.25.1.2, Broadcast: Unspecified,
    Generation: 445
  Protocol iso, MTU: 1500, Generation: 353, Route table: 0

```

```

Flags: Is-Primary
Protocol inet6, MTU: 1500, Generation: 354, Route table: 0
Flags: Is-Primary
Addresses, Flags: Is-Preferred
  Destination: fe80::/64, Local: fe80::2a0:a5ff:fe3d:ac6, Broadcast: Unspecified,
  Generation: 446
Addresses, Flags: Is-Preferred Is-Primary
  Destination: feee::10:25:1:0/126, Local: feee::10:25:1:2,
  Broadcast: Unspecified, Generation: 448

```

To view information about the fractional E1 interface, include the **e1-fpc/pic/port** option with the **show interfaces** command:

```

user@RouterA> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,

FCS: 16, Framing: G704, Parent: ce1-1/2/6 (Index 25)
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 : 4 (last seen 00:00:05 ago)
  Output: 3 (last sent 00:00:09 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mp1s:
Not-configured
CHAP state: Not-configured
Last flapped   : 2002-10-04 18:28:27 PDT (00:01:07 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          189          0 bps
  Output bytes  :          478          0 bps
  Input packets:           13          0 pps
  Output packets:         28          0 pps
Queue counters:      Queued packets  Transmitted packets  Dropped packets

  0 best-effort          28             28             0
  1 expedited-fo         0              0             0
  2 assured-forw         0              0             0
  3 network-cont         0              0             0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: Unknown (0)
Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 401, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.255.126/24, Local: 10.255.126.2, Broadcast: Unspecified,

```


Generation: 525

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

Example: DLCI Class of Service on a Channelized IQ Interface Configuration

This example applies class of service at the logical interface level on a clear channel T3 interface derived from a channelized DS3 IQ interface. (For more information on configuring a channelized DS3 IQ interface, see [“Example: Channelized DS3 IQ Interface Configuration” on page 88.](#))

Configure a scheduler map, complete with the desired transmit rates, buffer sizes, and service classes. Once the scheduler map is ready, enable logical interface-level class of service with the **per-unit-scheduler** statement at the **[edit interfaces *interface-name*]** hierarchy level. Also, configure a DLCI for each logical interface with the **dcli *dcli-number*** statement at the **[edit interfaces *interface-name* unit *unit-number*]** hierarchy level. Finally, configure the logical interfaces for class of service with the **scheduler-map** and **shaping-rate** statements at the **[edit class-of-service interfaces *interface-name* unit *unit-number*]** hierarchy level. These statements specify which scheduler map to associate with each logical interface and how much bandwidth to reserve for the DLCI queues.

```
[edit]
interfaces {
  ct3-3/1/0 {
    no-partition interface-type t3; # This converts the channelized DS3 IQ
  }
  t3-3/1/0 {
    per-unit-scheduler; # This enables scheduling at the logical interface level.
    encapsulation frame-relay;
    unit 0 { # The logical interface where scheduler map sched-0 takes effect.
      dcli 100; # The DLCI affected by scheduler map sched-0.
      family inet {
        address 10.40.1.1/30;
      }
    }
    unit 1 { # The logical interface where scheduler map sched-1 takes effect.
      dcli 101; # The DLCI affected by scheduler map sched-1.
      family inet {
        address 10.40.2.1/30;
      }
    }
  }
}
class-of-service {
  interfaces {
    t3-3/1/0 { # This specifies the channel where the scheduled DLCI is located.
      unit 0 { # This specifies the logical interface for the first scheduled DLCI.
        scheduler-map sched-0; # This applies a scheduler map to the first DLCI.
        shaping-rate 10m; # This reserves bandwidth for scheduler map sched-0.
      }
    }
  }
}
```

```
        unit 1 { # This specifies the logical interface for the second scheduled DLCI.
            scheduler-map sched-1; # Applies a scheduler map to the second DLCI.
            shaping-rate 10m; # This reserves bandwidth for scheduler map sched-1.
        }
    }
}
scheduler-maps {
    sched-0 { # This is where classes of service are associated with a scheduler.
        forwarding-class assured-forwarding scheduler af;
        forwarding-class best-effort scheduler be;
        forwarding-class expedited-forwarding scheduler ef;
    }
    sched-1 { # This is where classes of service are associated with a scheduler.
        forwarding-class assured-forwarding scheduler af-1;
        forwarding-class best-effort scheduler be-1;
        forwarding-class expedited-forwarding scheduler ef-1;
    }
}
schedulers {
    af {
        transmit-rate percent 10;
        buffer-size percent 10;
    }
    be {
        transmit-rate percent 20;
        buffer-size percent 20;
    }
    ef {
        transmit-rate percent 70;
        buffer-size percent 70;
    }
    af-1 {
        transmit-rate percent 10;
        buffer-size percent 10;
    }
    be-1 {
        transmit-rate percent 30;
        buffer-size percent 30;
    }
    ef-1 {
        transmit-rate percent 60;
        buffer-size percent 60;
    }
}
}
```

Verifying Your Work

To verify correct operation of class-of-service schedulers on a channelized IQ interface, use the following commands:

- **show class-of-service forwarding-table**
- **show class-of-service interface**

```
user@router> show class-of-service interface t3-3/1/0
```

```
Physical interface: t3-3/1/0, Index: 169
Scheduler map: <default>, Index: 1
Logical interface: t3-3/1/0.0, Index: 68
  Object      Name      Type      Index
  Scheduler-map sched-0      11204
  Rewrite      exp-default  exp        2
  Classifier    ipprec-compatibility ip          5
Logical interface: t3-3/1/0.1, Index: 69
  Object      Name      Type      Index
  Scheduler-map sched-1      7038
  Rewrite      exp-default  exp        2
  Classifier    ipprec-compatibility ip          5
```

- Related Documentation**
- [Roadmap for Channelized IQ Interface Configuration Examples on page 49](#)
 - [Roadmap for Configuring Channelized IQ Interfaces on page 43](#)

CHAPTER 4

Configuring Channelized E1 PRI and T1 PRI Interfaces

- [Channelized E1 PRI and T1 PRI Overview on page 113](#)
- [Configuring a Clear Channel on a Dual-Port Channelized T1-E1 PIM on page 114](#)
- [Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 114](#)
- [Configuring Primary Rate Interfaces on page 115](#)
- [Example: Configuring a Channelized T1 Interface as Primary Rate Interface on page 117](#)
- [Configuring PRI Interfaces on page 118](#)
- [Allocating B-Channels for Dialout on page 119](#)

Channelized E1 PRI and T1 PRI Overview

ISDN PRI, referred to as S2M in Europe, is the “primary” extended ISDN network interface. It offers a larger capacity of digital channels utilizing a variety of improved mediums, and is used by large organizations with intensive communication needs. In contrast, the ISDN Basic Rate Interface (BRI), known as SO in Europe, provides a limited number of channels, transmitting over copper wire, and is used by smaller organizations or individuals with less intensive communication needs.

Unlike channelized PICs on the M Series and T Series routers, the interface type on the Dual-Port Channelized T1/E1 PIM is configurable. A single interface can operate as either a channelized T1 or channelized E1 interface (or clear channel) or as an ISDN PRI. The ISDN PRI channels can operate on the same interface as T1 or E1 channels. The PIM also supports a “drop-and-insert” feature, allowing you to insert channels from one port on the PIM into the other port on the PIM.

These ISDN channels are delivered to the user in one of two predefined configurations:

- ISDN BRI is configured by specifying properties for a physical (**br-**) interface and a logical (**dln**) interface.
- For ISDN PRI, you configure:
 1. Either a channelized E1 (**ce1-pim/0/port**) or channelized T1 (**ct1-pim/0/port**) interface.
 2. Time slots within a **ce1-pim/0/port** interface or **ct1-pim/0/port** interface.

3. A bearer (B) channel **bc-pim/O/port:channel** interface for each time slot that you want to function as an ISDN PRI B-channel. The B-channel is used for data, video, voice, and multimedia. You can create up to 30 B-channels on a channelized E1 interface, and 23 B-channels on a channelized T1 interface.
4. One delta (D) channel, used between switching equipment in the ISDN network and the ISDN equipment at your site for signaling. For channelized E1, the D-channel must be time slot 16. For channelized T1, the D-channel must be time slot 24.



NOTE: Time slots can also be shared with **ds-pim/O/port** time slots within the same channelized interface.

Configuring a Clear Channel on a Dual-Port Channelized T1-E1 PIM

A *clear channel* is an interface that uses the entire bandwidth of the port on a PIM. To configure a clear channel, include the **no-partition** and **interface-type** statements in the configuration. On a Dual-Port Channelized T1-E1 PIM, you can configure two clear-channel interfaces.

To configure an E1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ce1-pim/O/port]** hierarchy level:

```
[edit interfaces ce1-pim/O/port]
no-partition interface-type e1;
```

This configuration creates interface **e1-pim/O/port**.

To configure a T1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct1-pim/O/port]** hierarchy level:

```
[edit interfaces ct1-pim/O/port]
no-partition interface-type t1;
```

This configuration creates interface **t1-pim/O/port**.

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

On channelized T1/E1 interfaces configured for channelized operation, you can insert channels (time slots) from one port (for example, channels carrying voice) directly into the other port on the PIM, to replace channels coming through the Routing Engine. This feature, known as drop and insert, allows you to integrate voice and data on a single T1 or E1 link by removing the DS0 time slots of one T1 or E1 port and replacing them by inserting the time slots of another T1 or E1 port. It is not necessary to use the same time slots on both interfaces, but the time slots count must be same. The channels that are not configured for the drop-and-insert feature are used for normal traffic.

You can configure:

- 30 channelized E1 time slots, with the 16th time slot operating as the signaling channel
- 23 channelized T1 time slots, with the 24th time slot operating as the signaling channel

The signaling channel, or D-channel, must be part of the channels that are being switched through the drop-and-insert functionality. The Junos OS does not support switching of voice and data between ports by default.

Both ports involved in the drop-and-insert configuration must use the same clock source—either the router's internal clock or an external clock.

The following clock source settings are valid:

- When port 0 is set to use the internal clock, port 1 must also be set to use it, and vice versa.
- When port 0 is set to use its external clock, port 1 must be set to run on the same clock—the external clock for port 0.
- When port 1 is set to use its external clock, port 0 must be set to run on the same clock—the external clock for port 1.

For more details about valid clock combinations, see the *Junos OS Interfaces and Routing Configuration Guide*.

To configure drop-and-insert time slots on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-pim/0/port]** hierarchy level with the **timeslots** statement and **interface-type** statements specified:

```
[edit interfaces]
ct1-pim/0/port {
  partition 1 timeslots 1-10 interface-type ds;
  partition 2 timeslots 11-14 interface-type ds;
  partition 3 timeslots 15-32 interface-type ds;
}
```

This configuration creates interfaces **ds-pim/0/port:1**, **ds-pim/0/port:2**, and **ds-pim/0/port:3**.

Use the same configuration to create drop-and insert time slots on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-pim/0/port]** hierarchy level.

Configuring Primary Rate Interfaces

Primary rate interfaces are a combination of B-channels with one controlling D-channel for the group. Configure B-channel interfaces for each time slot that you want to function as an ISDN PRI interface. The B-channel is used for data, video, voice, and multimedia. You can create:

- 23 B-channels on a channelized T1 interface
- 30 B-channels on a channelized E1 interface

To configure B-channels on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-pim/0/port]** hierarchy level with the **timeslots** statement and **interface-type bc** specified:

```
[edit interfaces]
ct1-pim/0/port {
  partition 1-23 timeslots 1-23 interface-type bc;
}
```

This configuration creates interfaces **bc-pim/0/port:1** through **bc-pim/0/port:1**, and **ds-pim/0/port:3**.

Use the same configuration to create B-channels on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-pim/0/port]** hierarchy level.

One D-channel is used between switching equipment in the ISDN network and the ISDN equipment at your site for signaling. For channelized E1, the D-channel must be time slot 16. For channelized T1, the D-channel must be time slot 24.

To configure a D-channel on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-pim/0/port]** hierarchy level with the **timeslots** statement and **interface-type dc** specified:

```
[edit interfaces]
ct1-pim/0/port {
  partition 24 timeslots 24 interface-type dc;
}
```

This configuration creates interfaces **dc-pim/0/port**.

Use the same configuration to create B-channels on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-pim/0/port]** hierarchy level.

```
[edit interfaces]
ce1-pim/0/port {
  partition 16 timeslots 16 interface-type dc;
}
```

To view PRI or ISDN options information about interface, use the following operational mode commands supporting BRI interfaces:

- **show interfaces *interface-name* detail**
- **show interface *dln***
- **show isdn calls**
- **show isdn history**
- **show isdn q921 statistics**
- **show isdn q931 statistics**
- **show isdn status**



NOTE: You must configure a D-channel and B-channels to complete your ISDN PRI line configuration.



NOTE: You can configure dso-options on the B-channel, but you cannot configure parameters for a D-channel. However, when interface statistics are displayed, both B-channel and D-channel interfaces have statistical values.

Example: Configuring a Channelized T1 Interface as Primary Rate Interface

Configure a channelized T1 interface to operate fully as a PRI:

```
[edit interfaces]
ct1-2/0/0 {
  partition 1-23 timeslots 1-23 interface-type bc;
  partition 24 timeslots 24 interface-type dc;
  t1-options {
    line-encoding b8zs;
    framing esf;
  }
  traceoptions {
    flag q931;
    flag q921;
    file {
      pri_trace_log;
    }
  }
  dialer-options {
    pool 1 priority 25;
  }
  isdn-options {
    switch-type att5e;
    bchannel-allocation descending;
    incoming-called-number 384101;
    incoming-called-number 384102;
    incoming-called-number 384103;
  }
}

[edit interfaces]
d10 {
  unit 0 {
    dialer-options {
      pool 1;
      dial-string 384010;
      incoming-map {
        accept-all;
      }
    }
    family inet {
      filter {
        dialer int-packet;
      }
      address 13.1.1.2/24;
    }
  }
}
```

```

}
[edit firewall]
family inet {
  dialer-filter int-packet {
    term term1 {
      from {
        destination address {
          13.1.1.1/24;
        }
        protocol icmp;
        then note;
      }
    }
    term term2 {
      then ignore;
    }
  }
}
}

```

Related Documentation • [Channelized Interfaces Overview on page 3](#)

Configuring PRI Interfaces

When you create a PRI from a channelized E1 or channelized T1 interface, you can select all the slots for the PRI, or just a few of them, leaving the rest as **ds-** interfaces.

To configure a PRI from a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-pim/O/port]** hierarchy level with the **timeslots** statement and **interface-type bc** specified:

```

[edit interfaces]
ct1-pim/O/port {
  partition 1 timeslots 1-10 interface-type ds;
  partition 2 timeslots 11-24 interface-type pr;
}

```

This configuration creates interfaces **ds-pim/O/port:1** through **pr-pim/O/port:2**.

Use the same configuration to create interfaces on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-pim/O/port]** hierarchy level.

To configure channelized E1 interface properties, include the **e1-options** statement at the **[edit interfaces interface-name]** hierarchy level:

```

[edit interfaces interface-name]
e1-options {
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (filler | shared);
}

```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
ds0-options {  
  byte-encoding (nx56 | nx64);  
  fcs (16 | 32);  
  idle-cycle-flag (flags | ones);  
  loopback payload;  
  start-end-flag (filler | shared);  
}
```

Allocating B-Channels for Dialout

You can configure the system to allocate B-channels for dialout from lowest or highest numbered B-channel (ascending or descending order). By configuring this feature, you reduce chances of “glare” on PRI lines carrying a mix of incoming and outgoing calls.

To configure the B-channel allocation, include the **idsn-options** and **bchannel-allocation** statements at the **[edit interfaces *ct1-pim/O/port* | *ce1-pim/O/port*]** hierarchy level:

```
[edit interfaces]  
(ct1-pim/O/port | ce1-pim/O/port) {  
  (bchannel-allocation (ascending | descending);  
  }  
}
```


CHAPTER 5

Configuring Channelized OC3 IQ and IQE Interfaces

- [Channelized OC3 IQ and IQE Overview on page 121](#)
- [Partitions, OC Slices, Interface Types, and Time Slots on page 122](#)
- [Configuring a Clear Channel on Channelized OC3 IQ and IQE PICs on page 123](#)
- [Configuring T3 Interfaces on IQ and IQE Interfaces on page 124](#)
- [Configuring T1 and NxDS0 Interfaces on page 124](#)
- [Configuring Fractional T1 IQ Interfaces on page 128](#)
- [Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces on page 128](#)

Channelized OC3 IQ and IQE Overview

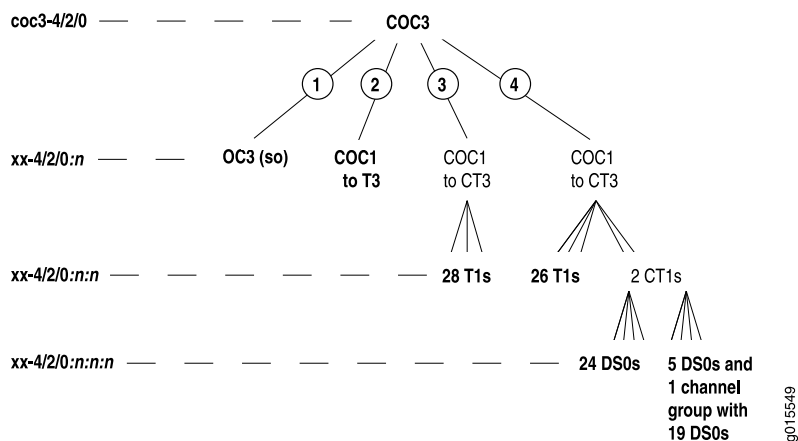
Channelized intelligent queuing (IQ) and channelized enhanced intelligent queuing (IQE) interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than regular channelized interfaces.

On each port of a Channelized OC3 IQ or a Channelized OC3 IQE interface, you can configure the following interface types:

- One OC3 SONET interface
- Up to three T3 interfaces
- Up to 84 T1 interfaces
- Up to three E3 interfaces (COC3 IQE PICs in SDH mode)
- Up to 63 E1 interfaces (COC3 IQE PICs in SDH mode)
- Up to 336 NxDS0 interfaces on an M Series router
- Up to 768 NxDS0 interfaces on a T Series router

[Figure 24 on page 122](#) shows an example of how a Channelized OC3 PIC might be partitioned. In the figure, the OC3 SONET interface would be a standalone interface because it would use the entire bandwidth of the PIC. The same applies to each port of the 2-port Channelized OC3 Enhanced IQ (IQE) PIC.

Figure 24: Channelized OC3 IQ Interface Example for Show Interfaces Controller



You can configure the following encapsulation types:

- PPP
- Frame Relay
- Cisco HDLC
- CCC
- TCC
- MPLS—On IQE interfaces.

For more information about interface encapsulation, see *Configuring Interface Encapsulation on Physical Interfaces* and *Configuring Interface Encapsulation on Logical Interfaces*.

To configure channelized interfaces, include the following statements at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
no-partition interface-type type;
partition partition-number oc-slice oc-slice-range interface-type type;
partition partition-number timeslots time-slot-range interface-type type;
```

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Partitions, OC Slices, Interface Types, and Time Slots

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized OC3 interfaces, you can configure up to three OC1 interfaces, so the partition number can be 1, 2, or 3. For channelized T3 interfaces (**ct3**), you can configure multiple interfaces at once by including a partition range, such as 1-3. This creates three T1 interfaces with channel numbers 1 through 3.



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

You configure the OC-slice range for SONET/SDH interfaces only. The OC-slice range is correlated with the bandwidth size required for the interface type you are configuring. For example, a channelized OC3 interface (**coc3**) can be divided into three OC1 interfaces, each containing one OC slice. Therefore the OC-slice value must be **1, 2, or 3**.

The configurable interface types are dependent on the hierarchy level at which you include the **interface-type** and **partition** or **no-partition** statements. For example, when you include the **no-partition** statement at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level, the only configurable interface type is **so**, because the **no-partition** statement signals that you are creating a clear-channel SONET/SDH interface. When you include the **partition** statement at the **[edit interfaces coc1-fpc/pic/port]** hierarchy level, the configurable interface types are **ct1** or **t1**. If you want to create a T1 interface, include the **t1** option. If you want to further channelize down to the NxDS0 level, include the **ct1** option as an intermediate step before dividing the channelized T1 interface (**ct1**) into NxDS0 interfaces.

You configure time slots for fractional T1 interfaces and NxDS0 interfaces. You can configure ranges by using hyphens. You can configure discontinuous time slots by using commas. Do not include spaces.

Related Documentation

- [oc-slice on page 381](#)

Configuring a Clear Channel on Channelized OC3 IQ and IQE PICs

A *clear channel* is an interface that uses the entire bandwidth of the PIC. To configure a clear channel, include the **no-partition** and **interface-type** statements in the configuration.

On Channelized OC3 IQ and IQE PICs, you can configure one OC3 clear-channel interface per port. To configure an OC3 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level:

```
[edit interfaces coc3-fpc/pic/port]
no-partition interface-type so;
```

This configuration creates interface **so-fpc/pic/port**. When you include the **no-partition** statement at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level, the only configurable interface type is **so**, because the **no-partition** statement signals that you are creating a clear-channel SONET/SDH interface.

On a 2-port or 4-port Channelized OC3 IQE PIC, you can configure two to four separate OC3 clear-channel interfaces by additionally specifying the port numbers. Configuration is otherwise the same as previously described on a (1-port) Channelized OC3 IQ PIC.

Related Documentation

- [Channelized Interfaces Feature Guide for Routing Devices](#)

Configuring T3 Interfaces on IQ and IQE Interfaces

To configure a T3 interface on an OC3 PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc3-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type coc1;
```

When you include the **partition** statement at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level, the only configurable interface type is **coc1**. This configuration creates interface **coc1-fpc/pic/port:channel**.



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

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 t3;
```

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

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 coc3-1/1/0]
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, Release 15.1*.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Configuring T1 and NxDSO Interfaces

To configure T1 interfaces on a Channelized OC3 IQ or IQE PIC, perform the following tasks:

1. Partition the channelized OC3 interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc3-fpc/pic/port]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc3-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type coc1;
```


2. If your network equipment uses 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:channel]** hierarchy level, specifying the **t1** interface type:

```
[edit interfaces coc1-fpc/pic/port:channel]
partition partition-number interface-type 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:

```
[edit interfaces coc1-fpc/pic/port:channel]
no-partition partition-number interface-type ct3;
```



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

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.

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

```
[edit interfaces ct3-fpc/pic/port:channel]
partition partition-number interface-type t1;
```

5. To configure NxDS0 interfaces, 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:channel]** hierarchy level and specifying the **ct1** interface type:

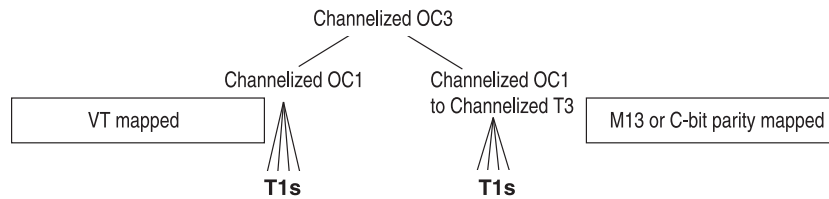
```
[edit interfaces ct3-fpc/pic/port:channel]
partition partition-number interface-type ct1;
```



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

Figure 25 on page 126 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 IQ interfaces.

Figure 25: T1 Interfaces on a Channelized OC3 PIC



Bold entries correspond to actual packet channels.

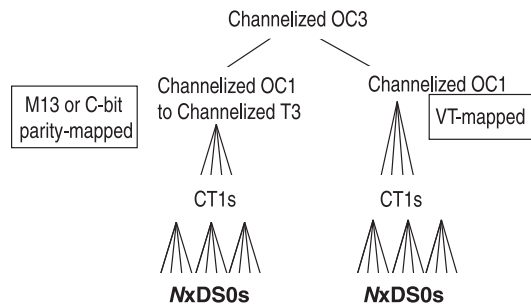
g015503

- Configure channelized *NxDS0* 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]
partition partition-number timeslots time-slot-range interface-type ds;
```

Figure 26 on page 126 shows VT-mapped and M13 or C-bit parity-mapped configurations of *NxDS0* IQ interfaces.

Figure 26: Sample Channelization of OC3 IQ or IQE PIC



Bold entries correspond to actual packet channels.

g015504

Example: Configuring T1 and *NxDS0* 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 coc3-0/0/0]
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 coc3-0/0/0]
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;
```

Configure the following two *NxDS0* interfaces with 10 time slots and 4 time slots, respectively:

VT-Mapped Configuration	<pre>ds-0/0/0:1:2:1 ds-0/0/0:1:2:2 [edit interfaces coc3-0/0/0] 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;</pre>
----------------------------	--

M13 or C-bit Parity-Mapped Configuration	<pre>[edit interfaces coc3-0/0/0] 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;</pre>
--	--

For a full configuration example, see the *Junos OS, Release 15.1*.

Example: Setting Remote Loopback and Running BERT Tests on NxDS0 Interfaces

For Channelized OC3 IQ and IQE PICs, if you need remote loopback on a far-end *NxDS0* interface, and you are running a BERT test from the local *NxDS0* interface, you must set remote loopback on the far-end router's associated channelized T1 interface (**ct1**). To do this, include the **loopback remote** statement at the **[edit interfaces ct1-*fpc/pic*port t1-options]** hierarchy level. For example:

Local router:

```
[edit interfaces]
ct1-0/0/0:2:2 {
  partition 1 timeslots 1-10 interface-type ds;
  ds-0/0/0:2:2:1 {
    ds0-options {
      bert-period 30;
    }
  }
}
```

Remote router:

```
[edit interfaces]
ct1-0/0/0:2:2 {
  partition 1 timeslots 1-10 interface-type ds;
  t1-options {
    loopback remote;
  }
}
```

Configuring Fractional T1 IQ Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized OC3 IQ or IQE PIC, you must perform the following tasks:

1. Configure a T1 interface on the Channelized OC3 IQ or IQE PIC. For more information, see [“Configuring T1 and NxDS0 Interfaces” on page 124](#).
2. Configure the number of time slots allocated to the T1 IQ 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 IQ 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 IQ Interfaces

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

```
[edit interfaces coc3-0/0/0]
  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, Release 15.1*.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces

For Channelized OC3 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*.

CHAPTER 6

Configuring Channelized OC12/STM4 Interfaces

- [Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129](#)
- [Channelization of OC12 PIC \(SONET Mode\) on page 129](#)
- [Configuring Channelized OC12 Interfaces on page 130](#)
- [Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs \(SONET Mode\) on page 133](#)
- [Configuring Channelized OC12/STM4 IQ and IQE Interfaces \(SONET Mode\) on page 134](#)
- [Channelization of OC12/STM4 IQE PIC \(SDH Mode\) on page 141](#)
- [Configuring Channelized OC12/STM4 IQE Interfaces \(SDH Mode\) on page 142](#)
- [Channelization of OC12/STM4 IQ PIC \(SDH Mode\) on page 147](#)
- [Configuring Channelized OC12/STM4 IQ Interfaces \(SDH Mode\) on page 148](#)
- [Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel on page 154](#)
- [Example: Configuring Channelized OC12 Interfaces with Partitioned Channels on page 157](#)
- [Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 159](#)

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 on page 3](#)

Channelization of OC12 PIC (SONET Mode)

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

Figure 27: Sample Channelization of OC12 PIC (non IQ and IQE)

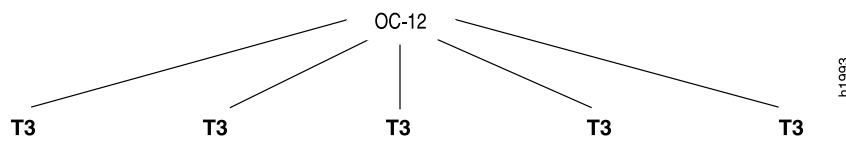


Figure 27 on page 130 shows five T3 channels configured on the Channelized OC12 PIC. You can configure seven additional T3 channels. For more information about configuring Channelized OC12 PICs, see “Configuring Channelized OC12 Interfaces” on page 130.

Configuring Channelized OC12 Interfaces

- on page 130

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” on page 8.

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

Table 17 on page 130 summarizes the OC12-to-DS3 numbering scheme.

Table 17: 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

Table 17: OC12-to-DS3 Numbering Scheme (*continued*)

Two-Level STS-1 Number (STS-3,STS-1)	One-Level STS Number	OC12-to-DS3 PIC DS3 Number
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;
  }
}
```

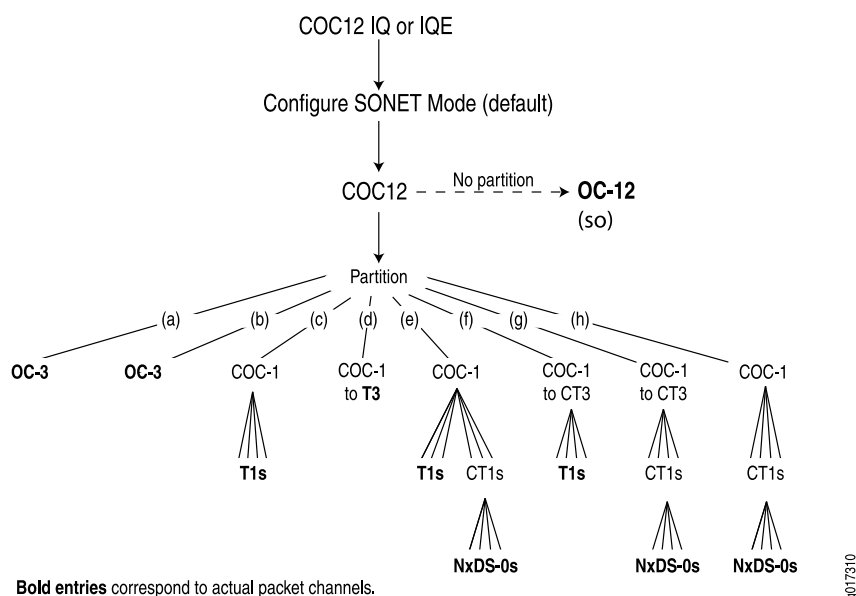
```
t3-fpc/pic/port:2 {
  encapsulation frame-relay;
  t3-options {
    compatibility-mode larscom;
    payload-scrambler;
  }
  unit 0 {
    dlci 100;
    family inet {
      address 10.11.30.9/30;
    }
    family iso;
  }
  unit 1 {
    dlci 101;
    family inet {
      address 10.11.31.9/30;
    }
    family iso;
  }
}
t3-lfpc/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;
  }
}
```


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 28 on page 133](#) illustrates one possible channelization configuration for Channelized OC12/STM4 IQ and IQE PICs operating in SONET mode.

Figure 28: Sample Channelization of OC12/STM4 IQ or IQE PIC (SONET Mode)



In the example in [Figure 28 on page 133](#), a Channelized OC12/STM4 IQ or IQE PIC operating in SONET mode is partitioned into the following OC slices:

- An OC3 interface.
- Another OC3 interface.
- A channelized OC1 partitioned into T1 interfaces.
- A channelized OC1 converted into a T3 interface.
- A channelized OC1 partitioned into T1 interfaces and channelized T1s, which are partitioned into NxDS0 interfaces.
- A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces.
- A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into NxDS0 interfaces.
- A channelized OC1 partitioned into channelized T1s, which are partitioned into NxDS0 interfaces.

- Related Documentation**
- [Example: Channelized OC3 IQ Interface Configuration on page 81](#)

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 on page 134](#)
- [Configuring T3 Interfaces on page 134](#)
- [Configuring OC3 Interfaces on page 136](#)
- [Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces on page 137](#)
- [Configuring NxDS0 Interfaces on page 138](#)
- [Configuring Fractional T1 Interfaces on page 140](#)

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**:

For a full configuration example, see the *Junos OS, Release 15.1*.

```
[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;
```

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**:

For a full configuration example, see the *Junos OS, Release 15.1*.

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

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:

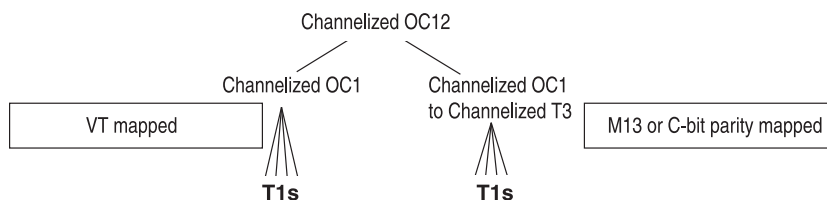
```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type (Interfaces) t1;
```



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 29 on page 138 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

Figure 29: T1 Interfaces on a Channelized OC12 PIC



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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, Release 15.1*.

Configuring NxDSO Interfaces

To configure NxDSO 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.

- 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.

- 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:

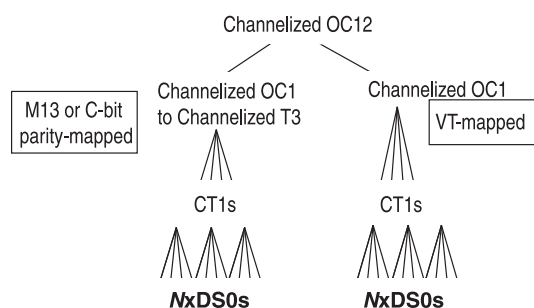
```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type (Interfaces) ct1;
```

- Configure channelized NxDS0 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: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;
```

Figure 30 on page 139 shows VT-mapped and M13 or C-bit parity-mapped configurations of NxDS0 IQ interfaces.

Figure 30: Sample Channelization of OC12 IQE PIC



Bold entries correspond to actual packet channels.

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Example: Configuring NxDS0 Interfaces Configure the following two NxDS0 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, Release 15.1*.

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” on page 167](#).
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 t1-options]
timeslots 1-5,10;

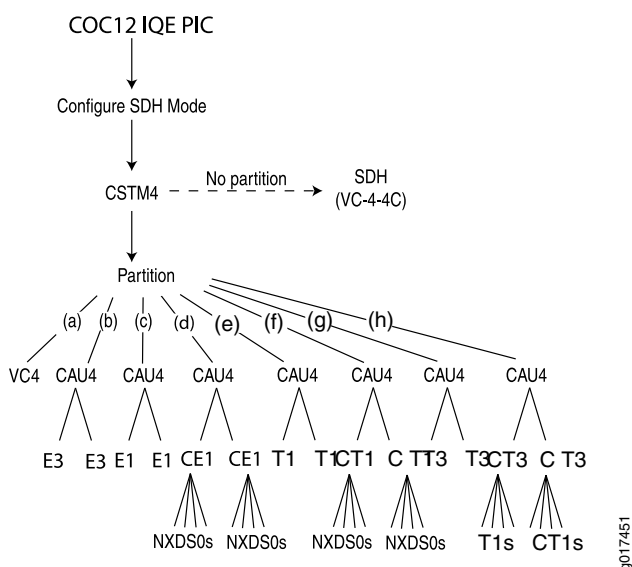
```

For a full configuration example, see the *Junos OS, Release 15.1*.

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 31 on page 141](#) illustrates one possible channelization configuration for Channelized OC12/STM4 IQE PICs operating in SDH mode.

Figure 31: Sample Channelization of OC12/STM4 IQE PIC (SDH Mode)



In [Figure 31 on page 141](#), 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:

- An SDH VC-4 interface.
- A channelized AU-4 partitioned into E3 interfaces.
- A channelized AU-4 interface partitioned into E1 interfaces.
- A channelized AU-4 interface partitioned into CE1 interfaces partitioned into *NxDSO* interfaces.
- A channelized AU-4 interface partitioned into T1 interfaces.
- 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 on page 54](#)

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)
- NxDS0 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 142](#)
- [Configuring an Unpartitioned SDH \(VC-4-4C\) Interface on a Channelized OC12/STM4 IQE PIC on page 143](#)
- [Configuring SDH \(VC-4\) Interfaces on Channelized OC12/STM4 IQE PICs on page 143](#)
- [Configuring Channelized AU-4 Interfaces on page 144](#)
- [Configuring E3 Interfaces on page 145](#)
- [Configuring E1 or Channelized E1 Interfaces on page 146](#)
- [Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs on page 147](#)

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/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 System Basics Configuration Guide*.

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;
```

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 NxDS0 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

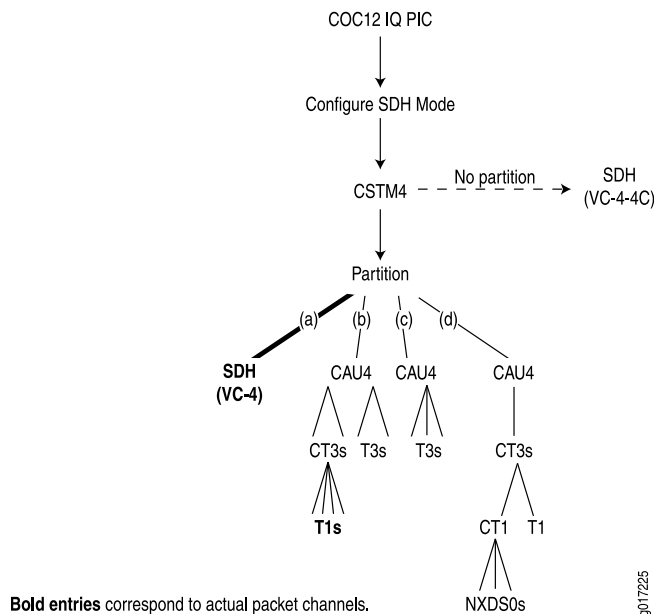
Configure channelized NxDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[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**.

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 32 on page 148](#) illustrates one possible channelization configuration for Channelized OC12/STM4 IQ PICs operating in SDH mode.

Figure 32: Sample Channelization of OC12/STM4 IQ PIC (SDH Mode)

In [Figure 32 on page 148](#), 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:

- An SDH VC-4 interface.
- A channelized AU-4 partitioned into channelized T3 interfaces and T3 interfaces.
- Another channelized AU-4 interface converted into T3 interfaces.
- 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 NxDS0 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 on page 54](#)

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)
- NxDSO 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 on page 149](#)
- [Configuring an Unpartitioned SDH \(VC-4-4C\) Interface on a Channelized OC12/STM4 IQ PIC on page 149](#)
- [Configuring SDH \(VC-4\) Interfaces on Channelized OC12/STM4 IQ PICs on page 150](#)
- [Configuring Channelized AU-4 Interfaces on page 151](#)
- [Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces on page 151](#)
- [Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces on page 152](#)
- [Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces on page 153](#)
- [Configuring NxDSO Interfaces on Channelized OC12/STM4 IQ PICs on page 153](#)

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 System Basics Configuration Guide*.

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 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 NxDS0 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 NxDSO Interfaces

Configure channelized NxDSO 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**.

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 NxDSO 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 NxDSO interfaces
- h. A channelized OC1 partitioned into channelized T1s, which are partitioned into NxDSO 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) coc1-1/1/0:5
  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 NxDSOs.";
    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-1/1/0:7:1:1
partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:7:1:2
...
}

(h) coc1-1/1/0:8 {
    description "(h) OC-slice 12 of coc12-1/1/0. COC12 to COC1 VT-mapped to CT1 to NxDSOs.";
    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, Release 15.1*.

Related Documentation

- [Channelized Interfaces Overview on page 3](#)

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-lfpc/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 130](#)

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*.

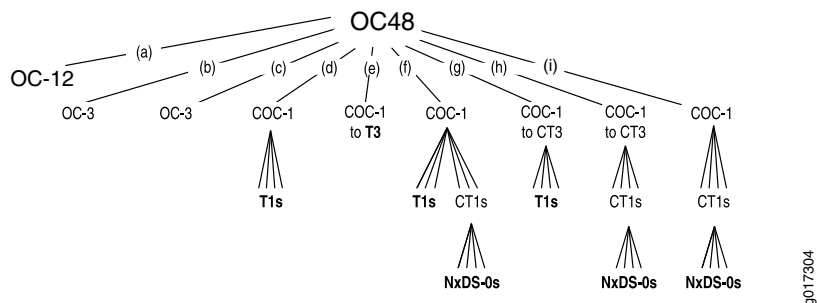
Configuring Channelized OC48/STM16 IQE Interfaces

- [Channelized OC48/STM16 IQE Interfaces Overview on page 161](#)
- [Configuring Channelized OC48/STM16 IQE Interfaces \(SONET Mode\) on page 163](#)
- [Configuring Channelized OC48/STM16 IQE Interfaces \(SDH Mode\) on page 173](#)
- [Example: Configuring Channelized OC48 Interfaces with Partitioned Channels on page 180](#)
- [Configuring Link PIC Failover on Channelized OC48/STM16 IQE Interfaces on page 182](#)

Channelized OC48/STM16 IQE Interfaces Overview

Channelized enhanced intelligent queuing (IQE) interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than the channelized interfaces. [Figure 33 on page 161](#), [Figure 34 on page 162](#), and [Figure 35 on page 163](#) illustrate the Channelized OC48/STM16 IQE Physical Interface Cards (PICs) in several examples of many possible configurations.

Figure 33: Sample Channelization of OC48/STM16 IQE PIC (SONET Mode)



Bold entries correspond to actual packet channels.

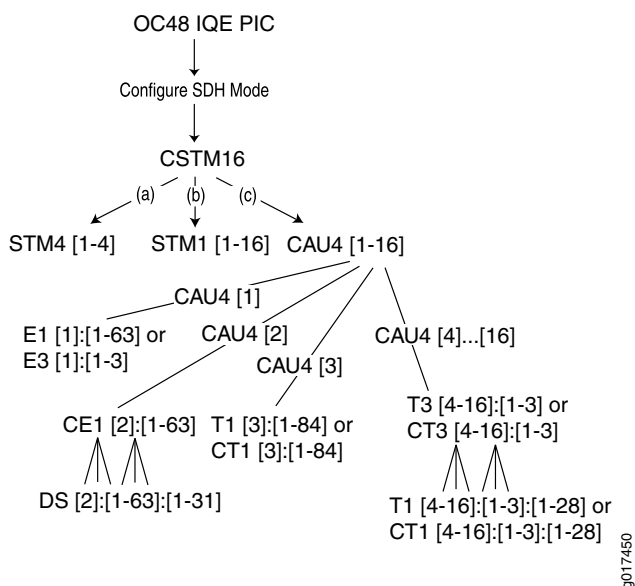
In the example in [Figure 33 on page 161](#), a Channelized OC48/STM16 IQE PIC operating in SONET mode is partitioned into the following OC slices:

- A clear channel OC12 interface.
- An OC3 interface.
- A channelized COC1 partitioned into T1 interfaces.

- d. A channelized COC1 partitioned into a T3 interface.
- e. A channelized COC1 partitioned into CT3, partitioned into T1 interfaces, and CT1s partitioned into NxDS0 interfaces.
- f. A channelized COC1 partitioned into CT3, partitioned into T1 interfaces.
- g. A channelized COC1 partitioned into CT3, partitioned into CT1s, partitioned into NxDS0 interfaces.
- h. A channelized COC1 partitioned into CT1s, partitioned into NxDS0 interfaces.

This is one of thousands of ways to configure a Channelized OC48/STM16 IQE PIC. To configure the interfaces shown in [Figure 34 on page 162](#), see “[Configuring Channelized OC48/STM16 IQE Interfaces \(SDH Mode\)](#)” on page 173.

Figure 34: Sample Channelization of OC48/STM16 IQE PIC (SDH Mode)



In [Figure 34 on page 162](#), a Channelized OC48/STM16 IQE PIC operating in SDH mode results in a channelized STM16 interface, which can be partitioned as the following:

- a. Up to 4 STM4s.
- b. Up to 16 STM1s.
- c. Up to 16 CAU4s that can each be partitioned into up to 63 E1s, up to 3 E3s, or up to 63 CE1s. Up to 16 CAU4s that can each be partitioned into up to 84 T1s, 84 CT1s, 63 E1s, 63 CE1s, 3 E3s, 3 T3s or 3 CT3s. Each CE1 can be partitioned into up to 31 NxDS0s. Each CT1 can be partitioned into up to 24 NxDS0s. Each CT3 can be partitioned into up to 28 T1s or 28 CT1s.

This is one of thousands of ways to configure a Channelized OC48/STM16 IQE PIC.

Figure 35: Sample Channelization of OC48/STM16 IQE PIC to E3 Channels

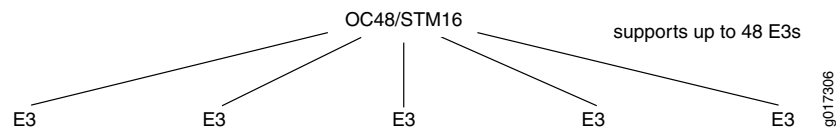


Figure 35 on page 163 shows five E3 channels configured on the Channelized OC48/STM16 IQE PIC. You can configure 43 additional E3 channels. For more information about configuring E3 channels on Channelized OC48/STM16 IQE PICs, see “Configuring E3 Interfaces” on page 173.

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Channelized OC48/STM16 IQE Interfaces (SONET Mode)

- [Configuring OC12 Interfaces on page 163](#)
- [Example: Configuring OC12 Interfaces on page 164](#)
- [Configuring OC3 Interfaces on page 164](#)
- [Example: Configuring OC3 Interfaces on page 165](#)
- [Configuring T3 Interfaces on page 165](#)
- [Example: Configuring T3 Interfaces on page 167](#)
- [Configuring T1 Interfaces on page 167](#)
- [Example: Configuring T1 Interfaces on page 169](#)
- [Configuring Fractional T1 Interfaces on page 169](#)
- [Example: Configuring Fractional T1 Interfaces on page 170](#)
- [Configuring NxDS0 Interfaces on page 170](#)
- [Example: Configuring NxDS0 Interfaces on page 173](#)

Configuring OC12 Interfaces

You can configure up to four OC12 interfaces on a 1-port Channelized OC48/STM16 IQE PIC.

To configure an OC12 interface:

1. In the configuration mode go to the **[edit interfaces coc48-fpc/pic/port]** hierarchy level:

```
[edit]
user@host# edit interfaces coc48-fpc/pic/port
```

2. Include the **partition**, **oc-slice**, and **interface-type** statements and specify **so** interface type.

```
[edit interfaces coc48-fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type so
```

The partition number is the sublevel interface partition index. For SONET/SDH interfaces, the partition number does not correlate with bandwidth size. For OC12 interfaces, the partition number can be from 1 through 4.



NOTE: For channelized OC48 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. OC12 interfaces must occupy 12 consecutive OC slices per interface, in one of the following forms:

- 1–12
- 13–24
- 25–26
- 37–48

By contrast, the T3 and OC1 interfaces each occupy one OC slice per interface and OC3 interfaces occupy three slices per interface.

The interface type is the channelized interface type or data channel you are creating. For channelized OC48 IQE interfaces, the interface type can be **so**.

Example: Configuring OC12 Interfaces

Configure an OC12 interface, using partition 1 and OC slices 1 through 12. .

```
[edit interfaces]
coc48-1/1/0 {
  partition 1 oc-slice 1-12 interface-type so;
}
```

This configuration creates interface **so-1/1/0:1**

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring OC3 Interfaces

To configure an OC3 interface:

1. In the configuration mode go to the **[edit interfaces coc48-fpc/pic/port]** hierarchy level:

```
[edit]
user@host# edit interfaces coc48-fpc/pic/port
```

2. Include the **partition**, **oc-slice**, and **interface-type** statements and specify **so** interface type.

```
[edit interfaces coc48-fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type 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 16.



NOTE: For channelized OC48 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
- and so on (in groups of 3), up to 48

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

The interface type is the channelized interface type or data channel you are creating. For channelized OC48 IQE interfaces, the interface type can be **so**.

Example: Configuring OC3 Interfaces

Configure an OC3 interface, using partition 1 and OC slices 4 through 6.

```
[edit interfaces]
coc48-1/1/0 {
  partition 1 oc-slice 4-6 interface-type so;
}
```

This configuration creates interface **so-1/1/0:1**

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring T3 Interfaces

Channelized OC48/STM16 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, the 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 (all 4 through 11 configured) for E3 or T3 channels will the Junos OS then allocate channel 0 through 3 space for further E3 or T3 channels; thereby using up the 0 through 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 through 6 or 7 through 9 with an OC3 SONET channel; the configuration fails because the channel 0 through 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 through 3.

To configure a T3 interface on an OC48/STM16 IQE PIC:

1. In the configuration mode go to the **[edit interfaces coc48-fpc/pic/port]** hierarchy level:

```
[edit]
user@host# edit interfaces coc48-fpc/pic/port
```

2. Include the **partition**, **oc-slice**, and **interface-type** statements and specify **coc1** interface type.

```
[edit interfaces coc48-fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type coc1
```

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

3. Go to **[edit interfaces coc1-fpc/pic/port:channel]** hierarchy level.

```
[edit]
user@host# edit interfaces coc1-fpc/pic/port:channel
```

4. Include the **no-partition interface-type** statement specifying the **t3** interface type.

```
edit interfaces coc1-fpc/pic/port:channel
user@host# set no-partition interface-type 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 48. For channelized OC48/STM16 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 OC48 interfaces, **type** can be **so** or **coc1**.

Example: Configuring T3 Interfaces

Configure a T3 interface using partition 3 and OC slice 3.

```
[edit interfaces]
coc48-1/1/0 {
  partition 3 oc-slice 3 interface-type coc1;
}
[edit interfaces]
coc1-1/1/0:3 {
  no-partition interface-type t3;
}
```

This configuration creates interface **t3-1/1/0:3**

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring T1 Interfaces

To configure T1 interfaces on a Channelized OC48 IQE PIC, perform the following tasks:

1. In the configuration mode go to the **[edit interfaces coc48-fpc/pic/port]** hierarchy level.

```
[edit]
user@host# edit interfaces coc48-fpc/pic/port
```

2. Partition the channelized OC48 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements and specify **coc1** interface type.

```
[edit interfaces coc48-fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type coc1;
```

3. If your network equipment uses VT mapping, in the configuration mode go to the **[edit interfaces coc1-fpc/pic/port]**.

```
[edit]
user@host# edit interfaces coc1-fpc/pic/port:channel
```

4. Partition the channelized OC1 interface into T1 interfaces by including the **partition** and **interface-type** statements and specify **t1** interface type.

```
[edit interfaces coc1-fpc/pic/port:channel]
user@host# set partition partition-number interface-type t1;
```

5. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface. Go to the **[edit interfaces coc1-fpc/pic/port:channel]** hierarchy level.

```
[edit]
user@host# edit interfaces coc1-fpc/pic/port:channel
```

6. Include the **no-partition** and **interface-type** statements and specify **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:channel
user@host# set no-partition partition-number interface-type ct3;
```

7. To partition the channelized T3 interface into T1 interfaces go to **[edit interfaces ct3-fpc/pic/port:channel]** hierarchy level.

```
[edit]
user@host [edit interfaces ct3-fpc/pic/port:channel]
```

8. Include the **partition** and **interface-type** statements and specify **t1** interface type.

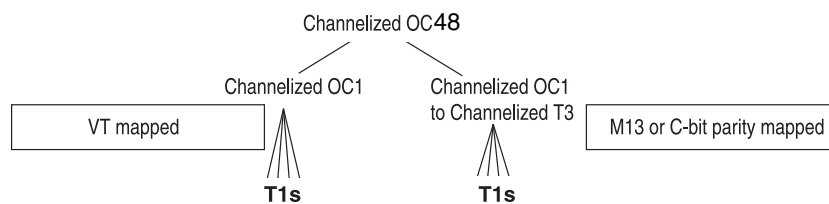
```
[edit interfaces ct3-fpc/pic/port:channel]
user@host set partition partition-number interface-type t1;]
```



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.

Figure 36 on page 168 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

Figure 36: T1 Interfaces on a Channelized OC48 PIC



Bold entries correspond to actual packet channels.

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Example: Configuring T1 Interfaces

Configure the following T1 interfaces:

	<pre> 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 </pre>
VT-Mapped Configuration	<pre> [edit interfaces] coc48-0/0/0 { partition 1 oc-slice 1 interface-type coc1; } [edit interfaces] coc1-0/0/0:1 { partition 1-5 interface-type t1; } </pre>
M13 or C-bit Parity-Mapped Configuration	<pre> [edit interfaces] coc48-0/0/0 { 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; } </pre>

For a full configuration example, see the *Junos OS, Release 15.1*.

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 OC48 IQE PIC, perform the following tasks:

1. Configure a T1 interface. For more information, see [“Configuring T1 Interfaces” on page 167](#).
2. In the configuration mode go to the `[edit interfaces t1-fpc/pic/port<:channel> t1-options]` hierarchy level.

```

[edit]
user@host# edit interfaces t1-fpc/pic/port<:channel> t1-options]

```

3. Configure the number of time slots allocated to the T1 interface by including the `timeslots` statement.

```

[edit interfaces t1-fpc/pic/port<:channel> t1-options]
user@host# set 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]
coc48-0/0/0 {
  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 t1-options {
  timeslots 1-5,10;
}
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring NxDS0 Interfaces

To configure NxDS0 interfaces on a Channelized OC48 IQE PIC, perform the following tasks:

1. In the configuration mode go to the **[edit interfaces coc48-fpc/pic/port:channel]** hierarchy level.

```
[edit]
user@host# edit interfaces coc48-fpc/pic/port:channel]
```

2. Partition the channelized OC48 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements and specify **coc1** interface type.

```
[edit interfaces coc48-fpc/pic/port:channel
user@host# set partition partition-number oc-slice oc-slice-range interface-type coc1;
```

3. If your network equipment uses VT mapping, go to the **[edit interfaces coc1-fpc/pic/port:channel]** hierarchy level.

```
[edit]
user@host# edit interfaces coc1-fpc/pic/port:channel
```

4. Partition the channelized OC1 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements and specify **ct1** interface type.

```
[edit interfaces coc1-fpc/pic/port:channel
user@host# set partition partition-number interface-type ct1;
```



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.

5. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface. Go to the `[edit interfaces coc1-fpc/pic/port]` hierarchy level.

```
[edit]
user@host# edit interfaces coc1-fpc/pic/port]
```

6. Include the **no-partition** and **interface-type** statements and specify **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:channel
user@host# set no-partition partition-number interface-type ct3;
```

7. Partition the channelized T3 interface into channelized T1 interfaces at the `[edit interfaces ct3-fpc/pic/port:channel]` hierarchy level:

```
[edit]
user@host [edit interfaces ct3-fpc/pic/port:channel]
```

8. Include the **partition** and **interface-type** statements and specify **ct1** interface type.

```
[edit interfaces ct3-fpc/pic/port:channel]
user@host set partition partition-number interface-type ct1;]
```

9. Configure channelized NxDS0 interfaces on the channelized T1 interface at `[edit interfaces ct1-fpc/pic/port:channel]`

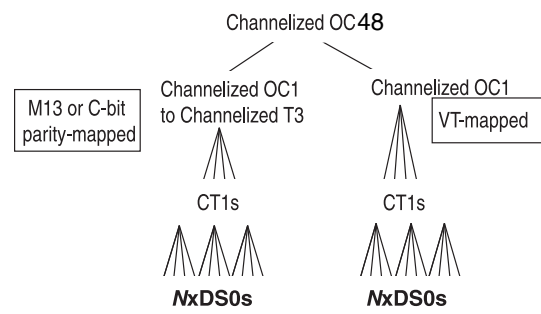
```
[edit]
user@host [edit interfaces ct1-fpc/pic/port:channel]
```

10. Include the **partition**, **timeslots**, and **interface-type** statements and specify **ds** interface type

```
[edit interfaces ct1-fpc/pic/port:channel
user@host set partition partition-number timeslots time-slot-range interface-type ds;]
```

Figure 37 on page 172 shows VT-mapped and M13 or C-bit parity-mapped configurations of NxDS0 interfaces.

Figure 37: Sample Channelization of OC48 IQE PIC



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Bold entries correspond to actual packet channels.

Example: Configuring NxDS0 Interfaces

Configure the following two NxDS0 interfaces with 10 time slots and 4 time slots, respectively:

VT-Mapped Configuration	<pre> ds-0/0/0:1:2:1 ds-0/0/0:1:2:2 [edit interfaces] coc48-0/0/0 { 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 12-15 interface-type ds; } </pre>
M13 or C-bit Parity-Mapped Configuration	<pre> [edit interfaces] coc48-0/0/0 { 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 12-15 interface-type ds; } </pre>

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Channelized OC48/STM16 IQE Interfaces (SDH Mode)

- [Understanding Channelized OC48/STM16 IQE Interfaces \(SDH Mode\) on page 174](#)
- [Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode on page 174](#)
- [Example: Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode on page 174](#)
- [Configuring Clear Channel STM1 and STM4 Interfaces on page 175](#)
- [Configuring Channelized AU-4 Interfaces on page 175](#)

- [Example: Configuring Channelized AU-4 Interfaces on page 176](#)
- [Configuring E3 Interfaces on page 176](#)
- [Example: Configuring E3 Interfaces on page 177](#)
- [Configuring E1 or Channelized E1 Interfaces on page 177](#)
- [Example: Configuring E1 and Channelized E1 Interfaces on page 178](#)
- [Configuring NxDSO IQE Interfaces on page 178](#)
- [Example: Configuring NxDSO IQE Interfaces on page 178](#)
- [Configuring T3 or Channelized T3 Interfaces on page 178](#)
- [Example: Configuring T3 or Channelized T3 Interfaces on page 179](#)
- [Configuring T1 or Channelized T1 Interfaces on page 179](#)
- [Example: Configuring T1 or Channelized T1 Interfaces on page 180](#)

Understanding Channelized OC48/STM16 IQE Interfaces (SDH Mode)

The Channelized OC48 IQE PIC configured for SDH mode creates a single channelized STM16 interface. You can configure the STM16 interface using the **partition** statement at the **[edit interfaces cstm16-fpc/pic/port]** hierarchy level to partition it into the following OC slices:

- 16 channelized AU-4 interfaces or a path layer with 4 STM4 or 16 STM1 interfaces.
- 16 channelized AU-4 interfaces, each partitioned to 3 clear channel E3 interfaces or 63 CE1 or E1 (ITU-T or KLM) interfaces. Combination of E1, CE1 and E3 are not supported in a single cau4.
- 16 channelized AU-4 interfaces, each partitioned to 63 CE1 (ITU-T or KLM) interfaces each partitioned to 31 NxDSO interfaces

The following sections describes how to configure the following channelized OC48 IQE interfaces on a Channelized OC48 IQE PIC configured in SDH mode.

Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode

To configure a Channelized OC48/STM16 IQE PIC to operate in SDH mode:

1. In the configuration mode go to the **[edit chassis fpc fpc/pic/port]** hierarchy level:

```
[edit]
user@host# edit chassis fpc fpc/pic/port
```

2. Include the **framing sdh** statement.

```
[edit chassis fpc fpc/pic/port]
user@host# set framing sdh
```

Example: Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode

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

```

    }
  }
}

```

This configuration creates interface **cstm16-0/2/0**.

For more information, see the *Junos OS System Basics Configuration Guide*.

Configuring Clear Channel STM1 and STM4 Interfaces

On a Channelized OC48/STM16 IQE PIC, you can partition the CSTM16 transport layer into 4 clear channel STM4 interfaces or 16 clear channel STM1 interfaces. Combinations of STM4 and STM1 are also permitted. However, you must observe the OC-slice parameters.

To configure Clear Channel STM1 or Clear Channel STM4 Interfaces:

1. In the configuration mode go to the **[edit interfaces cstm16-fpc/pic/port]** hierarchy level:

```

[edit]
user@host# edit interfaces cstm16 fpc pic/port

```

2. Include the **partition** and **interface-type** statements.

```

[edit interfaces cstm16 fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type so

```

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

Configuring Channelized AU-4 Interfaces

To configure channelized AU-4 Interfaces:

1. In the configuration mode go to the **[edit interfaces cstm16-fpc/pic/port:channel]** hierarchy level:

```

[edit]
user@host# edit interfaces cstm16 fpc/pic/port:channel

```

2. Include the **partition**, **oc-slice**, and **interface-type** statements and specify the **cau4** interface type.

```

[edit interfaces cstm16 fpc/pic/port]
user@host# set partition partition-number oc-slice oc-slice-range interface-type 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. For channelized OC48/STM16 IQE interfaces, channelized STM16 interface can have from 1 through 16 partition numbers and 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. The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

```
[edit interfaces]
cstm16-0/2/0 {
  partition 1 oc-slice 1-3 interface-type cau4;
}
```

Configuring E3 Interfaces

Channelized OC48/STM16 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.

To configure channelized E3 interfaces:

1. In the configuration mode go to the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level:

```
[edit]
user@host# edit interfaces cau4- fpc/pic/port
```

2. Include the **partition**, and **interface-type** statements and specify the **e3** interface type.

```
[edit interfaces cau4- fpc/pic/port]
user@host# set partition partition-number interface-type e3;
```

This configuration creates the interfaces **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.

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:

1. In the configuration mode go to the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level:

```
[edit]
user@host# edit interfaces cau4- fpc/pic/port
```

2. Include the **partition**, and **interface-type** statements and specify the **e1** or **ce1** interface type.

```
[edit interfaces cau4- fpc/pic/port]
user@host# set partition partition-number interface-type e1;
```

```
[edit interfaces cau4- fpc/pic/port]
user@host# set partition partition-number interface-type ce1;
```

This configuration creates the interfaces **e1-*fpc/pic/port:channel*** or **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 and Channelized E1 Interfaces

Configure E1 or channelized E1 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 IQE Interfaces

To configure channelized NxDS0 IQE interfaces on the channelized E1 IQE interface:

1. In the configuration mode go to the **[edit interfaces ce1-fpc/pic/port:channel]** hierarchy level:

```
[edit]
user@host# edit interfaces ce1-fpc/pic/port:channel:channel
```

2. Include the **partition**, **timeslots**, and **interface-type** statements and specify the **ds** interface type.

```
[edit interfaces ce1-fpc/pic/port:channel:channel]
user@host# set partition partition-number timeslots time-slot-range interface-type
ds;
```

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

The time-slot range is from 1 through 31. 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 IQE Interfaces

Configure channelized NxDS0 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 **ds0-0/2/0:1:2:3:4**.

Configuring T3 or Channelized T3 Interfaces

To configure T3 or channelized T3 interfaces:

1. In the configuration mode go to the **[edit interfaces cau4-fpc/pic/port]** hierarchy level:

```
[edit]
```

```
user@host# edit interfaces cau4-fpc/pic/port
```

2. Include the **partition** and **interface-type** statements and specify the **t3** or **ct3** interface type.

```
[edit interfaces cau4-fpc/pic/port]
```

```
user@host# set partition partition-number interface-type t3;
```

```
[edit interfaces cau4-fpc/pic/port]
```

```
user@host# set partition partition-number interface-type ct3;
```

This configuration creates the interfaces **t3-fpc/pic/port:channel** or **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 only apply CoS rules 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;
}
```

This configuration creates interfaces **t3-0/2/0:1:1** and **ct3-0/2/0:1:2**.

Configuring T1 or Channelized T1 Interfaces

To configure T1 or channelized T1 interfaces:

1. In the configuration mode go to the **[edit interfaces cau4-fpc/pic/port]** hierarchy level:

```
[edit]
```

```
user@host# edit interfaces cau4-fpc/pic/port
```

2. Include the **partition** and **interface-type** statements and specify the **t1** or **ct1** interface type.

```
[edit interfaces cau4-fpc/pic/port]
```

```
user@host# set partition partition-number interface-type t1;
```

```
[edit interfaces cau4-fpc/pic/port]
```

```
user@host# set partition partition-number interface-type ct1;
```

This configuration creates the interfaces **t1-fpc/pic/port:channel** or **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 only apply CoS rules to the aggregate bit streams.

Example: Configuring T1 or Channelized T1 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;
}
;
```

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

Example: Configuring Channelized OC48 Interfaces with Partitioned Channels

The following configuration is sufficient to get the channelized OC48 interface up and running. The OC48 interface can be divided into up to 4 OC12 channels, up to 16 OC3 channels, or up to 48 OC1 channels and combinations are permitted; for example, 1 OC12, 4 OC3s, and 24 OC1s. There are 48 OC1 slices available on the OC48 IQE interface. An OC48 configuration uses all 48 slices, each OC12 uses 12 slices, each OC1 uses 1 slice. Permissible combinations must fit within the 48 available OC1 slices. DS1 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-lfpc/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

- [Channelized Interfaces Overview on page 3](#)

Configuring Link PIC Failover on Channelized OC48/STM16 IQE Interfaces

For Channelized OC48 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*.

CHAPTER 8

Configuring Channelized STM1 Interfaces

- [Channelized STM1 Interfaces Overview on page 183](#)
- [Configuring Channelized STM1 Interfaces on page 183](#)
- [Example: Configuring Channelized STM1 Interfaces on page 192](#)
- [Configuring Channelized STM1 IQ and IQE Interfaces on page 193](#)
- [Configuring Link PIC Failover on Channelized STM1 Interfaces on page 198](#)

Channelized STM1 Interfaces Overview

Each Channelized STM1 PIC and Channelized STM1 Intelligent Queuing (IQ) PIC has one STM1 port.

For the Channelized STM1 IQ or IQE PIC, you can channelize the single port to the $N \times DS0$ level. Each E1 interface has 32 time slots (DS0), in which time slot 0 is reserved.

You can combine one or more of these DS0 time slots (channels) to create a channel group ($N \times DS0$).

Related Documentation

- [Configuring Channelized STM1 Interfaces on page 183](#)

Configuring Channelized STM1 Interfaces

To specify the channel number, include it after the colon (:) in the interface name. For example, a Channelized STM1-to-E1 PIC in FPC 1 and slot 1 will have the following physical interface, depending on the media type:

e1-1/1/0:x

The E1 channel number can be from 0 through 62.

This section contains the following topics:

- [Configuring Channelized STM1 Interface Properties on page 184](#)
- [Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 185](#)

Configuring Channelized STM1 Interface Properties

To configure the interface properties for Channelized STM1-to-E1 PICs, include the **e1-options** and **sonet-options** statements for both sides of the connection. The following configurations list all the valid statements.

To specify options for each of the E1 channels on the Channelized STM1-to-E1 PIC, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
e1-options {
  bert-error-rate;
  bert-period;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-number;
}
```



NOTE: When a channelized STM1 interface experiences a line transition, the E1 channels configured in unframed mode log a large number of drops (around 24,000) as the channelized STM1 interface clocks resynchronize. This does not occur on framed channels, because the framing resynchronizes clocks very quickly.

To specify options for the SONET/SDH side of the connection, include the **sonet-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
sonet-options {
  aps {
    advertise-interval milliseconds;
    authentication-key key;
    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 {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
  }
}
```

```

    z4 value;
  }
  loopback (local | remote);
}

```



NOTE: On channelized STM1 interfaces, you should configure the clock source on one side of the connection to be internal (the default Junos configuration) and on the other side of the connection to be external.

For information about Frame Relay DLCI limitations for channelized interfaces, see [“Data-Link Connection Identifiers on Channelized Interfaces” on page 6](#). For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For information about DLCI sparse mode, see the *Junos OS System Basics Configuration Guide*.

For more information about specific statements, see *E1 Interfaces Overview*, *SONET/SDH Interfaces Overview*, and *T1 Interfaces Overview*. For a configuration example, see [“Example: Configuring Channelized STM1 Interfaces” on page 192](#).

Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces

You can configure virtual tributary mapping to use KLM mode or ITU-T mode. To configure virtual tributary mapping, include the **vtmapping** statement at the **[edit chassis fpc slot-number pic pic-number]** hierarchy level:

```

[edit chassis fpc slot-number pic pic-number]
  vtmapping (klm | itu-t);

```

By default, virtual tributary mapping uses KLM mode. For more information, see the *Junos OS System Basics Configuration Guide*.

For the Channelized STM1 IQ and IQE PICs, you can configure virtual tributary mapping by including the **vtmapping** statement at the **[edit interfaces cau4-fpc/pic/port sonet-options]** hierarchy level:

```

[edit interfaces cau4-fpc/pic/port sonet-options]
  vtmapping (klm | itu-t);

```

[Table 18 on page 185](#) lists the KLM mappings used by the channelized STM1-to-E1 PIC interfaces. The PIC defaults to KLM numbering with an offset of -1; for example, KLM 1=STM1 PIC 0.

Table 18: Channelized STM1-to-E1 Channel Mapping

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
0	1	1	1	1	1
1	2	1	1	2	22
2	3	1	1	3	43
3	4	1	2	1	4

Table 18: Channelized STM1-to-E1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
4	5	1	2	2	25
5	6	1	2	3	46
6	7	1	3	1	7
7	8	1	3	2	28
8	9	1	3	3	49
9	10	1	4	1	10
10	11	1	4	2	31
11	12	1	4	3	52
12	13	1	5	1	13
13	14	1	5	2	34
14	15	1	5	3	55
15	16	1	6	1	16
16	17	1	6	2	37
17	18	1	6	3	58
18	19	1	7	1	19
19	20	1	7	2	40
20	21	1	7	3	61
21	22	2	1	1	2
22	23	2	1	2	23
23	24	2	1	3	44
24	25	2	2	1	5
25	26	2	2	2	26
26	27	2	2	3	47

Table 18: Channelized STM1-to-E1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
27	28	2	3	1	8
28	29	2	3	2	29
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32
32	33	2	4	3	53
33	34	2	5	1	14
34	35	2	5	2	35
35	36	2	5	3	56
36	37	2	6	1	17
37	38	2	6	2	38
38	39	2	6	3	59
39	40	2	7	1	20
40	41	2	7	2	41
41	42	2	7	3	62
42	43	3	1	1	3
43	44	3	1	2	24
44	45	3	1	3	45
45	46	3	2	1	6
46	47	3	2	2	27
47	48	3	2	3	48
48	49	3	3	1	9
49	50	3	3	2	30

Table 18: Channelized STM1-to-E1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
50	51	3	3	3	51
51	52	3	4	1	12
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15
55	56	3	5	2	36
56	57	3	5	3	57
57	58	3	6	1	18
58	59	3	6	2	39
59	60	3	6	3	60
60	61	3	7	1	21
61	62	3	7	2	42
62	63	3	7	3	63

Table 19 on page 188 lists the KLM mappings used by the channelized STM1-to-T1 PIC interfaces. The PIC defaults to KLM numbering with an offset of -1; for example, KLM 1= STM1 PIC 0.

Table 19: Channelized STM1-to-T1 Channel Mapping

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
0	1	1	1	1	1
1	2	1	1	2	22
2	3	1	1	3	43
3	4	1	2	1	4
4	5	1	2	2	25
5	6	1	2	3	46

Table 19: Channelized STM1-to-T1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
6	7	1	3	1	7
7	8	1	3	2	28
8	9	1	3	3	49
9	10	1	4	1	10
10	11	1	4	2	31
11	12	1	4	3	52
12	13	1	5	1	13
13	14	1	5	2	34
14	15	1	5	3	55
15	16	1	6	1	16
16	17	1	6	2	37
17	18	1	6	3	58
18	19	1	7	1	19
19	20	1	7	2	40
20	21	1	7	3	61
21	22	2	1	1	2
22	23	2	1	2	23
23	24	2	1	3	44
24	25	2	2	1	5
25	26	2	2	2	26
26	27	2	2	3	47
27	28	2	3	1	8
28	29	2	3	2	29

Table 19: Channelized STM1-to-T1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32
32	33	2	4	3	53
33	34	2	5	1	14
34	35	2	5	2	35
35	36	2	5	3	56
36	37	2	6	1	17
37	38	2	6	2	38
38	39	2	6	3	59
39	40	2	7	1	20
40	41	2	7	2	41
41	42	2	7	3	62
42	43	3	1	1	3
43	44	3	1	2	24
44	45	3	1	3	45
45	46	3	2	1	6
46	47	3	2	2	27
47	48	3	2	3	48
48	49	3	3	1	9
49	50	3	3	2	30
50	51	3	3	3	51
51	52	3	4	1	12

Table 19: Channelized STM1-to-T1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15
55	56	3	5	2	36
56	57	3	5	3	57
57	58	3	6	1	18
58	59	3	6	2	39
59	60	3	6	3	60
60	61	3	7	1	21
61	62	3	7	2	42
62	63	3	7	3	63
63	64	4	1	1	24
64	65	4	1	2	45
65	66	4	1	3	66
66	67	4	2	1	27
67	68	4	2	2	48
68	69	4	2	3	69
69	70	4	3	1	30
70	71	4	3	2	51
71	72	4	3	3	72
72	73	4	4	1	33
73	74	4	4	2	54
74	75	4	4	3	75

Table 19: Channelized STM1-to-T1 Channel Mapping (*continued*)

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
75	76	4	5	1	36
76	77	4	5	2	57
77	78	4	5	3	78
78	79	4	6	1	39
79	80	4	6	2	60
80	81	4	6	3	81
81	82	4	7	1	42
82	83	4	7	2	63
83	84	4	7	3	84

Related Documentation

- *Physical Interfaces Properties Statements List*

Example: Configuring Channelized STM1 Interfaces

The following configuration is sufficient to get the Channelized STM1-to-E1 PIC interface up and running. The channelized STM1-to-E1 interface is an STM1 that is divided into 63 E1 interfaces. E1 interfaces 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. For information about Frame Relay DLCI limitations for channelized interfaces, see [“Data-Link Connection Identifiers on Channelized Interfaces” on page 6](#). For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS System Basics Configuration Guide*.

You apply all STM1 interface SONET/SDH options to the first E1 interface in the configuration by including the **sonet-options** statement at the **[edit interfaces e1-fpc/pic/port:channel]** hierarchy level:

```
[edit]
interfaces {
  e1-0/0/1:0 {
    encapsulation cisco-hdlc;
```

```

sonet-options {
    no-z0-increment;
}
e1-options {
    framing g704;
}
unit 0 {
    family inet {
        address 10.11.30.1/30;
    }
}
e1-0/0/1:1 {
    encapsulation frame-relay;
    e1-options {
        framing g704;
    }
    unit 1 {
        dlci 16;
        family inet {
            address 10.11.31.9/30;
        }
    }
}
e1-0/0/1:2 {
    encapsulation ppp;
    no-keepalives;
    unit 0 {
        family inet {
            address 10.11.31.47/30;
        }
    }
}
[edit]
chassis {
    fpc 2 {
        pic 0 {
            vtmapping klm;
        }
    }
}

```

Configuring Channelized STM1 IQ and IQE Interfaces

This section includes the following topics:

- [Configuring an STM1 IQ or STM1 IQE Interface on page 194](#)
- [Configuring E1 IQ and IQE Interfaces on page 194](#)
- [Configuring Fractional E1 IQ and IQE Interfaces on page 195](#)
- [Configuring an NxDS0 IQ Interface on page 196](#)
- [Example: Configuring Channelized STM1 IQ and IQE Interfaces on page 197](#)

Configuring an STM1 IQ or STM1 IQE Interface

On a one-port Channelized STM1 IQ PIC, or each individual port of the 4-port Channelized STM1 IQE PIC, you can configure one SDH STM1 interface. To configure an SDH STM1 interface, include the **no-partition interface-type** statement at the **[edit interfaces cstm1-fpc/pic/port]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type 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 only apply CoS rules to the aggregate bit streams.

Configuring E1 IQ and IQE Interfaces

To configure an E1 interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-fpc/pic/port]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-fpc/pic/port**:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type cau4;
```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level, specifying the **e1** interface type. This configuration creates interface **e1-fpc/pic/port:channel**. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, **type** can be **ce1** or **e1**.

```
[edit interfaces cau4-fpc/pic/port]
partition partition-number interface-type e1;
```



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



NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ and IQE interfaces, channel numbering begins with 1 (:1).

Example: Configuring E1 IQ and IQE Interfaces

Configure the following five E1 interfaces:

```
e1-0/0/0:1
e1-0/0/0:2
e1-0/0/0:3
e1-0/0/0:4
e1-0/0/0:5
```

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;
[edit interfaces cau4-0/0/0]
partition 1-5 interface-type e1;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Fractional E1 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure a fractional E1 interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-fpc/pic/port]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-fpc/pic/port**:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type cau4;
```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level, specifying the **e1** interface type. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, **type** can be **ce1** or **e1**. This configuration creates interface **e1-fpc/pic/port:channel**:

```
[edit interfaces cau4-fpc/pic/port]
partition partition-number interface-type e1;
```

3. Configure the number of time slots allocated to the E1 IQ or IQE interface by including the **timeslots** statement at the **[edit interfaces e1-fpc/pic/port:channel e1-options]** hierarchy level. NxDS0 time slots configured on either a channelized STM1 IQ or IQE interface or channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots range from 2 to 32 (1 is reserved). To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

```
[edit interfaces e1-fpc/pic/port:channel e1-options]
timeslots time-slot-range;
```



NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ or IQE interfaces, channel numbering begins with 1 (:1).

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring Fractional E1 Interfaces

Configure a fractional E1 interface that uses time slots 2 through 10:

```
[edit interfaces cstm1-0/0/0]
no-partition cau4;
[edit interfaces cau4-0/0/0]
partition 1 interface-type e1;
[edit interfaces e1-0/0/0 e1-options]
timeslots 2-10;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized STM1 interface are used. To configure an NxDS0 IQ interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-fpc/pic/port]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-fpc/pic/port**:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type cau4;
```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-fpc/pic/port]** hierarchy level, specifying the **ce1** interface type. This configuration creates interface **ce1-fpc/pic/port:channel**. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, **type** can be **ce1** or **e1**:

```
[edit interfaces cau4-fpc/pic/port]
partition partition-number interface-type ce1;
```

3. Configure the number of time slots allocated to the NxDS0 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces e1-fpc/pic/port:channel]** hierarchy level, specifying the **ds** interface type. For channelized E1 IQ interfaces, the partition number range is from 1 through 31. For E1 IQ interfaces (**e1-fpc/pic/port**), the time-slot range is from 2 through 31. For channelized E1 IQ interfaces (**ce1-fpc/pic/port**), the time-slot range is from 1 through 31. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces:

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




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



NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ and IQE interfaces, channel numbering begins with 1 (:1).

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring an NxDS0 IQ Interface

Configure an NxDS0 interface that uses time slots 1 through 10. This configuration creates the `ds-0/0/0:1:1` interface.

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;
[edit interfaces cau4-0/0/0]
partition 1 interface-type ce1;
[edit interfaces ce1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Example: Configuring Channelized STM1 IQ and IQE Interfaces

Configure STM1, E1, fractional E1, and NxDS0 interfaces:

STM1 Interface	<pre>[edit interfaces] cstm1-0/0/0 { no-partition interface-type so; } so-0/0/0 { unit 0 { family inet { address 10.10.12.1/30; } } }</pre>
E1 Interface	<pre>[edit interfaces] cstm1-1/1/0 { no-partition interface-type cau4; } [edit interfaces] cau4-1/1/0 { partition 1-63 interface-type e1; } [edit interfaces] e1-1/1/0:1 { unit 0 { family inet { address 10.10.10.1/30; } } }</pre>

```

    }
  }
  ...

Fractional E1 Interface [edit interfaces]
                          cstm1-1/0/0 {
                            no-partition interface-type cau4;
                          }
                          [edit interfaces]
                          cau4-1/0/0 {
                            partition 1-63 interface-type e1;
                          }
                          [edit interfaces]
                          e1-1/1/0:1 {
                            e1-options {
                              timeslots 2-10;
                            }
                          }
                          unit 0 {
                            family inet {
                              address 10.10.10.1/30;
                            }
                          }
                        }
                      }
                    ...

DS0 Interface [edit interfaces]
                  cstm1-2/0/0 {
                    no-partition interface-type cau4;
                  }
                  [edit interfaces]
                  cau4-2/0/0 {
                    partition 1-10 interface-type ce1;
                  }
                  [edit interfaces]
                  ce1-2/0/0:1 {
                    partition 1 interface-type ds timeslots 2-10;
                    [edit interfaces]
                    ds-2/0/0:1:1 {
                      unit 0 {
                        family inet {
                          address 10.12.12.1/30;
                        }
                      }
                    }
                  }
                }
              ...
            }

```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Link PIC Failover on Channelized STM1 Interfaces

For Channelized STM1 IQ and 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*.

CHAPTER 9

Configuring Channelized T1 Interfaces

- [Channelized T1 IQ and IQE Interfaces Overview on page 201](#)
- [Configuring Channelized T1 IQ and IQE Interfaces on page 201](#)
- [Example: Configuring Channelized T1 IQ and IQE Interfaces on page 205](#)

Channelized T1 IQ and IQE Interfaces Overview

The Channelized T1 intelligent queuing (IQ) and enhanced intelligent queuing (IQE) PICs have 10 T1 ports that you can channelize to the DS0 level. Each T1 interface has 24 DS0 time slots. You can combine DS0 time slots (channels) to create a channel group (NxDS0).

The Channelized T1 IQ and IQE PICs are supported on the M7i, M10i, M20, M40e, M120, and M320 routers.

Related Documentation

- [Example: Configuring Channelized T1 IQ and IQE Interfaces on page 205](#)

Configuring Channelized T1 IQ and IQE Interfaces

- [Configuring T1 IQ and IQE Interfaces on page 201](#)
- [Configuring Fractional T1 IQ and IQE Interfaces on page 202](#)
- [Configuring NxDS0 IQ and IQE Interfaces on page 203](#)
- [Configuring Payload Loopback on page 203](#)
- [Configuring Channelized T1 Interface Properties on page 204](#)

Configuring T1 IQ and IQE Interfaces

To configure a T1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct1-fpc/pic/port]** hierarchy level:

```
[edit interfaces ct1-fpc/pic/port]  
no-partition interface-type t1;
```

This configuration creates the interface **t1-fpc/pic/port**.



NOTE: For a T1 (t1-) interface configured on channelized T1 (ct1-) interface on a Channelized T1 IQ or IQE PIC, you can configure the following T1 options, but these options do not take effect for the T1 interface:

- bert-algorithm
- bert-error-rate
- bert-period
- buildout
- framing
- line-encoding
- loopback
- remote-loopback-respond

The T1 interface inherits these option settings from the parent channelized T1 interface.

Configuring Fractional T1 IQ and IQE Interfaces

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

1. Include the **no-partition** statement at the **[edit interfaces ct1-fpc/pic/port]** hierarchy level. This configuration creates the interface **t1-fpc/pic/port**.

```
[edit interfaces ct1-fpc/pic/port]
no-partition interface-type t1;
```

2. Configure the number of time slots allocated to the T1 IQ or IQE interface by including the **timeslots** statement at the **[edit interfaces t1-fpc/pic/port t1-options]** hierarchy level. DSO time slots configured on the channelized T1 IQ or IQE interface are numbered from 1 to 24. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

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

For more information about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 IQ and IQE Interfaces

Configure a fractional T1 interface that uses time slots 2 through 10:

```
[edit interfaces t1-0/0/0]
no-partition interface-type t1;
[edit interfaces t1-0/0/0 t1-options]
timeslots 1-10;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring NxDS0 IQ and IQE Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure an NxDS0 IQ or IQE interface on a Channelized T1 IQ or IQE PIC, you must configure the number of time slots allocated to the NxDS0 IQ or IQE interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces t1-fpc/pic/port]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces t1-fpc/pic/port]
partition partition-number timeslots time-slot-range interface-type ds;
```

For channelized T1 IQ or IQE interfaces, the partition number range is from 1 through 24.

For channelized T1 IQ or IQE interfaces (**t1-fpc/pic/port**), 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 about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring an NxDS0 IQ or IQE Interface

Configure an NxDS0 interface that uses time slots 2 through 10. This configuration creates the **ds-0/0/0:1** interface.

```
[edit interfaces t1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Payload Loopback

Clocking and loopback options are configured at the controller level for all IQ-based and IQE-based interfaces. However, for the channelized T1 IQ or IQE interfaces, configure the payload loopback on the T1 interfaces instead of the channelized T1 IQ or IQE interface. To configure the payload option, include the **loopback payload** statement at the **[edit interfaces t1-fpc/pic/port t1-options loopback]** hierarchy level.

By default, all the time slots on a channelized T1 IQ or IQE interface are used. There can be a maximum of 24 channel groups per channelized T1 IQ or IQE interface. Thus, you can configure a maximum of 240 channel groups per PIC.

To specify the DS0 channel group number in the interface name, include a colon (:) as a separator. For example, a Channelized T1 IQ or IQE PIC might have the following physical and virtual interfaces:

```
ds-0/0/0:x
```

x is a DS0 channel group from 1 through 24 (for more information about ranges, see [Table 20 on page 204](#)).

You can use any of the values within the range available for **x**; you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

- To configure the **t1-options** statement, you must set channel group **x** to **0**:

```
ds-0/0/0:0
```

- There are no restrictions on configuring the **ds0-options** statement.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

To configure the channel groups and time slots for a channelized T1 IQ or IQE interface, include the following statements at the **[edit chassis]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    ct1 {
      t1 link-number {
        channel-group group-number;
        timeslots time-slot-range;
      }
    }
  }
}
```

There are 24 time slots on a T1 interface. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

Table 20 on page 204 shows the ranges you can specify.

Table 20: Ranges for Channelized T1 IQ Configuration

Item	Option	Range
FPC slot	<i>slot-number</i>	0 through 7
PIC slot	<i>pic-number</i>	0 through 3
T1 port	<i>port-number</i>	0 through 9
DS0 channel group	<i>partition</i>	1 through 24
Time slot	<i>time-slot-range</i>	1 through 24

The theoretical maximum number of channel groups possible per PIC is $10 * 24 = 240$. This is within the maximum bandwidth available.

Configuring Channelized T1 Interface Properties

To configure channelized T1 IQ or IQE interface properties, include the **t1-options** statement at the **[edit interfaces interface-name]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx56 | nx64)
  fcs (16 | 32);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
```



```

invert-data;
line-encoding (ami | b8zs);
loopback (local | payload | remote);
start-end-flag (filler | shared);
}

```



NOTE: If you configure the line-encoding statement with the ami option and the byte-encoding statement with the nx64 option, excessive zeros in the payload area may bring the interface down. To prevent this, configure the byte-encoding statement with the nx56 option or include the invert-data statement.

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```

[edit interfaces interface-name]
ds0-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  loopback payload;
  start-end-flag (filler | shared);
}

```

Only a subset of the T1 options is valid for the channelized configuration; you specify the time slots using the **[edit chassis]** configuration described in *Examples: Interface Naming*. For more information about the T1 and DS0 options, see *T1 Interfaces Overview*.

Each T1 interface has 24 time slots (DS0s). You can combine one or more of these DS0 time slots (channels) to create a channel group (*NxDS0*). There can be a maximum of 24 channel groups per T1 interface.

Example: Configuring Channelized T1 IQ and IQE Interfaces

Configure a channelized T1 interface as an unpartitioned, clear channel.

Configuring a T1 Interface

```

[edit interfaces]
ct1-2/0/0 {
  no-partition interface-type t1; # t1-2/0/0
}

```

Configure a partitioned channel group.

Configuring a Channel Group

```

[edit interfaces]
ct1-0/0/1 {
  partition 1 interface-type ds0 timeslots 1-10;
  partition 2 interface-type ds0 timeslots 11-20;
}

```

The following configuration is sufficient to get the channelized T1 IQ or IQE interface up and running:

Configuring Multiple Interface Types

```

[edit]
interfaces {

```

```
ct1-1/2/3 {
  partition 1 timeslots 10 interface-type ds; # ds-1/2/3:1
  partition 2 timeslots 1-9 interface-type ds; # ds-1/2/3:2
}
ds-1/2/3:1 {
  unit 0 {
    family inet {
      address 10.25.1.2/24;
    }
  }
}
ds-1/2/3:2 {
  unit 0 {
    family inet {
      address 10.25.2.2/24;
    }
  }
}
}
[edit]
interfaces {
  ct1-1/2/6 {
    no-partition interface-type t1; # t1-1/2/6
  }
  t1-1/2/6 {
    t1-options {
      timeslots 1-2;
    }
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
```

Related Documentation

- [Configuring Channelized T1 IQ and IQE Interfaces on page 201](#)

CHAPTER 10

Configuring Channelized T3 Interfaces

- [Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207](#)
- [Configuring the Channelized T3 Loop Timing on page 209](#)
- [Configuring Channelized T3 IQ Interfaces on page 209](#)
- [Example: Configuring Channelized T3 IQ Interfaces on page 212](#)
- [Configuring Channelized DS3-to-DS0 Interfaces on page 213](#)
- [Examples: Configuring Channelized DS3-to-DS0 Interfaces on page 216](#)
- [Configuring Channelized DS3-to-DS1 Interfaces on page 218](#)
- [Examples: Configuring Channelized DS3-to-DS1 Interfaces on page 220](#)

Configuring the Junos OS to Enable Channelization on DS3/E3 MIC

By default, the DS3/E3 MIC functions in clear-channel mode. To enable the DS3/E3 MIC to function in channelized mode, you need to use the software license S-MIC-3D-8CHDS3. To enable channelization, set the **channelization** statement at the **[edit chassis fpc MPC-slot-number pic MIC-slot-number]** hierarchy level. You can use the **channelization** option to channelize only individual DS3 interfaces.



NOTE:

- You can configure the **channelization** statement to enable channelization for the DS3/E3 MIC only. Moreover, you can use the **channelization** statement only on MX Series routers with Queuing and Enhanced Queuing MPCs (MX-MPC1-3D-Q, MX-MPC2-3D-Q, and MX-MPC2-3D-EQ) or on MX80 routers. Configuring the **channelization** statement on other MPCs does not have any effect, and the MICs continue to operate in clear-channel mode.
- Only clear-channel E3 mode is supported on the DS3/E3 MIC. Therefore, configuring the **channelization** statement does not impact the E3 functionality.

To configure channelization on the DS3/E3 MIC:

1. At the **[edit chassis]** hierarchy level in configuration mode, navigate to the hierarchy level that indicates the slot on which the DS3/E3 MIC is located.

```
[edit chassis]
user@host# edit fpc MPC-slot-number pic MIC-slot-number
```

For example, to navigate to the **[edit chassis fpc 1 pic 2]** hierarchy level:

```
[edit chassis]
user@host# edit fpc 1 pic 2
```

2. Configure the **channelization** statement.

```
[edit chassis fpc MPC-slot-number pic MIC-slot-number]
user@host# set channelization
```

For example:

```
[edit chassis fpc 1 pic 2]
user@host# set channelization
```

3. Verify the configuration by using the **show** command at the **[edit chassis]** hierarchy level:

```
[edit chassis]
user@host# show
fpc 1 {
  pic 2 {
    channelization;
  }
}
```

To enable the DS3/E3 MIC to function in clear-channel mode, you need to disable channelization. To do this, delete the **channelization** option at the **[chassis fpc MPC-slot-number pic MIC-slot-number]** hierarchy level.

To disable channelization on the DS3/E3 MIC:

1. At the **[edit chassis]** hierarchy level in configuration mode, navigate to the hierarchy level that indicates the slot on which the DS3/E3 MIC is located.

```
[edit chassis]
user@host# edit fpc MPC-slot-number pic MIC-slot-number
```

For example:

```
[edit chassis]
user@host# edit fpc 1 pic 2
```

2. Delete the **channelization** statement.

```
[edit chassis fpc MPC-slot-number pic MIC-slot-number]
user@host# delete channelization
```

For example:

```
[edit chassis fpc 1 pic 2]
user@host# delete channelization
```

Related Documentation

- [channelization on page 353](#)

Configuring the Channelized T3 Loop Timing

By default, internal clocking (line timing) is used on channelized IQ and IQE interfaces. To configure SONET/SDH or DS3-level external clocking, include the **loop-timing** statement:

```
loop-timing;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces ct3-*fpc/pic/port* t3-options]**
- **[edit interfaces stm1-*fpc/pic/port* sonet-options]**

To explicitly configure the default line timing, include the **no-loop-timing** statement in the configuration:

```
no-loop-timing;
```

The **loop-timing** and **no-loop-timing** statements apply only to E1 and T1 interfaces you configure on channelized IQ and IQE PICs. If you attempt to include these statements on any other interface type, they are ignored.

For all channelized IQ and IQE PICs, the **clocking** statement is supported on all channels. To configure clocking on individual interfaces, include the **clocking** statement at the **[edit interfaces *type-fpc/pic/port:channel*]** hierarchy level. If you do not include the **clocking** statement, the individual interfaces use internal clocking by default.

For more information, see *Configuring the Clock Source*.

Configuring Channelized T3 IQ Interfaces



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

This section describes how to configure channelized T3 intelligent queuing (IQ) interfaces, discussing the following topics:

- [Configuring T3 IQ Interfaces on page 209](#)
- [Configuring T1 IQ Interfaces on page 210](#)
- [Configuring Fractional T1 IQ and IQE Interfaces on page 210](#)
- [Configuring an NxDS0 IQ Interface on page 211](#)

Configuring T3 IQ Interfaces

To configure a T3 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces ct3-fpc/pic/port]
```

```
no-partition interface-type t3;
```

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

Configuring T1 IQ Interfaces

On a Channelized DS3 IQ or IQE Physical Interface Card (PIC), you can create up to 112 T1 interfaces. To configure a T1 interface on a Channelized DS3 IQ or IQE PIC, include 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 t1;
```

This configuration creates interface **t1-fpc/pic/port:channel**.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized T3 interfaces, the partition number can be from 1 through 28.



NOTE: For channelized T3 interfaces, channel numbering begins with 0 (:0). For channelized T3 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The interface type is the channelized interface type or clear channel you are creating. For channelized T3 interfaces, **type** can be **ct1** or **t1**.

Example: Configuring T1 IQ and IQE Interfaces

Configure the following five T1 interfaces:

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

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

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring Fractional T1 IQ and IQE Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized DS3 IQ or IQE PIC, perform the following tasks:

1. Configure a T1 IQ interface. For more information, see [“Configuring T1 IQ Interfaces” on page 210](#).

This configuration creates interface **t1-fpc/pic/port:channel**.

2. Configure the number of time slots allocated to the T1 IQ 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 t1-options]
```

timeslots *time-slot-range*;

For channelized T1 IQ 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 about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 IQ Interfaces

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

```
[edit interfaces ct3-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-10;
```

For a full configuration example, see the *Junos OS, Release 15.1*.

Configuring an NxDSO IQ Interface

By default, all the time slots on a channelized T3 interface are used. To configure an NxDSO IQ interface on a Channelized DS3 IQ or IQE PIC, perform the following tasks:

1. 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 ct1;
```

This configuration creates interface **ct1-fpc/pic/port:channel**.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized T1 interfaces, the partition number can be from 1 through 28.

The interface type is the channelized interface type or clear channel you are creating. For channelized T3 interfaces, **type** can be **ct1** or **t1**.



NOTE: For channelized T3 interfaces, channel numbering begins with 0 (:0). For channelized T3 IQ interfaces, channel numbering begins with 1 (:1).

2. Configure the number of time slots allocated to the NxDSO 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]
partition partition-number timeslots time-slot-range interface-type ds;
```

For channelized T1 IQ interfaces, the partition number range is from 1 through 28; 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 about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring an NxDSO IQ Interface

Configure the following two NxDSO interfaces with 10 time slots and 4 time slots, respectively:

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

[edit interfaces ct3-0/0/0]
partition 1 interface-type ct1;
[edit interfaces ct1-0/0/0:1]
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, Release 15.1*.

Example: Configuring Channelized T3 IQ Interfaces

Configure a channelized T3 interface as an unpartitioned, clear channel.

Configuring a T3 Interface

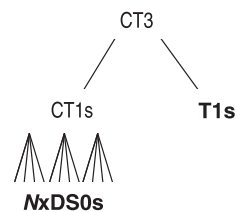
```
[edit interfaces]
ct3-5/0/0 {
  no-partition interface-type t3;
}
```

Configuring NxDSO and T1 Interfaces

Figure 38 on page 212 shows the following interfaces on a Channelized DS3 IQ or IQE PIC:

- A channelized T1, which is partitioned into NxDSO interfaces
- T1 interfaces

Figure 38: Sample Channelization of DS3 IQ or IQE PIC



Bold entries correspond to actual packet channels.

g003015

```
[edit interfaces]
ct3-1/1/0 {
  description "CT3 to CT1 and CT3 to T1.";
  t3-options {
    loopback remote;
    looptiming;
  }
  partition 1 interface-type ct1; # ct1-1/1/0:1.
  partition 2-28 interface-type t1; # t1-1/1/0:[2-28]
}
ct1-1/1/0:1 {
  description "case (a) CT1s to NxDSOs.";
  t1-options {
    bert-algorithm all-ones-repeating;
```



```

    framing sf;
    line-encoding ami;
}
partition 1 timeslots 2 - 10 interface-type ds0; # ds-1/1/0:1:1, channel group with 10 DS0s
partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:1:2, channel group with 13 DS0s
...
}

```

**Related
Documentation**

- [Configuring Channelized T3 IQ Interfaces on page 209](#)

Configuring Channelized DS3-to-DS0 Interfaces

For channelized interfaces, you can configure 28 T1 channels per T3 interface. Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots. To specify the T1 link and DS0 channel group number in the interface name, use colons (:) as separators. For example, a Multichannel DS3 PIC might have the following physical and virtual interfaces:

`ds-0/0/0:x:y`

where *x* is a T1 link ranging from 0 through 27 and *y* is a DS0 channel group from 0 through 7. For more information about ranges, see [Table 21 on page 214](#).

You can use any of the values within the range available for *x* and *y*, and you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

- To configure the T1 options, you must set channel group *y* to 0; the T1 link *x* can be any value:

`ds-0/0/0:x:0`

- To configure the T3 options, you must set the T1 link *x* to 0 and channel group *y* to 0:

`ds-0/0/0:0:0`

- There are no restrictions on configuring the DS0 options.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

By default, all the time slots are used. To configure the channel groups and time slots for a channelized DS3-to-DS0 interface, include the **channel-group** and **timeslots** statements at the **[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]** hierarchy level:

```

[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number ]
channel-group group-number;
timeslots time-slot-range;

```



NOTE: If you commit the interface name but do not include the **[edit chassis]** configuration, the channelized DS3-to-DS0 interface behaves like a channelized DS3-to-DS1 interface: none of the DS0 functionality is accessible.

Table 21 on page 214 shows the ranges you can specify for each of the elements in the preceding configuration.

Table 21: Ranges for Channelized DS3-to-DS0 Configuration

Item	Option	Range
FPC slot	slot-number	0 through 7 (see note below)
PIC slot	pic-number	0 through 3
Port	port-number	0 through 1
T1 link	link-number	0 through 27
DS0 channel group	group-number	0 through 7
Time slot	time-slot-range	1 through 24



NOTE: The FPC slot range depends on the router. For a routing matrix, the range is from 0 through 31. For M40, M40e, M160, M320, M120, and other T Series routers, the range is from 0 through 7. For M20 routers, the range is from 0 through 3. For M10 and M10i routers the range is from 0 through 1. For M5 and M7i routers, the only applicable value is 0.

Bandwidth limitations restrict the interface to a maximum of 128 channel groups per T3 port, rather than the theoretical maximum of $8 * 28 = 224$.

There are 24 time slots on a T1 interface. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. You can use each time slot number on only one channel group within the same T1 link.

To configure channelized DS3-to-DS0 interface properties, you can include the **t3-options**, **t1-options**, and **ds0-options** statements. Only a subset of the T3 options are valid for this configuration, and the **buildout**, **invert-data**, and **line-encoding** statements at the **[edit interfaces interface-name t1-options]** hierarchy level are ignored. Likewise, only a subset of the DS0 options are valid for this configuration, and the **bert-algorithm**, **bert-error-rate**, **bert-period**, and **loopback payload** statements at the **[edit interfaces interface-name ds0-options]** hierarchy level are ignored. The following configurations list all the valid parameters.



NOTE: The set of options the Junos OS applies to the interface depends on how you specify the interface name. For more information, see [“Examples: Configuring Channelized DS3-to-DS0 Interfaces” on page 216](#).

To specify options for the T3 side of the connection, include the **t3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t3-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  (cbit-parity | no-cbit-parity);
  (long-buildout | no-long-buildout);
  loopback (local | payload | remote);
}
```

The statements at the **t3-options** hierarchy are supported only for channel 0; they are ignored if configured on other channels. To specify options for each of the T1 channels, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  framing (esf | lf);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | payload | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-number;
}
```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
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);
}
```

For more information about specific parameters, see *E1 Interfaces Overview*, *E3 Interfaces Overview*, *T1 Interfaces Overview*, and *T3 Interfaces Overview*. For a configuration example, see “[Examples: Configuring Channelized DS3-to-DS0 Interfaces](#)” on page 216.

For information about Frame Relay DLCI limitations for channelized interfaces, see “[Data-Link Connection Identifiers on Channelized Interfaces](#)” on page 6. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS System Basics Configuration Guide*.

Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots.

Related Documentation

Examples: Configuring Channelized DS3-to-DS0 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS0 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 channels can use the following encapsulation types for their logical interfaces:

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

For more information, see *Configuring Frame Relay DLCIs*.



NOTE: All these configuration examples specify channel group 0 in the interface address, which is required for configuring the `t3-options` and `t1-options` statements.

Configuring Cisco HDLC Encapsulation on a Channelized DS3-to-DS0 Interface

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
[edit chassis]
fpc 2 {
  pic 0 {
    ct3 {
      port 1 {
        t1 20 {
          channel-group 0 timeslots 1-5;
        }
      }
    }
  }
}
```

Configuring PPP Encapsulation on a Channelized DS3-to-DS0 Interface

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation ppp;
  unit 0 {
    family inet {
```

```

        address 10.0.4.40/32 {
            destination 10.0.4.41;
        }
    }
}
[edit chassis]
fpc 2 {
    pic 0 {
        ct3 {
            port 1 {
                t1 20 {
                    channel-group 0 timeslots 1-5;
                }
            }
        }
    }
}
}

```

**Configuring Three
Frame Relay DLCIs on
a Channelized DS3
Interface**

```

[edit interfaces]
t1-5/1/3:0 {
    mtu 9192;
    encapsulation frame-relay;
    unit 1 {
        dlci 101;
        family inet {
            mtu 9000;
            address 10.123.1.2/32 {
                destination 10.123.1.1;
            }
        }
        family iso {
            mtu 9000;
        }
        family mpls {
            mtu 9000;
        }
    }
    unit 2 {
        dlci 102;
        family inet {
            mtu 9000;
            address 10.123.1.4/32 {
                destination 10.123.1.3;
            }
        }
        family iso {
            mtu 9000;
        }
        family mpls {
            mtu 9000;
        }
    }
    unit 3 {
        dlci 103;
        family inet {

```

```
mtu 9000;
address 10.123.1.6/32 {
    destination 10.123.1.5;
}
}
family iso {
    mtu 9000;
}
family mpls {
    mtu 9000;
}
}
}
```

**Configuring Cisco
HDLC Encapsulation
with Byte-Encoding**

```
[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
ds0-options {
    byte-encoding nx56;
}
unit 0 {
    family inet {
        address 10.221.2.8/24;
    }
}
}
```

**Configuring Cisco
HDLC Encapsulation
with Byte-Encoding
and Framing**

```
[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
    byte-encoding nx56;
    framing sf;
}
unit 0 {
    family inet {
        address 10.221.2.8/24;
    }
}
}
```

**Use Time Slots
1 Through 10**

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number;
timeslots 1-10;
```

**Use Time Slots 1
Through 5, 10, and 24**

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number;
timeslots 1-5,10,24;
```

**Related
Documentation**

Configuring Channelized DS3-to-DS1 Interfaces

You can configure 28 T1 channels per T3 interface, and each interface can have logical interfaces. To specify the channel number, include it after the colon (:) in the interface

name. For example, a 4-port T3 PIC in FPC 1 and slot 1 will have the following physical interfaces, depending on the media type:

```
t1-1/1/0:x
t1-1/1/1:x
t1-1/1/2:x
t1-1/1/3:x
```

where *x* is a channel number ranging from 0 through 27.

To configure channelized DS3-to-DS1 interface properties, you can include both the **t1-options** and **t3-options** statements. Only a subset of the T3 options is valid for this configuration, and the **buildout**, **invert-data**, and **line-encoding** statements at the **[edit interfaces *interface-name* t1-options]** hierarchy level are ignored. Likewise, only a subset of the DS0 options are valid for this configuration, and the **bert-algorithm**, **bert-error-rate**, **bert-period**, and **loopback payload** statements at the **[edit interfaces *interface-name* ds0-options]** hierarchy level are ignored. The following configuration lists all the valid parameters.

To specify options for the T3 side of the connection, include the **t3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t3-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  (cbit-parity | no-cbit-parity);
  (feac-loop-respond | no-feac-loop-respond);
  loopback (local | payload | remote);
}
```

The statements in the **t3-options** hierarchy are supported only for channel 0; they are ignored if configured on other channels.

To specify options for each of the T1 channels, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  framing (sf | esf);
  idle-cycle-flag (flags | ones);
  loopback (local | payload | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-number;
}
```

For T1 channels on a channelized T3 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 T3 interface. The individual T1 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” on page 8](#).

For information about Frame Relay DLCI limitations for channelized interfaces, see [“Data-Link Connection Identifiers on Channelized Interfaces” on page 6](#). For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS System Basics Configuration Guide*.

For more information about specific parameters, see *T1 Interfaces Overview* and *T3 Interfaces Overview*. For a configuration example, see [“Examples: Configuring Channelized DS3-to-DS1 Interfaces” on page 220](#).

Related Documentation

Examples: Configuring Channelized DS3-to-DS1 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS1 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 channels can use the following encapsulation types for their logical interfaces:

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

For more information, see *Configuring Frame Relay DLCIs*.

Configuring Cisco HDLC Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
```

Configuring PPP Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
```


**Configuring Five Frame
Relay DLCIs on a
Channelized DS3
Interface**

```
[edit interfaces]
tl-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlc1 101;
    family inet {
      mtu 9000;
      address 10.123.1.2/32 {
        destination 10.123.1.1;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 2 {
    dlc1 102;
    family inet {
      mtu 9000;
      address 10.123.1.4/32 {
        destination 10.123.1.3;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 3 {
    dlc1 103;
    family inet {
      mtu 9000;
      address 10.123.1.6/32 {
        destination 10.123.1.5;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 4 {
    dlc1 104;
    family inet {
      mtu 9000;
      address 10.123.1.8/32 {
        destination 10.123.1.7;
      }
    }
  }
}
```

```
    }  
    family iso {  
        mtu 9000;  
    }  
    family mpls {  
        mtu 9000;  
    }  
}  
unit 5 {  
    dlc1 105;  
    family inet {  
        mtu 9000;  
        address 10.123.1.10/32 {  
            destination 10.123.1.9;  
        }  
    }  
    family iso {  
        mtu 9000;  
    }  
    family mpls {  
        mtu 9000;  
    }  
}  
}
```

**Configuring Cisco
HDLC Encapsulation
with Byte-Encoding**

```
[edit interfaces t1-1/1/0:1]  
no-keepalives;  
encapsulation cisco-hdlc;  
t1-options {  
    byte-encoding nx56;  
}  
unit 0 {  
    family inet {  
        address 10.221.2.8/24;  
    }  
}
```

**Configuring Cisco
HDLC Encapsulation
with Byte-Encoding
and Framing**

```
[edit interfaces t1-1/1/0:1]  
no-keepalives;  
encapsulation cisco-hdlc;  
t1-options {  
    byte-encoding nx56;  
    framing sf;  
}  
unit 0 {  
    family inet {  
        address 10.221.2.8/24;  
    }  
}
```

**Related
Documentation**

PART 3

Troubleshooting Information

- [Troubleshooting Interfaces on page 225](#)
- [Troubleshooting Channelized DS3 Interfaces on page 235](#)
- [Troubleshooting Multichannel DS3 Interfaces on page 265](#)
- [Troubleshooting Channelized OC12 Interfaces on page 295](#)

Troubleshooting Interfaces

- [Configuring Interface Diagnostics Tools to Test the Physical Layer Connections on page 225](#)
- [Investigating Interface Steps and Commands on page 231](#)

Configuring Interface Diagnostics Tools to Test the Physical Layer Connections

- [Configuring Loopback Testing on page 225](#)
- [Configuring BERT Testing on page 227](#)
- [Starting and Stopping a BERT Test on page 230](#)

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, NxDSO, 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 that 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.

The following types of loopback testing are supported by Junos OS:

- DCE local—Loops packets back on the local data circuit-terminating equipment (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 22 on page 226 shows the loopback modes supported on the various interface types.

Table 22: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	<i>Configuring Ethernet Loopback Capability</i>
Circuit Emulation E1	Local and remote	<i>Configuring E1 Loopback Capability</i>
Circuit Emulation T1	Local and remote	<i>Configuring T1 Loopback Capability</i>
E1 and E3	Local and remote	<i>Configuring E1 Loopback Capability and Configuring E3 Loopback Capability</i>
NxDSO	Payload	"Configuring NxDSO IQ and IQE Interfaces" on page 32, "Configuring T1 and NxDSO Interfaces" on page 124, "Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode)" on page 134, "Configuring Channelized STM1 IQ and IQE Interfaces" on page 193, and "Configuring Channelized T3 IQ Interfaces" on page 209
Serial (V.35 and X.21)	Local and remote	<i>Configuring Serial Loopback Capability</i>
Serial (EIA-530)	DCE local, DCE remote, local, and remote	<i>Configuring Serial Loopback Capability</i>

Table 22: Loopback Modes by Interface Type (*continued*)

Interface	Loopback Modes	Usage Guidelines
SONET/SDH	Local and remote	<i>Configuring SONET/SDH Loopback Capability to Identify a Problem as Internal or External</i>
T1 and T3	Local, payload, and remote	<i>Configuring T1 Loopback Capability and Configuring T3 Loopback Capability</i> <i>See also Configuring the T1 Remote Loopback Response</i>

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

```
user@host# 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]

Configuring BERT Testing

To configure BERT:

- Configure the duration of the test.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-period 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. By default, the BERT period is 10 seconds.

- Configure the error rate to monitor when the inbound pattern is received.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-error-rate rate;
```

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).

- Configure the bit pattern to send on the transmit path.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-algorithm algorithm;
```

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 0.152 standard)
pseudo-2e15-o151    Pattern is 2^15 - 1 (per 0.152 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)
...
```

For specific hierarchy information, see the individual interface types.



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

```
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-2e23-o151    Pattern is 2^23 (per 0.151 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 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-2e7          Pattern is 2^7 - 1
pseudo-2e9-o153     Pattern is 2^9 - 1 (per 0.153 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 0.153 (511 type) standard)
pseudo-2e11-o152     Pattern is 2^11 -1 (per 0.152 and 0.153 (2047 type)
standards)
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 -1 (per 0.151 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 23 on page 229 shows the BERT capabilities for various interface types.

Table 23: BERT Capabilities by Interface Type

Interface	T1 BERT	T3 BERT	Comments
12-port T1/E1 Circuit Emulation	Yes (ports 0–11)	—	<ul style="list-style-type: none"> Limited algorithms
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)	—	<ul style="list-style-type: none"> Limited algorithms

Table 23: BERT Capabilities by Interface Type (*continued*)

Interface	T1 BERT	T3 BERT	Comments
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time Limited algorithms
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time
Channelized OC12	—	Yes (channel 0–11)	<ul style="list-style-type: none"> Single channel at a time Limited algorithms No bit count
Channelized STM1	Yes (channel 0–62)	—	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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” on page 14](#).

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 want 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 [CLI Explorer](#).



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.

Related Documentation

- [show interfaces diagnostics optics \(Gigabit Ethernet, 10-Gigabit Ethernet, 40-Gigabit Ethernet, 100-Gigabit Ethernet, and Virtual Chassis Port\)](#)

Investigating Interface Steps and Commands

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

- [Investigating Interface Steps and Commands Overview on page 231](#)
- [Monitoring Interfaces on page 231](#)
- [Performing a Loopback Test on an Interface on page 232](#)
- [Locating Interface Alarms on page 234](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on page 231 section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on page 232 section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on page 234 section explains some of the alarms and errors for the media.

Monitoring Interfaces

Problem Description: 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 24 on page 232](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 24: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse <i>interface-name</i> For example: show interfaces terse t1*	Displays summary information about the named interfaces.
show interfaces <i>interface-name</i> For example: show interfaces t1-x/y/z	Displays static status information about a specific interface.
show interfaces <i>interface-name</i> extensive For example: show interfaces t1-x/y/z extensive	Displays very detailed interface information about a specific interface.
monitor interface <i>interface-name</i> 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 Description: 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 25 on page 233](#) 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 25: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
<code>[edit interfaces <i>interface-name</i> interface-options] set loopback (local remote)</code>	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.
<code>show</code>	All interfaces	Verify the configuration before you commit it.
<code>commit</code>	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.
<code>[edit interfaces <i>interface-name</i> set clocking internal</code>	T1, T3, ATM, and SONET interfaces	The clocking statement at this hierarchy level configures the clock source of the interface to internal.
<code>show interfaces <i>interface-name</i></code>	Used for all interfaces	Display static status information about a specific interface.
<code>[edit interfaces <i>interface-name</i> unit logical-unit-number family inet address ip-address] set arp ip-address mac mac-address</code>	Fast Ethernet and Gigabit Ethernet interfaces	The arp statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
<code>show arp no-resolve</code>	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).
<code>clear interfaces statistics <i>interface-name</i></code>	All interfaces	Reset the statistics for an interface to zero.
<code>[edit interfaces <i>interface-name</i> set encapsulation cisco-hdlc</code>	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.
<code>[edit interfaces <i>interface-name</i> set no-keepalives</code>	T1, T3, SONET, and Multichannel DS3 interfaces	The no-keepalives statement at this level disables the sending of keepalives on the physical interface.

Table 25: Commands Used to Perform Loopback Testing on Interfaces (*continued*)

CLI Statement or Command	Interface Type	Description
show interfaces <i>interface-name</i> 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 <i>local-ip-address</i> bypass-routing count 1000 rapid	All interfaces	<p>Check the reachability of network hosts by sending ICMP ECHO_REQUEST messages to elicit ICMP ECHO_RESPONSE messages from the specified host.</p> <p>Use the bypass-routing option to ping a local system through an interface that has no route through it.</p> <p>The count option sends 1000 ping requests through the system.</p> <p>Type Ctrl+C to interrupt a ping command.</p>
show interfaces <i>interface-name</i> extensive	All interfaces	Display very detailed interface information about a specific interface.

Locating Interface Alarms

Problem **Description:** 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.

CHAPTER 12

Troubleshooting Channelized DS3 Interfaces

- [Monitoring Channelized DS3 Interfaces on page 235](#)
- [Using Loopback Testing For Channelized DS3 Interfaces on page 248](#)
- [Locating Channelized DS3 Alarms and Errors on page 259](#)

Monitoring Channelized DS3 Interfaces

- [Checklist for Monitoring Channelized DS3 Interfaces on page 235](#)
- [Monitor Channelized DS3 Interfaces on page 236](#)

Checklist for Monitoring Channelized DS3 Interfaces

Purpose To monitor Channelized DS3 interfaces and begin the process of isolating Channelized DS3 interface problems when they occur.

Action [Table 26 on page 235](#) provides the links and commands for monitoring Channelized DS3 interfaces.

Table 26: Checklist for Monitoring Channelized DS3 Interfaces

Tasks	Command or Action
"Monitor Channelized DS3 Interfaces" on page 236	
1. Display the Status of Channelized DS3 Interfaces on page 236	show interfaces terse t1*
2. Display the Status of a Specific Channelized DS3 Interface on page 237	show interfaces t1-fpc/pic/port:channel
3. Display Extensive Status Information for a Specific Channelized DS3 Interface on page 240	show interfaces t1-fpc/pic/port:channel extensive
4. Monitor Statistics for a Channelized DS3 Interface on page 245	monitor interfaces t1-fpc/pic/port:channel

Monitor Channelized DS3 Interfaces

By monitoring Channelized DS3 interfaces, you begin the process of isolating Channelized DS3 interface problems when they occur.

To monitor your Channelized DS3 interfaces, follow these steps:

1. [Display the Status of Channelized DS3 Interfaces on page 236](#)
2. [Display the Status of a Specific Channelized DS3 Interface on page 237](#)
3. [Display Extensive Status Information for a Specific Channelized DS3 Interface on page 240](#)
4. [Monitor Statistics for a Channelized DS3 Interface on page 245](#)

Display the Status of Channelized DS3 Interfaces

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces t1* terse`

Sample Output 1

```
user@host> show interfaces t1* terse
Interface      Admin Link Proto Local Remote
t1-1/2/0:1     up   down
t1-1/2/0:2     up   down
t1-1/2/0:3     up   down
t1-1/2/0:4     up   down
t1-1/2/0:5     up   up
t1-1/2/0:5.0   up   up   inet 172.16.1.33/30
t1-1/2/0:6     up   up
t1-1/2/0:6.0   up   up   inet 172.16.1.37/30
t1-1/2/0:7     up   up
t1-1/2/0:7.0   up   up   inet 172.16.1.41/30
t1-1/2/0:8     up   down
t1-1/2/0:9     up   down
t1-1/2/0:10    up   down
t1-1/2/0:11    up   up
t1-1/2/0:11.0  up   up   inet 172.16.1.45/30
t1-1/2/0:12    up   up
t1-1/2/0:12.0  up   up   inet 172.16.1.49/30
t1-1/2/0:13    up   up
t1-1/2/0:13.0  up   up   inet 172.16.1.53/30
t1-1/2/0:14    up   up
t1-1/2/0:14.0  up   up   inet 172.16.1.153/30
t1-1/2/0:15    up   up
t1-1/2/0:15.0  up   up   inet 172.16.1.177/30
t1-1/2/0:16    up   up
t1-1/2/0:16.0  up   up   inet 172.16.1.181/30
t1-1/2/0:17    up   up
t1-1/2/0:17.0  up   up   inet 172.16.1.129/30
t1-1/2/0:18    up   up
t1-1/2/0:18.0  up   up   inet 172.16.1.133/30
t1-1/2/0:19    up   down
t1-1/2/0:19.0  up   down inet 172.16.1.137/30
t1-1/2/0:20    up   down
```



```

t1-1/2/0:21      up    down
t1-1/2/0:22      up    down
t1-1/2/0:23      up    down
t1-1/2/0:24      up    down
t1-1/2/0:25      up    down
t1-1/2/0:26      up    down
t1-1/2/0:27      up    down
t1-1/2/0:28      up    down

```

Sample Output 2

```

user@host> show interfaces t1* terse
Interface          Admin Link Proto Local                               Remote
t1-0/3/3:0         down down
t1-0/3/3:0.0       up  down inet 10.10.10.1/30
t1-0/3/3:1         up    up
t1-0/3/3:1.0       up    up  inet 10.10.10.5/30
t1-0/3/3:2         up    up
t1-0/3/3:2.0       up    up  inet 10.10.10.53/30

```

Meaning The sample output shows the status of both the physical and logical interfaces. Sample output 1 shows that 12 of the possible 28 channels have IP addresses and are connected. Of the 12 connected channels, the last channel (**t1-1/2/0:19.0**) is currently down.

Sample output 2 shows that all links are up except for interface **t1-0/3/3:0**, which has both the physical and logical links down.

Display the Status of a Specific Channelized DS3 Interface

Purpose To display the status of a specific Channelized DS3 interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces t1-fpc/pic/port:channel`

Sample Output 1

```

user@host> show interfaces t1-1/2/0:5
Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
  Interface index: 181, SNMP ifIndex: 210
  Description: T1 to Tombstone - Circuit # 123456789
  Link-level type: PPP , MTU: 1504, Clocking: Internal , Speed: T1, Loopback: None,
FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 6898 (00:00:48 ago), Output: 6874 (00:00:07 ago)
  LCP state: Opened
  NCP state: inet: Opened , inet6: Not-configured, iso: Not-configured, mp1s:
Not-configured
  CHAP state: Not-configured
  CoS queues   : 4 supported
  Last flapped : 2004-05-11 16:01:30 EDT (5d 02:41 ago)
  Input rate    : 2648 bps (6 pps)
  Output rate   : 14608 bps (4 pps)
  DSI alarms   : None

```

DS1 defects :None

```

Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast:
68.71.141.35

```

Sample Output 2

```

user@host> show interfaces t1-0/3/3:2
Physical interface: t1-0/3/3:2, Enabled, Physical link is Up
  Interface index: 239, SNMP ifIndex: 127
  Description:
  Link-level type: Cisco-HDLC , MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Mode: M23, Framing: ESF
  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: 124789 (00:00:08 ago), Output: 125379 (00:00:04 ago)
  CoS queues     : 4 supported
  Last flapped   : 2004-04-30 09:12:44 UTC (2w0d 10:45 ago)
  Input rate     : 3984 bps (10 pps)
  Output rate    : 56328 bps (14 pps)
  DS1 alarms     : None
  DS3 alarms     : None
  DS1 defects    : None
  DS3 defects    : None
Logical interface t1-0/3/3:2.0 (Index 132) (SNMP ifIndex 236)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Input packets : 33897375
  Output packets: 40673351
  Protocol inet, MTU: 1500
  Flags: No-Redirects, uRPF, uRPF-loose
  Addresses, Flags: Primary Is-Preferred Is-Primary
    Destination: 10.10.10.52/30, Local: 10.10.10.53,
    Broadcast: 10.10.10.55

```

Sample Output 3

```

user@host> show interfaces t1-1/2/0:1
Physical interface: t1-1/2/0:1, Enabled, Physical link is Down
  Interface index: 177, SNMP ifIndex: 205
  Description: T1 to Bedrock #1 - RESERVED
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-04-02 09:12:49 EST (6w2d 08:29 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms     : AIS, LOF
  DS1 defects    : AIS, LOF

```

Sample Output 4

```

user@host> show interfaces t1-1/2/0:19
  Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
    Interface index: 148, SNMP ifIndex: 224
    Description: T1 to Rock City #6 - Circuit # 987654321
    Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF,
    Parent: ct3-1/2/0 Interface index 173
    Device flags : Present Running Down
    Interface flags: Hardware-Down Point-To-Point SNMP-Traps
    Link flags      : Keepalives
    Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
    Keepalive: Input: 0 (never), Output: 0 (never)
    LCP state: Conf-req-sent
    NCP state: inet: Down , inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
    CHAP state: Not-configured
    CoS queues      : 4 supported
    Last flapped    : 2004-05-14 15:56:43 EDT (2d 02:47 ago)
    Input rate      : 0 bps (0 pps)
    Output rate     : 0 bps (0 pps)
    DS1 alarms     : AIS, LOF
    DS1 defects    : AIS, LOF

    Logical interface t1-1/2/0:19.0 (Index 91) (SNMP ifIndex 256)
      Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps Encapsulation:
PPP
      Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
68.71.141.139

```

Meaning The first line of the output shows the status of the channel. 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.

Sample output 1 shows a channel that is connected and operating correctly. You can verify the following information to check that the interface is functioning correctly:

- Encapsulation used on the physical interface, **Link-level type: PPP**
- Reference clock source, **Clocking: Internal**
- Frame checksum sequence, **FCS: 16**
- Physical layer framing format used on the link, **Framing: ESF**

Because the link-level type is Point-to-Point Protocol (PPP), the link control protocol (LCP) state is **Opened**, and the network control protocol (NCP) state has one protocol, **NCP::inet:Opened**, indicating that the link is healthy. There are no DS1 alarms or defects.

Sample output 2 shows a channel that is connected and operating correctly. However, this channel has Cisco HDLC configured as the link-level type and a logical interface (**t1-0/3/3:2.0**) configured.

Sample output 3 shows a channel that is not connected, **Physical link is Down**. Loopback is not configured, **Loopback: None**, and the input and output counters are zero. In addition, there are alarm indication signal (AIS) and loss of frame (LOF) alarms and defects.

Sample output 4 shows a channel that is assigned but down, **Physical link is Down**. Information about the physical interfaces shows the device flags are **Present Running Down**, and one of the interface flags is **Hardware-Down**. In addition, interface protocol initialization failed to complete successfully on logical interface **t1-1/2/0:19.0**, **Flags: Hardware-Down Device-Down**.

Display Extensive Status Information for a Specific Channelized DS3 Interface

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces t1-fpc/pic/port:channel extensive`

Sample Output 1

```
user@host> show interfaces t1-1/2/0:5 extensive
Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
  Interface index: 181, SNMP ifIndex: 210, Generation: 96
  Description: T1 to Tombstone - Circuit # 123456789
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  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 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 6910 (last seen 00:00:21 ago)
    Output: 6886 (last sent 00:00:04 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 : 2004-05-11 16:01:30 EDT (5d 02:53 ago)
  Statistics last cleared: 2004-05-11 23:43:42 EDT (4d 19:10 ago)
  Traffic statistics:
    Input bytes :          551301316          4432 bps
    Output bytes :          4091306894         2696 bps
    Input packets:           5231609           6 pps
    Output packets:          4867661           3 pps
  Input errors:
    Errors: 47, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
398, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort          4820512          4804578          24909

    1 expedited-fo           0              0              0
```

2 assured-forw	0	0	0
3 network-cont	63083	63083	0

DS1 alarms :None

DS1 defects :None

T1 media:

		Seconds	Count	State
SEF	5	4 OK		
BEE	246	127 OK		
AIS		0	0	OK
LOF		0	0	OK
LOS		0	0	OK
YELLOW		0	0	OK
BPV		0	0	
EXZ		0	0	
LCV		246	538	
PCV		0	0	
CS		0	0	
LES		0		
ES		0		
SES		8		
SEFS		12		
BES		0		
UAS		0		

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, 0.151, Pseudorandom (9)

Packet Forwarding Engine configuration:

Destination slot: 1, PLP byte: 4 (0x01)

Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238) (Generation 111)

Flags: Point-To-Point SNMP-Traps Encapsulation: PPP

Protocol inet, MTU: 1500, Generation: 117, Route table: 0

Flags: None

Addresses, Flags: Is-Preferred Is-Primary

Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast: 68.71.141.35,

Generation: 169

Even though there are counts in the t1 media section of the output, notice how the " State" column has all " OK"

Sample Output 2

```
user@host> show interfaces t1-0/3/3:2 extensive
```

Physical interface: t1-0/3/3:2, Enabled, Physical link is Up

Interface index: 239, SNMP ifIndex: 127, Generation: 122

Description:

Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,

Loopback: None, FCS: 16, Mode: M23, Framing: ESF

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 : 124790 (last seen 00:00:03 ago)
Output: 125379 (last sent 00:00:09 ago)
CoS queues      : 4 supported
Last flapped    : 2004-04-30 09:12:44 UTC (2w0d 10:45 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :          2930724407          9560 bps
Output bytes :          9983871242         78464 bps
Input packets:          17011460           14 pps
Output packets:         20390813           19 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 233516,
L3 incompletes: 1, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 17341, Aged packets: 0
DS1 alarms :None
DS3 alarms :None
DS1 defects :None
DS3 defects :None
T1 media:
Seconds      Count  State
SEF          0        0 OK
BEE          1    1 OK
AIS          0        0 OK
LOF          0        0 OK
LOS          0        0 OK
YELLOW       7        1 OK
BPV          0        0
EXZ          0        0
LCV          1       1029
PCV          0        0
CS           0        0
LES          0
ES           0
SES          1
SEFS         2
BES          0
UAS          0
DS3 media:
Seconds      Count  State
PLL Lock     0        0 OK
Reframing    0        0 OK
AIS          0        0 OK
LOF          0        0 OK
LOS          0        0 OK
IDLE         0        0 OK
YELLOW       7        1 OK
BPV          1       65535
EXZ          1       65535
LCV          2      131070
PCV          1       1079
LES          1
PES          1
PSES         1
SEFS         0
UAS          0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95      20265434  9981112904  17341        0
Queue1    5   5       125379    2758338      0          0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3

```

```

Timeslots      : 1-24
Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled,
Idle cycle flag: flags, Start end flag: shared
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x2e)
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      bytes
0 best-effort             95      1459200  95      0      low      none
3 network-control         5       76800   5       0      low      none
Logical interface t1-0/3/3:2.0 (Index 132) (SNMP ifIndex 236) (Generation 69)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Traffic statistics:
  Input bytes :          5789719245
  Output bytes :        19909405752
  Input packets:         33897585
  Output packets:        40673646
Local statistics:
  Input bytes :          2930724407
  Output bytes :         9983871242
  Input packets:         17011460
  Output packets:        20390813
Transit statistics:
  Input bytes :          2858994838          14784 bps
  Output bytes :         9925534510         286584 bps
  Input packets:          16886125           25 pps
  Output packets:         20282833           38 pps
Protocol inet, MTU: 1500, Generation: 80, Route table: 0
Flags: No-Redirects, uRPF, uRPF-loose
RPF Failures: Packets: 0, Bytes: 0
Addresses, Flags: Primary Is-Preferred Is-Primary
  Destination: 10.10.10.52/30, Local: 10.10.10.53,
  Broadcast: 10.10.10.55, Generation: 159

```

Sample Output 3

```

user@host> show interfaces t1-1/2/0:19 extensive
Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
  Interface index: 148, SNMP ifIndex: 224, Generation: 110
  Description: T1 to Rock City - Circuit # 987654321
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags : Keepalives
  Hold-times : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  CoS queues : 4 supported

```

```

Last flapped   : 2004-05-14 15:56:43 EDT (2d 03:01 ago)
Statistics last cleared: 2004-04-09 13:30:02 EDT (5w2d 05:28 ago)
Traffic statistics:
  Input bytes   :           89198           0 bps
  Output bytes  :           90532           0 bps
  Input packets :           6371           0 pps
  Output packets:          6448           0 pps
Input errors:
  Errors: 271124, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed
discards: 266254, L3 incompletes: 0,
  L2 channel errors: 2, L2 mismatch timeouts: 2, HS link CRC errors: 0, SRAM
errors: 0
Output errors:
  Carrier transitions: 32, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort              0              0              0
  1 expedited-fo             0              0              0
  2 assured-forw             0              0              0
  3 network-cont            6448            6448              0

DS1 alarms : AIS, LOF
DS1 defects : AIS, LOF
T1 media:
  Seconds      Count  State
SEF              33     31  OK
BEE              53     47  OK
AIS      3201537  15 Defect Active
LOF      3202041  16 Defect Active
LOS              0         0  OK
YELLOW        1023435         0  OK
BPV              0         0
EXZ              0         0
LCV              53        72
PCV              0         0
CS               0         0
LES      3202041
ES      3202041
SES      3202060
SEFS      3202102
BES              0
UAS      3202160
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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 4 (0x04)
Logical interface t1-1/2/0:19.0 (Index 91) (SNMP ifIndex 256) (Generation 115)

Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps Encapsulation: PPP

```



```

Protocol inet, MTU: 1500, Generation: 121, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
68.71.141.139, Generation: 179

```

Meaning The sample output shows very detailed interface information which includes where any errors might be occurring. The first line of the output indicates if the link is up. Sample output 1 and 2 show that both links are up. Sample output 3 shows that the link is down. The main sections of the output to examine are:

- DS1 alarms
- DS1 defects
- T1 media

Both sample output 1 and 2 show no DS1 alarms or defects. Sample output 3 shows AIS and LOF alarms and defects. For more information about AIS and LOF alarms and defects, see *List of Common SONET Alarms and Errors*.

Even though there are counts in the T1 media section of the output in sample output 1 and 2, the **State** column indicates that the media are **OK**. However, sample output 3, in which the link is down, shows that the AIS and LOF defects are active.

Monitor Statistics for a Channelized DS3 Interface

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interfaces t1-fpc/pic/port:channel`

Sample Output

```

user@host> monitor interfaces t1-1/2/0:5
host      Seconds: 35              Time: 19:02:34              Delay: 0/0/27

Interface: t1-1/2/0:5, Enabled, Link is Up
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:
  Input bytes:          551635800 (1768 bps)      [16596]
  Output bytes:         4094623791 (71376 bps)    [64020]
  Input packets:        5234195 (2 pps)          [211]
  Output packets:       4872090 (8 pps)          [147]
Encapsulation statistics:
  Input keepalives:      6918                    [1]
  Output keepalives:     6893                    [0]
  LCP state: Opened
Error statistics:
  Input errors:          47                      [0]
  Input drops:           0                      [0]
  Input framing errors:  0                      [0]
  Policed discards:     398                    [0]
  L3 incompletes:       0                      [0]
  L2 channel errors:    0                      [0]
  L2 mismatch timeouts: 0                      [0]
  Carrier transitions:   0                      [0]

```

```

Output errors:                                0                      [0]
Output drops:                                0                      [0]
Aged packets:                                0                      [0]
Active alarms : None
Active defects: None
T1 statistics:
BPV                                           0                      [0]
EXZ                                           0                      [0]
LCV                                           538                   [0]
PCV                                           0                      [0]
CS                                             0                      [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Sample Output 2

```

user@host> monitor interface t1-0/3/3:2
host      Seconds: 9      Time: 10:36:11
Delay: 3/3/3
Interface: t1-0/3/3:2, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: T1
Traffic statistics:                                Current delta
Input bytes:                2931288250 (43936 bps)
[427]
Output bytes:                9987968300 (93512 bps)
[207]
Input packets:                17017904 (106 pps)
[14]
Output packets:                20398890 (109 pps)
[26]
Encapsulation statistics:
Input keepalives:                124817
[0]
Output keepalives:                125405
[0]
Error statistics:
Input errors:                                0
[0]
Input drops:                                0
[0]
Input framing errors:                0
[0]
Input runs:                                0                      [0]
Input giants:                0                      [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Sample Output 3

```

user@host> monitor t1-1/2/0:19
host      Seconds: 9      Time: 19:05:23
Delay: 0/0/68
Interface: t1-1/2/0:19, Enabled, Link is Down
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:                                Current delta
Input bytes:                89198 (0 bps)                      [0]
Output bytes:                90532 (0 bps)                      [0]
Input packets:                6371 (0 pps)                      [0]
Output packets:                6448 (0 pps)                      [0]
Encapsulation statistics:
Input keepalives:                0                      [0]
Output keepalives:                0                      [0]

```

```

LCP state: Conf-req-sent
Error statistics:
  Input errors:                271124                [0]
  Input drops:                  0                    [0]
  Input framing errors:         0                    [0]
  Policed discards:             266254                [0]
  L3 incompletes:               0                    [0]
  L2 channel errors:            2                    [0]
  L2 mismatch timeouts:         2                    [0]
  Carrier transitions:          32                    [0]
  Output errors:                0                    [0]
  Output drops:                 0                    [0]
  Aged packets:                 0                    [0]
Active alarms: AIS LOF
Active defects: AIS LOF
T1 statistics:
  BPV                           0                    [0]
  EXZ                           0                    [0]
  LCV                           72                    [0]
  PCV                           0                    [0]
  CS                            0                    [0]
Interface warnings:
  o Outstanding DS1 alarm(s)
  o INET NCP is not Opened
  o LCP state is not Opened
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

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.

The output in the examples is static, however, the counters in real time change as they are updated every second. The counters in sample output 3 show that there is no traffic for the interface that is down, and that it has active alarms, defects, and there are interface warnings.



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.

**Related
Documentation**

Using Loopback Testing For Channelized DS3 Interfaces

- [Checklist for Using Loopback Testing for Channelized DS3 Interfaces on page 248](#)
- [Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface on page 249](#)
- [Create a Loopback on page 249](#)
- [Verify That the Interface Is Up on page 251](#)
- [Clear Interface Statistics on page 252](#)
- [Force the Link Layer to Stay Up on page 252](#)
- [Verify the Status of the Logical Interface on page 254](#)
- [Ping the Channelized Interface on page 255](#)
- [Check for Interface Error Statistics on page 255](#)
- [Diagnose a Suspected Circuit Problem on page 257](#)

Checklist for Using Loopback Testing for Channelized DS3 Interfaces

Purpose To use loopback testing to isolate Channelized DS3 interface problems.

Action [Table 27 on page 248](#) provides the links and commands for using loopback testing for Channelized DS3 interfaces.

Table 27: Checklist for Using Loopback Testing for Channelized DS3 Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface” on page 249	
1. Create a Loopback on page 249	
a. Create a Physical Loopback on page 250	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 250	<code>[edit interfaces <i>interface name</i> (t3-options t1-options)]</code> <code>set loopback local</code> <code>show</code> <code>commit</code>
2. Verify That the Interface Is Up on page 251	<code>show interfaces t1-fpc/pic/port:channel</code> <code>show interfaces t3-fpc/pic/port:channel</code>
3. Clear Interface Statistics on page 252	<code>clear interfaces statistics t1-fpc/pic/port:channel</code>
4. Force the Link Layer to Stay Up on page 252	
a. Configure Encapsulation to Cisco-HDLC on page 252	<code>[edit interfaces <i>interface-name</i>]</code> <code>set encapsulation cisco-hdlc</code> <code>show</code> <code>commit</code>

Table 27: Checklist for Using Loopback Testing for Channelized DS3 Interfaces (*continued*)

Tasks	Command or Action
b. Configure No-Keepalives on page 254	<code>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</code>
5. Verify the Status of the Logical Interface on page 254	<code>show interfaces t1-fpc/pic/port:channel</code>
6. Ping the Channelized Interface on page 255	<code>ping interface t1-fpc/pic/port:channel local-IP-address bypass-routing count 1000 rapid</code>
7. Check for Interface Error Statistics on page 255	<code>show interfaces t1-fpc/pic/port:channel extensive</code>
“Diagnose a Suspected Circuit Problem” on page 257	
8. “Create a Loop from the Router to the Network” on page 258	<code>[edit interfaces t1-fpc/pic/port:channel t1-options] set loopback remote show commit</code>
9. Create a Loop to the Router from Various Points in the Network on page 258	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface” on page 249 .

Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface

Problem **Description:** To diagnose a suspected hardware problem with a Channelized DS3 interface, follow these steps:

- Solution**
- [Create a Loopback on page 249](#)
 - [Verify That the Interface Is Up on page 251](#)
 - [Clear Interface Statistics on page 252](#)
 - [Force the Link Layer to Stay Up on page 252](#)
 - [Verify the Status of the Logical Interface on page 254](#)
 - [Ping the Channelized Interface on page 255](#)
 - [Check for Interface Error Statistics on page 255](#)

Create a Loopback

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 DS3 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).

1. [Create a Physical Loopback on page 250](#)
2. [Configure a Local Loopback on page 250](#)

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:

1. In configuration mode, go to the following hierarchy level, depending on whether you are configuring a full T3 or T1 interface:

```
[edit]
user@host# edit interfaces interface-name (t3-options | t1-options)
```

2. Configure the local loopback:

```
[edit interfaces interface-name (t3-options | t1-options)]
user@host# set loopback local
```

The following is an example of the name for a T1 channel on a Channelized DS3 port for a Channelized DS3 to DS1 interface:

```
[edit interfaces t1-2/1/1:0 t1-options]
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-2/1/1:0 t1-options]
user@host# show
loopback local;
```

4. Commit the configuration:

```
user@host# commit
```

For example:

```
[edit interfaces t1-2/1/1:0 t1-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 DS1 or DS3 interface to determine whether the physical link is up or down.

Action To verify that the status of the Channelized DS1 or DS3 interface is up, use one of the following Junos OS command-line interface (CLI) operational mode commands:

```
user@host> show interfaces t1-fpc/pic/port:channel
user@host> show interfaces t3-fpc/pic/port:channel
```

Sample Output

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host# show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  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: 39 (00:00:06 ago), Output: 0 (never)
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
  Input rate     : 16 bps (0 pps)
  Output rate    : 160 bps (0 pps)
  DS1  alarms    : None
  DS3  alarms    : None
  DS1  defects   : None
  DS3  defects   : None
Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.10.1.1, Local: 10.10.1.2
```

Meaning The sample output shows that the physical link is up and there are no DS1 or DS3 alarms or defects. You should not see any DS1 or DS3 alarms. You can check any interface on the Channelized DS3 port. See [“Checklist for Channelized DS3 Alarms and Errors” on page 259](#) for more information on Channelized DS3 alarms and errors.

Clear Interface Statistics

Purpose

You must reset the Channelized DS3 interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/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 t1-fpc/pic/port:channel
```

Sample Output

```
user@host> clear interfaces statistics t1-2/1/0:20
```

```
user@host>
```

Meaning

This command clears the interface statistics counters for the Channelized or T1 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. If you have the Point-to-Point protocol (PPP) configured, you need to change the encapsulation to Cisco High-Level Data Link Control (HDLC) and reconfigure the keepalives in order to force the link layer to stay up.

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

1. [Configure Encapsulation to Cisco-HDLC on page 252](#)
2. [Configure No-Keepalives on page 254](#)

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T1 physical interface, follow these steps:

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

```
[edit]
```

```
user@host# edit interfaces interface-name
```


2. Configure Cisco-HDLC:

```
[edit interfaces interface-name]
user@host# set encapsulation cisco-hdlc
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-0/1/1:8]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-0/1/1:8]
user@host# commit
commit complete
```

5. Check the interface configuration

```
user@host# run show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
Interface index: 210, SNMP ifIndex: 173
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,  Loopback:
Local, FCS: 16,
Mode: C/Bit parity, Framing: ESF
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: 39 (00:00:06 ago), Output: 0 (never)
CoS queues     : 4 supported
Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
Input rate     : 16 bps (0 pps)
Output rate    : 160 bps (0 pps)
DS1  alarms    : None
DS3  alarms    : None
DS1  defects   : None
DS3  defects   : None
Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.10.1.1, Local: 10.10.1.2
```

Meaning

This command sets the interface encapsulation to the Cisco HDLC transport protocol. You must configure the interface with Cisco HDLC to ensure that the logical interface remains up in preparation for the ping test.

Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a channelized DS3 interface, follow these steps:

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

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure no-keepalives:

```
[edit interfaces interface-name]
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-2/1/0:20]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-2/1/0:20]
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 t1-fpc/pic/port:channel`

Sample Output 1

```
user@host# show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
```

Meaning The sample output shows that the channelized interface has the physical and logical links up.

Purpose Use the ping command to verify the loopback connection.

```
user@host> ping interface t1-fpc/pic/port:channel local-IP-address bypass-routing count
1000 rapid
```

```
user@host> ping interface t1-2/1/0:20 10.10.1.2 bypass-routing count 1000 rapid
PING 10.10.1.2 (10.10.1.2): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
-- 10.10.1.2 ping statistics --
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.830/3.872/9.965/0.633 ms
```

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 t1-fpc/pic/port:channel extensive
```

Sample Output

```
user@host# show interfaces t1-2/1/0:20 extensive
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173, Generation: 93
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  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  : 2004-05-20 21:46:27 UTC (00:26:47 ago)
  Statistics last cleared: 2004-05-20 22:12:03 UTC (00:01:11 ago)
  Traffic statistics:
    Input bytes :                88680                27640 bps
    Output bytes :                88680                27640 bps
    Input packets:                 1010                 39 pps
    Output packets:                 1010                 39 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 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: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms :None
  DS3 alarms :None
  DS1 defects :None
  DS3 defects :None
  T1 media:
    Seconds      Count  State
    SEF          0        0 OK
    BEE          0        0 OK
    AIS          0        0 OK
    LOF          0        0 OK
    LOS          0        0 OK
    YELLOW       0        0 OK
    BPV          0        0
    EXZ          0        0
    LCV          0        0
    PCV          0        0
    CS           0        0
    LES          0
    ES           0
    SES          0
    SEFS         0
    BES          0
    UAS          0
  DS3 media:
    Seconds      Count  State
    PLL Lock     0        0 OK
    Reframing    0        0 OK
    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
CES                               0
SEFS                               0
UAS                                0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95          0         0         0         0
Queue1    5   5        1010       88680         0         0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots       : All active
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled, Idle
cycle flag: flags,
  Start end flag: shared
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 2, PLP byte: 2 (0x14)
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      bytes
0 best-effort            95      1459200  95         0      low  none
3 network-control         5       76800   5         0      low  none
Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213) (Generation 14)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Generation: 24, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.10.1.1, Local: 10.10.1.2, Broadcast: Unspecified,
Generation: 24

```

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. [Create a Loop from the Router to the Network on page 258](#)
2. [Create a Loop to the Router from Various Points in the Network on page 258](#)

Create a Loop from the Router to the Network

Purpose

Creating a loop from a particular T1 interface to the network allows the transport-layer engineer to test the T1 interface from various points in the network and isolate the problem.

Action

To create a loop from a particular T1 interface to the network, follow these steps:

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

```
[edit]
user@host# edit interfaces t1-fpc/pic/port:channel t1-options
```
2. Configure the loopback:

```
[edit interfaces interface-name t1-options]
user@host# set loopback remote
```
3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-2/1/1:0:0 t1-options]
user@host# show
loopback remote;
```
4. Commit the configuration:

```
user@host# commit
```

Meaning

This 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 DS3"](#)

[Interface](#)” on [page 249](#). 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.

Related Documentation

Locating Channelized DS3 Alarms and Errors

- [Checklist for Channelized DS3 Alarms and Errors on page 259](#)
- [Display Alarms and Errors for Channelized DS3 Interfaces on page 259](#)

Checklist for Channelized DS3 Alarms and Errors

Purpose To check the most common Channelized DS3 alarms and errors when investigating line problems on a Juniper Networks router.

Action [Table 28 on page 259](#) provides links and commands for Channelized DS3 alarms and errors.

Table 28: Checklist for Channelized DS3 Alarms and Errors

Tasks	Command or Action
“Display Alarms and Errors for Channelized DS3 Interfaces” on page 259	<code>show interfaces t1-fpc/pic/port:channel extensive</code>

Display Alarms and Errors for Channelized DS3 Interfaces

Purpose To display channelized DS3 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces t1-fpc/pic/port:channel extensive`

Sample Output 1

```
user@host> show interfaces t1-1/2/0:5 extensive
Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
  Interface index: 181, SNMP ifIndex: 210, Generation: 96
  Description: T1 to Tombstone - Circuit # 123456789
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  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 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 6910 (last seen 00:00:21 ago)
    Output: 6886 (last sent 00:00:04 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    : 2004-05-11 16:01:30 EDT (5d 02:53 ago)
Statistics last cleared: 2004-05-11 23:43:42 EDT (4d 19:10 ago)
Traffic statistics:
Input bytes :          551301316          4432 bps
Output bytes :         4091306894          2696 bps
Input packets:          5231609           6 pps
Output packets:         4867661           3 pps
Input errors:
Errors: 47, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
398, L3 incompletes: 0, L2 channel errors: 0,
L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets

0 best-effort          4820512          4804578          24909

1 expedited-fo           0              0              0

2 assured-forw           0              0              0

3 network-cont          63083          63083              0

DS1 alarms : None
DS1 defects : None
T1 media:
SEF      5      4 OK
BEE     246    127 OK
AIS       0      0 OK
LOF       0      0 OK
LOS       0      0 OK
YELLOW    0      0 OK
BPV              0          0
EXZ              0          0
LCV             246        538
PCV              0          0
CS              0          0
LES              0
ES              0
SES              8
SEFS            12
BES              0
UAS              0
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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 4 (0x01)
Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238) (Generation 111)

```



```

Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 117, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast: 68.71.141.35,
    Generation: 169

```

Sample Output 2

```

user@host> show interfaces t1-1/2/0:19 extensive
Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
  Interface index: 148, SNMP ifIndex: 224, Generation: 110
  Description: T1 to Rock City - Circuit # 987654321
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpl:
Not-configured
  CHAP state: Not-configured
  CoS queues   : 4 supported
  Last flapped : 2004-05-14 15:56:43 EDT (2d 03:01 ago)
  Statistics last cleared: 2004-04-09 13:30:02 EDT (5w2d 05:28 ago)
  Traffic statistics:
    Input bytes :                89198                0 bps
    Output bytes:                90532                0 bps
    Input packets:                6371                0 pps
    Output packets:                6448                0 pps
  Input errors:
    Errors: 271124, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed
discards: 266254, L3 incompletes: 0,
    L2 channel errors: 2, L2 mismatch timeouts: 2, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 32, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort           0                0                0
    1 expedited-fo          0                0                0
    2 assured-forw          0                0                0
    3 network-cont         6448            6448            0

DS1 alarms : AIS, LOF
DS1 defects : AIS, LOF
  T1 media:
    Seconds      Count  State
    SEF          33      31  OK
    BEE          53      47  OK
    AIS          3201537  15 Defect Active
    LOF          3202041  16 Defect Active
    LOS          0        0  OK

```

```

YELLOW          1023435          0 OK
BPV              0              0
EXZ              0              0
LCV              53             72
PCV              0              0
CS               0              0
LES              3202041
ES               3202041
SES              3202060
SEFS             3202102
BES              0
UAS              3202160
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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 4 (0x04)
Logical interface t1-1/2/0:19.0 (Index 91) (SNMP ifIndex 256) (Generation 115)

Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps Encapsulation: PPP

Protocol inet, MTU: 1500, Generation: 121, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
    68.71.141.139, Generation: 179

```

Meaning The sample output shows the active alarms and active defects. Sample output 1 shows no active alarms or defects.

Sample output 2 shows that the physical and logical links are down, with active alarms and defects. 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 T1 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).

[Table 29 on page 263](#) shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 29: T1 Media Alarms and Error Definitions

T1 Media Alarm or Error	Definitions
AIS	Alarm indication signal (blue alarm)
BEE	Block error event
BES	Bursty errored seconds
BPV	Bipolar violation
CS	Controlled slip
ES	Errored seconds
EXZ	Excessive zeros
LCV	Line code violation
LES	Line errored seconds
LOF	Loss of frame
LOS	Loss of signal
PCV	Path code violation
SEF	Severely errored frame
SEFS	Severely errored frame seconds
SES	Severely errored seconds
UAS	Unavailable seconds
YLW	Yellow alarm

See *Checklist for T1 Alarms and Errors* for more details on T1 alarms and statistics.

Related Documentation

CHAPTER 13

Troubleshooting Multichannel DS3 Interfaces

- [Monitoring Multichannel DS3 Interfaces on page 265](#)
- [Using Loopback Testing for Multichannel DS3 Interfaces on page 273](#)
- [Locating Multichannel DS3 Alarms and Errors on page 288](#)

Monitoring Multichannel DS3 Interfaces

- [Checklist for Monitoring Multichannel DS3 Interfaces on page 265](#)
- [Monitor Multichannel DS3 Interfaces on page 266](#)

Checklist for Monitoring Multichannel DS3 Interfaces

Purpose To monitor Multichannel DS3 interfaces and begin the process of isolating Multichannel DS3 interface problems when they occur.

Action [Table 30 on page 265](#) provides the links and commands for monitoring Multichannel DS3 interfaces.

Table 30: Checklist for Monitoring Multichannel DS3 Interfaces

Tasks	Command or Action
"Monitor Multichannel DS3 Interfaces" on page 266	
1. Display the Status of Channelized Interfaces on page 266	<code>show interfaces terse ds*</code> <code>show interfaces terse t1*</code>
2. Display the Status of a Specific Channelized Interface on page 267	<code>show interfaces ds-fpc/pic/port:channel:channel</code> <code>show interfaces t1-fpc/pic/port:channel</code>
3. Display Extensive Status Information for a Specific T3 Interface on page 268	<code>show interfaces ds-fpc/pic/port:channel:channel extensive</code> <code>show interfaces t1-fpc/pic/port:channel extensive</code>
4. Monitor Statistics for a Channelized Interface on page 271	<code>monitor interfaces ds-fpc/pic/port:channel:channel</code> <code>monitor interfaces t1-fpc/pic/port:channel</code>

Monitor Multichannel DS3 Interfaces

Channelized interfaces enable you to configure a number of individual channels that subdivide the bandwidth of a larger interface and minimize the number of Physical Interface Cards (PICs) that an installation requires. By monitoring channelized DS3 to DS0 interfaces or channelized DS3 to DS1 interfaces, you can begin to isolate Multichannel DS3 problems when they occur.

To monitor Multichannel DS3 interfaces, follow these steps:

1. [Display the Status of Channelized Interfaces on page 266](#)
2. [Display the Status of a Specific Channelized Interface on page 267](#)
3. [Display Extensive Status Information for a Specific T3 Interface on page 268](#)
4. [Monitor Statistics for a Channelized Interface on page 271](#)

Display the Status of Channelized Interfaces

Purpose To display the status of channelized DS3 to DS0 interfaces or channelized DS3 to DS1 interfaces, use one of the following Junos OS command-line interface (CLI) operational mode commands:

Action `user@host> show interfaces terse ds*`
 `user@host> show interfaces terse t1*`

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces terse ds*
Interface      Admin Link Proto Local                               Remote
ds-2/1/0:5:1   up    up
ds-2/1/0:5:1.0 up    up   inet 192.168.140.197/30
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces terse t1*
[...Output truncated...]
t1-2/1/0:16     up    down
t1-2/1/0:16.0   up    down inet 192.168.118.61/30
t1-2/1/0:17     up    up
t1-2/1/0:17.0   up    up   inet 192.168.118.49/30
t1-2/1/0:18     up    up
t1-2/1/0:18.0   up    up   inet 192.168.36.21/30
t1-2/1/0:19     up    up
t1-2/1/0:19.0   up    up   inet 192.168.118.97/30
```

Meaning The sample output shows the status of both the physical and logical interfaces. In both sample outputs, all links are up except for the first interface in the T1 sample output. The first interface, `t1-2/1/0:16`, has both the physical and logical links down.

Display the Status of a Specific Channelized Interface

Purpose To display the status of a specific channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action `user@host> show interfaces ds-fpc/pic/port:channel:channel`
`user@host> show interfaces t1-fpc/pic/port:channel`

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
  16, Mode: M23,
  Framing: ESF
  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: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1  alarms    : None
  DS3  alarms    : None
  DS1  defects   : None
  DS3  defects   : None
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
    Destination: 192.168.140.196/30, Local: 192.168.140.197
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16,
  Mode: M23, Framing: ESF
  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: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
  Input rate      : 741512 bps (224 pps)
  Output rate     : 1266528 bps (224 pps)
  DS1  alarms    : None
  DS3  alarms    : None
  DS1  defects   : None
  DS3  defects   : None
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
```

Addresses, Flags: Is-Preferred Is-Primary
 Destination: 192.168.118.96/30, Local: 192.168.118.97

Meaning The first line of the sample 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.

Display Extensive Status Information for a Specific T3 Interface

Purpose To display extensive status information about a specific channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action `user@host> show interfaces ds-fpc/pic/port:channel:channel extensive`
`user@host> show interfaces t1-fpc/pic/port:channel extensive`

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1 extensive
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133, Generation: 35
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
  16, Mode: M23,
  Framing: ESF
  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 : 2 (last seen 00:00:05 ago)
    Output: 2 (last sent 00:00:05 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
  Traffic statistics:
    Input bytes :          524          304 bps
    Output bytes :          528          304 bps
    Input packets:           8           0 pps
    Output packets:          8           0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
  0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms :None
  DS3 alarms :None
  DS1 defects :None
  DS3 defects :None
  T1 media:
    Seconds      Count  State
    SEF          0       0 OK
    BEE          0       0 OK
    AIS          0       0 OK
    LOF          0       0 OK
    LOS          0       0 OK
    YELLOW       0       0 OK
```



```

BPV                                0          0
EXZ                                0          0
LCV                                0          0
PCV                                0          0
CS                                 0          0
LES                                0
ES                                 0
SES                                0
SEFS                               0
BES                                0
UAS                                0
DS3 media:                         Seconds      Count   State
PLL Lock                           0          0   OK
Reframing                          0          0   OK
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
LES                                0
PES                                0
PSES                               0
SEFS                               0
UAS                                0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95          4        336         0         0
Queue1    5   5          1         22         0         0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots      : 1
Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:
Destination slot: 2, PLP byte: 2 (0x2f)
CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                        %      bps      %      bytes
0 best-effort            0          0  0          0    low  none
1 expedited-forwarding  0          0  0          0    low  none
2 assured-forwarding    0          0  0          0    low  none
3 network-control       0          0  0          0    low  none
Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197,
Broadcast: Unspecified,
Generation: 22

```

The following sample output is for a channelized DS3 to DS1 interface:

```

user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59, Generation: 49
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16,
  Mode: M23, Framing: ESF
  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 : 117 (last seen 00:00:08 ago)
    Output: 121 (last sent 00:00:01 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
  Traffic statistics:
    Input bytes   :          22459734          236888 bps
    Output bytes  :          162288645         1322208 bps
    Input packets :          201233          214 pps
    Output packets:          236341          227 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
    0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
    errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms :None
  DS3 alarms :None
  DS1 defects :None
  DS3 defects :None
  T1 media:
    Seconds      Count  State
    SEF          0      0 OK
    BEE          0      0 OK
    AIS          0      0 OK
    LOF          0      0 OK
    LOS          0      0 OK
    YELLOW       0      0 OK
    BPV          0      0
    EXZ          0      0
    LCV          0      0
    PCV          0      0
    CS           0      0
    LES          0
    ES           0
    SES          0
    SEFS         0
    BES          0
    UAS          0
  DS3 media:
    Seconds      Count  State
    PLL Lock     0      0 OK
    Reframing    0      0 OK
    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
LES                      0
PES                      0
PSES                    0
SEFS                    0
UAS                      0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95      234494    162020375      0          0
Queue1    5   5         164       5808          0          0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots       : All active
Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:
Destination slot: 2, PLP byte: 2 (0xab)
CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                        %      bps      %      bytes
0 best-effort            0          0  0          0      low  none
1 expedited-forwarding  0          0  0          0      low  none
2 assured-forwarding    0          0  0          0      low  none
3 network-control       0          0  0          0      low  none
Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.118.96/30, Local: 192.168.118.97,
Broadcast: Unspecified, Generation: 44

```

Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the DS1 or DS3 interface and diagnose the media accordingly. See [“Checklist for Locating Multichannel DS3 Alarms and Errors” on page 288](#) for an explanation of Multichannel DS3 alarms.

Monitor Statistics for a Channelized Interface

Purpose To monitor statistics for a channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action `user@host> monitor interfaces ds-fpc/pic/port:channel:channel`
`user@host> monitor interfaces t1-fpc/pic/port:channel`

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```

user@host> monitor interface ds-2/1/0:5:1
host      Seconds: 9      Time: 10:36:11      Delay: 0/0/4

Interface: ds-2/1/0:5:1, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: 64kbps
Traffic statistics:      Current delta

```

```

Input bytes:                    52502 (80 bps)                [262]
Output bytes:                   52608 (88 bps)                [344]
Input packets:                  714 (0 pps)                  [4]
Output packets:                 714 (0 pps)                  [5]
Encapsulation statistics:
Input keepalives:               133                          [1]
Output keepalives:              133                          [1]
Error statistics:
Input errors:                   0                            [0]
Input drops:                    0                            [0]
Input framing errors:           0 [0]
Input runs:                     0                            [0]
Input giants:                   0                            [0]
Policed discards:               410                          [1]
L3 incompletes:                 0                            [0]
L2 channel errors:              0                            [0]
L2 mismatch timeouts:           0                            [0]
Carrier transitions:            0                            [0]
Output errors:                  0                            [0]
Output drops:                   0                            [0]
Aged packets:                   0Active alarms : N          [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

The following sample output is for a channelized DS3 to DS1 interface:

```

user@host> monitor interface tl-2/1/0:19
host      Seconds: 4                      Time: 10:37:53                      Delay: 0/0/4

Interface: tl-2/1/0:19, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: T1
Traffic statistics:                      Current delta
Input bytes:                    27046020 (124752 bps)        [32358]
Output bytes:                   186975710 (623840 bps)       [161809]
Input packets:                  233498 (139 pps)             [289]
Output packets:                 273161 (139 pps)             [290]
Encapsulation statistics:
Input keepalives:               138                          [0]
Output keepalives:              141                          [0]
Error statistics:
Input errors:                   0                            [0]
Input drops:                    0                            [0]
Input framing errors:           0 [0]
Input runs:                     0                            [0]
Input giants:                   0                            [0]
Policed discards:               439                          [0]
L3 incompletes:                 0                            [0]
L2 channel errors:              0                            [0]
L2 mismatch timeouts:           0                            [0]
Carrier transitions:            0                            [0]
Output errors:                  0                            [0]
Output drops:                   0                            [0]
Aged packets:                   0Active alarms : N          [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Meaning This command checks for and displays 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.

Table 31 on page 273 lists additional problem situations and actions to help you further understand an interface problem.

Table 31: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame checksum sequence (FCS), scrambling, and subrate configuration.
Framing errors are increasing, and the configuration is correct.	Check the cabling to the router and have the carrier verify the integrity of the line.
Input errors are increasing.	Check the cabling to the router and have the carrier verify the integrity of the line.



NOTE: 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.

Related Documentation

Using Loopback Testing for Multichannel DS3 Interfaces

- [Checklist for Using Loopback Testing for Multichannel DS3 Interfaces on page 274](#)
- [Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface on page 275](#)
- [Create a Loopback on page 275](#)
- [Verify That the Interface Is Up on page 277](#)
- [Clear Interface Statistics on page 278](#)
- [Force the Link Layer to Stay Up on page 279](#)
- [Verify the Status of the Logical Interface on page 280](#)
- [Ping the Channelized Interface on page 281](#)
- [Check for Interface Error Statistics on page 282](#)
- [Diagnose a Suspected Circuit Problem on page 286](#)
- [Create a Loop from the Router to the Network on page 286](#)
- [Create a Loop to the Router from Various Points in the Network on page 288](#)

Checklist for Using Loopback Testing for Multichannel DS3 Interfaces

Purpose To use loopback testing to isolate Multichannel DS3 interface problems.

Action [Table 32 on page 274](#) provides links and commands for using loopback testing for Multichannel DS3 interfaces.

Table 32: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface” on page 275	
1. Create a Loopback on page 275	
a. Create a Physical Loopback on page 276	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 276	[edit interfaces <i>interface name</i> (t3-options t1-options)] set loopback local show commit
2. Verify That the Interface Is Up on page 277	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>)
3. Clear Interface Statistics on page 278	clear interfaces statistics (t1- <i>fpc/pic/port:channel</i> ds- <i>fpc/pic/port:channel:channel</i>)
4. Force the Link Layer to Stay Up on page 279	
a. Configure Encapsulation to Cisco-HDLC on page 279	[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 280	[edit interfaces <i>interface-name</i>] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 280	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>)
6. Ping the Channelized Interface on page 281	ping interface (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>) <i>local-IP-address</i> bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 282	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>) extensive
“Diagnose a Suspected Circuit Problem” on page 286	
1. Create a Loop from the Router to the Network on page 286	

Table 32: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces (*continued*)

Tasks	Command or Action
a. Loop the Entire T3 Interface Toward the Network on page 286	<code>[edit interfaces <i>interface-name</i> t3-options]</code> <code>set loopback remote</code> <code>show</code> <code>commit</code>
b. Loop a Particular T1 Channel Toward the Network on page 287	<code>[edit interfaces <i>interface-name</i> t1-options]</code> <code>set loopback remote</code> <code>show</code> <code>commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 288	Perform Steps 2 through 8 from “ Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface ” on page 275.

Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface

Problem **Description:** To diagnose a suspected hardware problem with a Multichannel DS3 interface, follow these steps:

- Solution**
- [Create a Loopback on page 275](#)
 - [Verify That the Interface Is Up on page 277](#)
 - [Clear Interface Statistics on page 278](#)
 - [Force the Link Layer to Stay Up on page 279](#)
 - [Verify the Status of the Logical Interface on page 280](#)
 - [Ping the Channelized Interface on page 281](#)
 - [Check for Interface Error Statistics on page 282](#)

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 Multichannel DS3 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).

1. [Create a Physical Loopback on page 276](#)
2. [Configure a Local Loopback on page 276](#)

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:

1. In configuration mode, go to the following hierarchy level, depending on whether you are configuring a full T3 or T1 interface:

```
[edit]
user@host# edit interfaces interface-name (t3-options | t1-options)
```

2. Configure the local loopback:

```
[edit interfaces interface-name (t3-options | t1-options)]
user@host# set loopback local
```

The following is an example of the name for a T1 channel 0, group 0, on a Multichannel DS3 port for a channelized DS3 to DS0 interface:

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



NOTE: In order to configure T3 options on the Multichannel DS3, you configure the first logical interfaces: **ds-2/1/0:0:0 t3-options**.

The following is an example of the name for a T1 channel on a Multichannel DS3 port for a channelized DS3 to DS1 interface:

```
[edit interfaces t1-2/1/1:0 t1-options]
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-2/1/1:0 t1-options]
user@host# show
loopback local;
```

4. Commit the configuration:

```
user@host# commit
```

For example:


```
[edit interfaces t1-2/1/1:0 t1-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 DS1 or DS3 interface to determine whether the physical link is up or down.

Action To verify that the status of the Multichannel DS3 interface is up, use one of the following Junos OS command-line interface (CLI) operational mode commands:

```
user@host> show interfaces (ds-fpc/pic/port:channel:channel | t1-fpc/pic/port:channel
)
```

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
  16, Mode: M23,
  Framing: ESF
  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: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1  alarms    : None
  DS3  alarms    : None
  DS1  defects   : None
  DS3  defects   : None
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
    Destination: 192.168.140.196/30, Local: 192.168.140.197
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
```

```

Interface index: 50, SNMP ifIndex: 59
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16,
Mode: M23, Framing: ESF
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: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
Input rate      : 741512 bps (224 pps)
Output rate     : 1266528 bps (224 pps)
DS1  alarms    : None
DS3  alarms    : None
DS1  defects   : None
DS3  defects   : None
Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197

```

Meaning The sample output shows that the physical link is up and there are no DS1 or DS3 alarms or defects. You should not see any DS1 or DS3 alarms. You can check any interface on the Multichannel DS3 port.

Clear Interface Statistics

Purpose

You must reset the Multichannel DS3 interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/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 (ds-fpc/pic/port:channel:channel |
t1-fpc/pic/port:channel)

```

Sample Output

```

user@host> clear interfaces statistics DS1/1/0:0:0
user@host>
user@host> clear interfaces statistics t1-1/1/0:0
user@host>

```

Meaning

This command clears the interface statistics counters for the Multichannel or T1 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 279](#)
2. [Configure No-Keepalives on page 280](#)

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T1 physical interface, follow these steps:

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

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure Cisco-HDLC:

```
[edit interfaces interface-name ]
user@host# set encapsulation cisco-hdlc
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-0/1/1:8]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-0/1/1:8]
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 DS3 or DS0 interface, follow these steps:

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

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure no-keepalives:

```
[edit interfaces interface-name]
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-0/1/1:8]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-0/1/1:8]
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 (ds-fpc/pic/port:channel:channel | t1-fpc/pic/port:channel)`

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
```

```

16, Mode: M23,
Framing: ESF
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: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
DS3 defects : None
Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.10.10.196/30, Local: 10.10.10.197

```

The following sample output is for a channelized DS3 to DS1 interface:

```

user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
Interface index: 50, SNMP ifIndex: 59
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16,
Mode: M23, Framing: ESF
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: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
Input rate : 741512 bps (224 pps)
Output rate : 1266528 bps (224 pps)
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
DS3 defects : None
Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.10.10.196/30, Local: 10.10.10.197

```

Meaning The sample output shows that both channelized interfaces have the physical and logical links up.

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 commands:

```

user@host> ping interface ds-fpc/pic/port:channel:channel | t1-fpc/pic/port:channel
local-IP-address bypass-routing count 1000 rapid

```

Sample Output

```
user@host> ping interface tl-2/1/0:7 192.168.126.29 bypass-routing count 1000 rapid
PING 192.168.126.29 (192.168.126.29 ): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
-- 192.168.126.29 ping statistics --
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 6.068/7.475/74.080/3.696 ms
```

Meaning	This command sends 1000 ping packets out of the channelized interface under the Multichannel DS3 port 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 (ds-fpc/pic/port:channel:channel | t1-fpc/pic/port:channel)
extensive
```

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```

user@host> show interfaces ds-2/1/0:5:1 extensive
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133, Generation: 35
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
16, Mode: M23,
  Framing: ESF
  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 : 2 (last seen 00:00:05 ago)
    Output: 2 (last sent 00:00:05 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
  Traffic statistics:
    Input bytes   :           524           304 bps
    Output bytes  :           528           304 bps
    Input packets :             8             0 pps

```

```

Output packets:                8                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
0,
  L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
DS1  alarms   : None
DS3  alarms   : None
DS1  defects  : None
DS3  defects  : None
T1  media:
      Seconds      Count  State
SEF              0        0  OK
BEE              0        0  OK
AIS              0        0  OK
LOF              0        0  OK
LOS              0        0  OK
YELLOW           0        0  OK
BPV              0        0
EXZ              0        0
LCV              0        0
PCV              0        0
CS               0        0
LES              0
ES               0
SES              0
SEFS             0
BES              0
UAS              0
DS3  media:
      Seconds      Count  State
PLL Lock         0        0  OK
Reframing        0        0  OK
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
LES              0
PES              0
PSES            0
SEFS            0
UAS             0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95         4        336         0         0
Queue1    5   5         1         22         0         0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1
  Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:

```

```

Destination slot: 2, PLP byte: 2 (0x2f)
CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                        %      bps      %      bytes
0 best-effort           0           0  0           0      low  none
1 expedited-forwarding  0           0  0           0      low  none
2 assured-forwarding    0           0  0           0      low  none
3 network-control       0           0  0           0      low  none
Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

```

```

Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
Unspecified,
Generation: 22

```

The following sample output is for a channelized DS3 to DS1 interface:

```

user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
Interface index: 50, SNMP ifIndex: 59, Generation: 49
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16,
Mode: M23, Framing: ESF
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 : 117 (last seen 00:00:08 ago)
Output: 121 (last sent 00:00:01 ago)
Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
Traffic statistics:
Input bytes :          22459734          236888 bps
Output bytes :        162288645        1322208 bps
Input packets:          201233          214 pps
Output packets:        236341          227 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
0,
L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
DS3 defects : None
T1 media:      Seconds      Count  State
SEF            0            0  OK
BEE            0            0  OK
AIS            0            0  OK
LOF            0            0  OK
LOS            0            0  OK
YELLOW         0            0  OK
BPV            0            0
EXZ            0            0
LCV            0            0
PCV            0            0

```



```

CS                                0          0
LES                              0
ES                               0
SES                              0
SEFS                             0
BES                              0
UAS                              0
DS3 media:                      Seconds      Count  State
PLL Lock                        0          0 OK
Reframing                      0          0 OK
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
LES                             0
PES                             0
PSES                           0
SEFS                           0
UAS                             0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95      234494    162020375      0          0
Queue1    5   5         164       5808          0          0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:
Destination slot: 2, PLP byte: 2 (0xab)
CoS transmit queue      Bandwidth      Buffer      Priority  Limit
      %      bps      %      bytes
0 best-effort           0          0  0          0      low  none
1 expedited-forwarding  0          0  0          0      low  none
2 assured-forwarding    0          0  0          0      low  none
3 network-control       0          0  0          0      low  none
Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
Unspecified, Generation: 44

```

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

Problem **Description:** 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.

Solution To diagnose a suspected circuit problem, follow these steps:

- [Create a Loop from the Router to the Network on page 286](#)
- [Create a Loop to the Router from Various Points in the Network on page 288](#)

Create a Loop from the Router to the Network

To create a loop from the router to the network, follow these steps:

1. [Loop the Entire T3 Interface Toward the Network on page 286](#)
2. [Loop a Particular T1 Channel Toward the Network on page 287](#)

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.

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 interface-name t3-options
```

2. Configure the loopback:

```
[edit interfaces interface-name 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.

The interface name is one of the following:

- T1 channel 0, channel group 0, on the Multichannel DS3 port for a channelized DS3 to DS0 interface (for example, **ds-2/1/1:0:0**)
- T1 channel 0 on the Multichannel DS3 port for a channelized DS3 to DS1 interface (for example, **t1-2/1/1:0**)

Loop a Particular T1 Channel Toward the Network

Purpose

Creating a loop from a particular T1 interface to the network allows the transport-layer engineer to test the T1 interface from various points in the network and isolate the problem.

Action

To create a loop from a particular T1 interface to the network, follow these steps:

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

```
user@host# edit interfaces interface-name t1-options
```

2. Configure the loopback:

```
[edit interfaces interface-name t1-options]
user@host# set loopback remote
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces ds-2/1/1:0:0 t1-options]
user@host# show
loopback remote;
```

4. Commit the configuration:

```
user@host# commit
```

Meaning

This command loops any traffic from the network back into the network. The interface name is one of the following:

- Channel group 0 for the particular T1 channel on the Multichannel DS3 port for a channelized DS3 to DS3 interface (for example, **ds-2/1/1:2:0**)
- Particular T1 channel on the Multichannel DS3 port for a channelized DS3 to DS1 interface (for example, **t1-2/1/1:3**)

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 Step 2 through Step 7 in [“Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface” on page 275](#). 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.

Related Documentation

Locating Multichannel DS3 Alarms and Errors

- [Checklist for Locating Multichannel DS3 Alarms and Errors on page 288](#)
- [Display Alarms and Errors for Channelized DS3 to DS1 Interfaces on page 288](#)
- [Display Alarms and Errors for Channelized DS3 to DS0 Interfaces on page 291](#)

Checklist for Locating Multichannel DS3 Alarms and Errors

Purpose To check for the most common Multichannel DS3 alarms and errors encountered when investigating line problems on a Juniper Networks router.

Action [Table 33 on page 288](#) provides links and commands for Multichannel DS3 alarms and errors.

Table 33: Checklist for Multichannel DS3 Alarms and Errors

Tasks	Command or Action
“Display Alarms and Errors for Channelized DS3 to DS1 Interfaces” on page 288	<code>show interfaces t1-fpc/pic/port:channel extensive</code>
“Display Alarms and Errors for Channelized DS3 to DS0 Interfaces” on page 291	<code>show interfaces ds-fpc/pic/port:channel:channel extensive</code>

Display Alarms and Errors for Channelized DS3 to DS1 Interfaces

Purpose To display channelized DS3 to DS1 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> show interfaces t1-fpc/pic/port:channel extensive

Sample Output

```

user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59, Generation: 49
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16,
  Mode: M23, Framing: ESF
  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 : 117 (last seen 00:00:08 ago)
    Output: 121 (last sent 00:00:01 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
  Traffic statistics:
    Input bytes :          22459734          236888 bps
    Output bytes :         162288645         1322208 bps
    Input packets:          201233          214 pps
    Output packets:         236341          227 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms :None
  DS3 alarms :None
  DS1 defects :None
  DS3 defects :None
  T1 media:
    Seconds      Count  State
    SEF          0      0 OK
    BEE          0      0 OK
    AIS          0      0 OK
    LOF          0      0 OK
    LOS          0      0 OK
    YELLOW       0      0 OK
    BPV          0      0
    EXZ          0      0
    LCV          0      0
    PCV          0      0
    CS           0      0
    LES          0
    ES           0
    SES          0
    SEFS         0
    BES          0
    UAS          0
  DS3 media:
    Seconds      Count  State
    PLL Lock     0      0 OK
    Reframing    0      0 OK
    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
LES          0
PES          0
PSES         0
SEFS         0
UAS          0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95      234494    162020375         0         0
Queue1    5   5         164       5808         0         0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:
  Destination slot: 2, PLP byte: 2 (0xab)
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %      bps      %      bytes
0 best-effort             0          0  0          0      low  none
1 expedited-forwarding    0          0  0          0      low  none
2 assured-forwarding      0          0  0          0      low  none
3 network-control         0          0  0          0      low  none
Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
  Unspecified, Generation: 44

```

Meaning

The sample output shows that there are no active alarms and active defects. 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 T1 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). [Table 34 on page 291](#) shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 34: T1 Media Alarms and Error Definitions

T1 Media Alarm or Error	Definitions
AIS	Alarm indication signal (blue alarm)
BEE	Block error event
BES	Bursty errored seconds
BPV	Bipolar violation
CS	Controlled slip
ES	Errored seconds
EXZ	Excessive zeros
LCV	Line code violation
LES	Line errored seconds
LOF	Loss of frame
LOS	Loss of signal
PCV	Path code violation
SEF	Severely errored frame
SEFS	Severely errored frame seconds
SES	Severely errored seconds
UAS	Unavailable seconds
YLW	Yellow alarm

See *Checklist for T1 Alarms and Errors* for more details on T1 alarms and statistics.

Display Alarms and Errors for Channelized DS3 to DS0 Interfaces

Purpose To display T3 alarms and errors for channelized DS3 to DS0 interfaces, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces ds-fpc/pic/port:channel:channel extensive`

Sample Output

```
user@host> show interfaces ds-2/1/0:5:1 extensive
```

```

Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133, Generation: 35
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
  16, Mode: M23,
  Framing: ESF
  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 : 2 (last seen 00:00:05 ago)
    Output: 2 (last sent 00:00:05 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
  Traffic statistics:
    Input bytes :          524          304 bps
    Output bytes :          528          304 bps
    Input packets:           8           0 pps
    Output packets:          8           0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
  0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1  alarms : None
  DS3  alarms : None
  DS1  defects : None
  DS3  defects : None
  T1 media:
    Seconds      Count  State
    SEF          0       0 OK
    BEE          0       0 OK
    AIS          0       0 OK
    LOF          0       0 OK
    LOS          0       0 OK
    YELLOW       0       0 OK
    BPV          0       0
    EXZ          0       0
    LCV          0       0
    PCV          0       0
    CS           0       0
    LES         0
    ES           0
    SES         0
    SEFS        0
    BES         0
    UAS         0
  DS3 media:
    Seconds      Count  State
    PLL Lock     0       0 OK
    Reframing    0       0 OK
    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
    LES         0

```



```

PES                                0
PSES                              0
SEFS                              0
UAS                               0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95  95          4        336          0          0
Queue1    5   5          1         22          0          0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1
  Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
PFE configuration:
  Destination slot: 2, PLP byte: 2 (0x2f)
  CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                           %             bps      %       bytes
0 best-effort             0             0    0         0      low  none
1 expedited-forwarding    0             0    0         0      low  none
2 assured-forwarding      0             0    0         0      low  none
3 network-control         0             0    0         0      low  none
Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 192.168.118.96/30, Local: 192.168.118.97, Broadcast:
Unspecified,
  Generation: 22

```

Meaning

The sample output shows that there are no active alarms and active defects. 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.

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.

[“T1 Media Alarms and Error Definitions” on page 288](#) shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 35: 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

See *Checklist of Common T3 Alarms and Errors* for more details on T3 alarms and statistics.

Related Documentation

CHAPTER 14

Troubleshooting Channelized OC12 Interfaces

- [Monitoring Channelized OC12 Interfaces on page 295](#)
- [Using Loopback Testing for Channelized OC12 Interfaces on page 314](#)
- [Locating Channelized OC12 Alarms and Errors on page 328](#)

Monitoring Channelized OC12 Interfaces

- [Checklist for Monitoring Channelized OC12 Interfaces on page 295](#)
- [Monitor Channelized OC12 Interfaces on page 296](#)
- [Monitor Channelized OC12 IQ Interfaces on page 301](#)

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 36 on page 295](#) provides links and commands for monitoring Channelized OC12 interfaces.

Table 36: Checklist for Monitoring Channelized OC12 Interfaces

Tasks	Command or Action
“Monitor Channelized OC12 Interfaces” on page 296	
1. Display the Status of Channelized OC12 Interfaces on page 296	<code>show interfaces terse t3-interface-name*</code>
2. Display the Status of a Specific Channelized OC12 Interface on page 297	<code>show interfaces terse t3-fpc/pic/port:channel</code>
3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 298	<code>show interfaces t3-fpc/pic/port:channel extensive</code>
4. Monitor Statistics for a Channelized OC12 Interface on page 300	<code>monitor interfaces t3-fpc/pic/port:channel</code>
“Monitor Channelized OC12 IQ Interfaces” on page 301	

Table 36: Checklist for Monitoring Channelized OC12 Interfaces
(continued)

Tasks	Command or Action
1. Display the Status of a Channelized OC12 IQ Interface on page 301	<code>show interfaces terse coc*</code> <code>show interfaces controller</code> <code>show interfaces terse</code>
2. Display the Status of the Controller Channelized OC12 IQ Interface on page 305	<code>show interfaces interface-type-fpc/pic/port</code> <code>show interfaces interface-type-fpc/pic/port</code> <code>show interfaces interface-type-fpc/pic/port:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel:channel</code>
3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 307	<code>show interfaces interface-type-fpc/pic/port:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel:channel</code>
4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 310	<code>show interfaces interface-type-interface-name extensive</code>
5. Monitor Statistics for a Channelized OC12 IQ Interface on page 312	<code>monitor interfaces interface-type-fpc/pic/port:channel</code>

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 296](#)
2. [Display the Status of a Specific Channelized OC12 Interface on page 297](#)
3. [Display Extensive Status Information for a Specific Channelized OC12 Interface on page 298](#)
4. [Monitor Statistics for a Channelized OC12 Interface on page 300](#)

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 295](#).

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 295](#).

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 interface t3-0/3/0:0 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: $2^{\wedge}3 - 1$, 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 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   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:
  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 runs:            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 301](#)
2. [Display the Status of the Controller Channelized OC12 IQ Interface on page 305](#)
3. [Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 307](#)
4. [Display Extensive Status Information for a Channelized OC12 IQ Interface on page 310](#)
5. [Monitor Statistics for a Channelized OC12 IQ Interface on page 312](#)

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
coc12-0/0/0
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 IO interfaces are up.

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

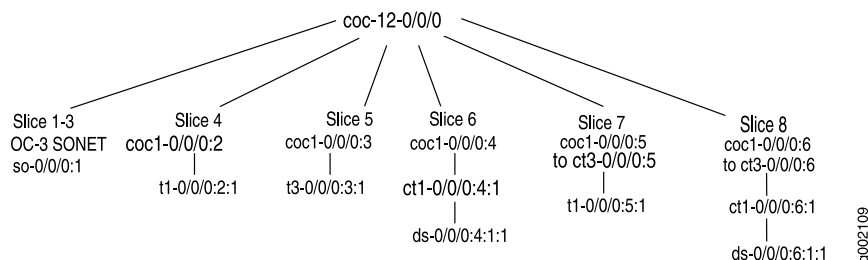
Sample output 2 shows the channels for the channelized interfaces that are configured and the hierarchy, but not the interface address information. At the top, the hierarchy includes the controller interface **coc12-0/0/0**.

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 39 on page 303](#).

Figure 39: 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 39 on page 303](#). 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
```

```

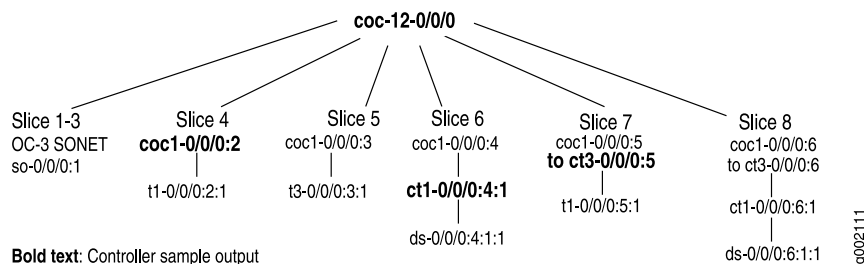
DS1   defects   : None
SONET alarms    : None
SONET defects    : None

```

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 40 on page 307](#).

Figure 40: 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: c0c1-0/0/0:2 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)
DSO 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

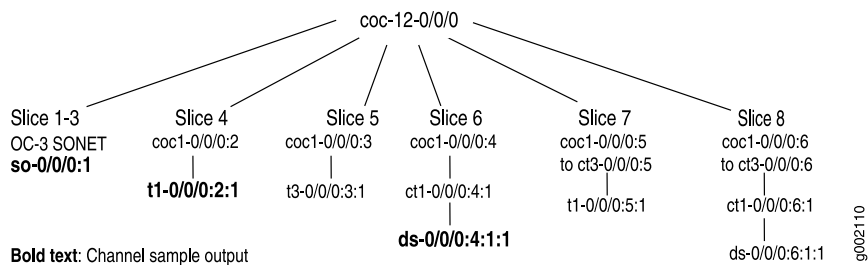
```

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 DSO interface that is the result of an OC1 interface partitioned into a T1 interface, which is further partitioned into the DSO interface.

Figure 41 on page 309 shows a visual representation of the different channel levels.

Figure 41: 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, DSO, 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, 0.151, 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:
    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:
    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:
    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.

Related Documentation

- [Channelized Interfaces Feature Guide for Routing Devices](#)

Using Loopback Testing for Channelized OC12 Interfaces

- [Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces on page 314](#)
- [Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface on page 316](#)
- [Create a Loopback on page 316](#)
- [Verify That the Interface Is Up on page 318](#)
- [Clear Interface Statistics on page 320](#)
- [Force the Link Layer to Stay Up on page 321](#)
- [Verify the Status of the Logical Interface on page 322](#)
- [Ping the Channelized Interface on page 323](#)
- [Check for Interface Error Statistics on page 324](#)
- [Diagnose a Suspected Circuit Problem on page 327](#)

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 37 on page 315](#) provides links and commands for using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems.

Table 37: 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 316	
1. Create a Loopback on page 316	
a. Create a Physical Loopback on page 316	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 317	<code>[edit interfaces t3-fpc/pic/port:channel t3 options] set loopback local show commit</code>
2. Verify That the Interface Is Up on page 318	<code>show interfaces t3-fpc/pic/port:channel extensive</code>
3. Clear Interface Statistics on page 320	<code>clear interfaces statistics t3-fpc/pic/port:channel</code>
4. Force the Link Layer to Stay Up on page 321	
a. Configure Encapsulation to Cisco-HDLC on page 321	<code>[edit interfaces t3-fpc/pic/port:channel] set encapsulation cisco-hdlc show commit</code>
b. Configure No-Keepalives on page 322	<code>[edit interfaces t3-fpc/pic/port:channel] set no-keepalives show commit</code>
5. Verify the Status of the Logical Interface on page 322	<code>show interfaces t3-fpc/pic/port:channel</code>
6. Ping the Channelized Interface on page 323	<code>ping interface t3-fpc/pic/port:channel local-IP-address bypass-routing count 1000 rapid</code>
7. Check for Interface Error Statistics on page 324	<code>show interfaces t3-fpc/pic/port:channel extensive</code>
“Diagnose a Suspected Circuit Problem” on page 327	
1. Loop the Entire T3 Interface Toward the Network on page 327	<code>[edit interfaces t3-fpc/pic/port:channel t3-options] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 328	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 316.

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

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

- Solution**
- [Create a Loopback on page 316](#)
 - [Verify That the Interface Is Up on page 318](#)
 - [Clear Interface Statistics on page 320](#)
 - [Force the Link Layer to Stay Up on page 321](#)
 - [Verify the Status of the Logical Interface on page 322](#)
 - [Ping the Channelized Interface on page 323](#)
 - [Check for Interface Error Statistics on page 324](#)

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 316](#)
2. [Configure a Local Loopback on page 317](#)

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:
  PLL Lock                        Seconds    Count    State
  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
  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 321](#)
2. [Configure No-Keepalives on page 322](#)

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
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 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
CES          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 327](#)
2. [Create a Loop to the Router from Various Points in the Network on page 328](#)

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 316. 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.

Related Documentation

- [Channelized Interfaces Feature Guide for Routing Devices](#)

Locating Channelized OC12 Alarms and Errors

- [Checklist for Channelized OC12 Alarms and Errors on page 328](#)
- [Display Channelized OC12 Alarms and Errors on page 329](#)
- [Display Channelized OC12 IQ Alarms and Errors on page 332](#)

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 38 on page 328](#) provides links and commands for Channelized OC12 alarms and errors.

Table 38: Checklist for Channelized OC12 Alarms and Errors

Tasks	Command or Action
“Display Channelized OC12 Alarms and Errors” on page 329	<code>show interfaces t3-fpc/pic/port:channel extensive</code>
“Display Channelized OC12 IQ Alarms and Errors” on page 332	<code>show interfaces interface-type-interface-name extensive</code>

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 interface t3-0/3/0:0 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: $2^{\wedge}3 - 1$, 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 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  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 39 on page 331 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 39: T3 Interface Error Counter Definitions

T3 Alarm or Error	Definition
AIS	Alarm indication signal
EXZ	Excessive zeros

Table 39: T3 Interface Error Counter Definitions (*continued*)

T3 Alarm or Error	Definition
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

TI 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: $2^{15} - 1$, 0.151, 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.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

PART 4

Configuration Statements and Operational Commands

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CHAPTER 15

Configuration Statements

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address

```

Syntax  address address {
        arp ip-address (mac | multicast-mac) mac-address <publish>;
        broadcast address;
        destination address;
        destination-profile name;
        eui-64;
        master-only;
        multipoint-destination address dlcid dlcid-identifier;
        multipoint-destination address {
            epd-threshold cells;
            inverse-arp;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            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;
        }
        primary;
        preferred;
        (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 ];
    }
}

```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family *family*],
 [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*
 family *family*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description Configure the interface address.

Options *address*—Address of the interface.

- In Junos OS Release 13.3 and later, when you configure an IPv6 host address and an IPv6 subnet address on an interface, the commit operation fails.
- In releases earlier than Junos OS Release 13.3, when you use the same configuration on an interface, the commit operation succeeds, but only one of the IPv6 addresses that was entered is assigned to the interface. The other address is not applied.



NOTE: If you configure the same address on multiple interfaces in the same routing instance, Junos OS uses only the first configuration, and the remaining address configurations are ignored and can leave interfaces without an address. Interfaces that do not have an assigned address cannot be used as a donor interface for an unnumbered Ethernet interface.

For example, in the following configuration the address configuration of interface xe-0/0/1.0 is ignored:

```
interfaces {
  xe-0/0/0 {
    unit 0 {
      family inet {
        address 192.168.1.1/8;
      }
    }
  }
  xe-0/0/1 {
    unit 0 {
      family inet {
        address 192.168.1.1/8;
      }
    }
  }
}
```

For more information on configuring the same address on multiple interfaces, see *Configuring the Interface Address*.

The remaining statements are explained separately.



NOTE: The edit logical-systems hierarchy is not available on QFabric systems.

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

- Related Documentation**
- *Configuring the Protocol Family*
 - *Junos OS System Basics Configuration Guide*
 - *family*
 - *negotiate-address*
 - *unnumbered-address (Ethernet)*

advertise-interval

Syntax	<code>advertise-interval <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Modify the Automatic Protection Switching (APS) interval at which the protect and working routers send packets to their neighbors to advertise that they are operational. A router considers its neighbor to be operational for a period, called the hold time, that is, by default, three times the advertisement interval.
Options	<p><i>milliseconds</i>—Interval between advertisement packets.</p> <p>Range: 1 through 65,534 milliseconds</p> <p>Default: 1000 milliseconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring APS Timers</i>

aps

Syntax `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;
 preserve-interface;
 protect-circuit group-name;
 request;
 revert-time seconds;
 switching-mode (bidirectional | unidirectional);
 working-circuit group-name;
 }`

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure Automatic Protection Switching (APS) on the router.

For DS3 channels on a channelized OC12 interface, configure APS on channel 0 only. If you configure APS on channels 1 through 11, it is ignored.

The statements are explained separately.

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

Related Documentation

- *Automatic Protection Switching and Multiplex Section Protection Overview*

authentication-key

Syntax	<code>authentication-key key;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> sonet-options aps]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the Automatic Protection Switching (APS) authentication key (password).
Options	key —Authentication password. It can be 1 through 8 characters long. Configure the same key for both the working and protect routers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> <i>Configuring Basic Automatic Protect Switching</i> For information about the authentication-key statement at the <code>[edit interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>]</code> or <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>unit-number</i> family (inet inet6) address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>]</code> hierarchy level, see the <i>Junos OS High Availability Library for Routing Devices</i>.

bchannel-allocation

Syntax	<code>bchannel-allocation (ascending descending);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> isdn-options]</code>
Release Information	Statement introduced in Junos OS Release 8.3.
Description	For Integrated Services Digital Network Primary Rate Interfaces (ISDN PRI), allocate PRI dialout B-channels in ascending or descending order.
Options	(ascending descending) —Allocate the B-channels in ascending (from low to high) or descending (from high to low) order. Default: Descending order
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Allocating B-Channels for Dialout on page 119 <i>Junos OS Interfaces and Routing Configuration Guide</i>

bert-algorithm

Syntax	<code>bert-algorithm <i>algorithm</i>;</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the pattern to send in the bit stream during a bit error rate test (BERT). Applies to T1, E3, T3, and multichannel DS3 interfaces, the channelized interfaces (DS3, OC12, STM1), and channelized IQ and IQE interfaces (E1, E3 and DS3).



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-algorithm` statement must be included at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

Options	<p><i>algorithm</i>—Pattern to send in the bit stream. There are two categories of test patterns: pseudorandom and repetitive. Both patterns conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The algorithm can be one of the following patterns:</p> <ul style="list-style-type: none"> • all-ones-repeating—Pattern is all ones. • all-zeros-repeating—Pattern is all zeros. • alternating-double-ones-zeros—Pattern is alternating pairs of ones and zeros. • alternating-ones-zeros—Pattern is alternating ones and zeros. • pseudo-2e3—Pattern is $2^3 - 1$. • pseudo-2e4—Pattern is $2^4 - 1$. • pseudo-2e5—Pattern is $2^5 - 1$. • pseudo-2e6—Pattern is $2^6 - 1$. • pseudo-2e7—Pattern is $2^7 - 1$. • pseudo-2e9-o153—Pattern is $2^9 - 1$, as defined in the O153 standard. • pseudo-2e10—Pattern is $2^{10} - 1$. • pseudo-2e11-o152—Pattern is $2^{11} - 1$, as defined in the O152 standard.
----------------	---

- **pseudo-2e15-o151**—Pattern is $2^{15} - 1$, as defined in the O151 standard.
- **pseudo-2e17**—Pattern is $2^{17} - 1$.
- **pseudo-2e18**—Pattern is $2^{18} - 1$.
- **pseudo-2e20-o151**—Pattern is $2^{20} - 1$, as defined in the O151 standard.
- **pseudo-2e20-o153**—Pattern is $2^{20} - 1$, as defined in the O153 standard.
- **pseudo-2e21**—Pattern is $2^{21} - 1$.
- **pseudo-2e22**—Pattern is $2^{22} - 1$.
- **pseudo-2e23-o151**—Pattern is $2^{23} - 1$, as defined in the O151 standard.
- **pseudo-2e25**—Pattern is $2^{25} - 1$.
- **pseudo-2e28**—Pattern is $2^{28} - 1$.
- **pseudo-2e29**—Pattern is $2^{29} - 1$.
- **pseudo-2e31**—Pattern is $2^{31} - 1$.
- **pseudo-2e32**—Pattern is $2^{32} - 1$.
- **repeating-1-in-4**—One bit in four is set to 1; the others are set to 0.
- **repeating-1-in-8**—One bit in eight is set to 1; the others are set to 0.
- **repeating-3-in-24**—Three bits in twenty four are set to 1; the others are set to 0.

Default: pseudo-2e3

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

Related Documentation

- [Interface Diagnostics on page 225](#)
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *Examples: Configuring T3 Interfaces*
- [bert-error-rate on page 348](#)
- [bert-period on page 350](#)

bert-error-rate

Syntax	<code>bert-error-rate rate;</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the bit error rate to use in a BERT procedure. Applies to E1, E3, T1, or T3 interfaces, and to the channelized interfaces (DS3, OC3, OC12, and STM1).




NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-error-rate` statement must be included at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

Options	<p><code>rate</code>—Bit error rate.</p> <p>Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)</p> <p>Default: 0</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • bert-algorithm on page 346 • bert-period on page 350 • ds0-options on page 402 • e1-options on page 357 • e3-options • t1-options on page 389 • t3-options on page 390 • Interface Diagnostics on page 225 • Configuring E1 BERT Properties • Configuring E3 BERT Properties

- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *Examples: Configuring T3 Interfaces*

bert-period

Syntax	<code>bert-period seconds;</code>
Hierarchy Level	<p>[edit interfaces <i>ce1-fpc/pic/port</i>], [edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name ds0-options</i>], [edit interfaces <i>interface-name e1-options</i>], [edit interfaces <i>interface-name e3-options</i>], [edit interfaces <i>interface-name t1-options</i>], [edit interfaces <i>interface-name t3-options</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	<p>Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).</p> <p>E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).</p>
	<p> NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>bert-period</code> statement must be included at the [edit interfaces <i>ce1-fpc/pic/port</i>] or [edit interfaces <i>ct1-fpc/pic/port</i>] hierarchy level as appropriate.</p>
Options	<p>seconds—Test duration. Range and default values vary by interface type.</p> <p>Range:</p> <ul style="list-style-type: none"> PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds PIC-dependent—Extended BERT period: from 1 through 86,400 seconds <p>Default:</p> <ul style="list-style-type: none"> Normal BERT period: 10 seconds Extended BERT period (on supported E1 interfaces): 10 seconds Extended BERT period (on supported T1 interfaces): 240 seconds
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Interface Diagnostics on page 225 Configuring E1 BERT Properties

- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- [bert-algorithm on page 346](#)
- [bert-error-rate on page 348](#)

byte-encoding

Syntax	byte-encoding (nx56 nx64);
Hierarchy Level	[edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.



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

Default	The default byte encoding is 8 bits per byte (nx64).
Options	nx56—Use 7 bits per byte. nx64—Use 8 bits per byte.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring T1 Byte Encoding</i>

bytes

Syntax	<pre>bytes { c2 <i>value</i>; e1-quiet <i>value</i>; f1 <i>value</i>; f2 <i>value</i>; s1 <i>value</i>; z3 <i>value</i>; z4 <i>value</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set values in some SONET/SDH header bytes.
Options	<p>c2 <i>value</i>—Path signal label SONET/SDH overhead byte. SONET/SDH frames use the C2 byte to indicate the contents of the payload inside the frame. SONET/SDH interfaces use the C2 byte to indicate whether the payload is scrambled.</p> <p>Range: 0 through 255</p> <p>Default: 0xCF</p> <p>e1-quiet <i>value</i>—Default idle byte sent on the orderwire SONET/SDH overhead bytes. The router does not support the orderwire channel, and hence sends this byte continuously.</p> <p>Range: 0 through 255</p> <p>Default: 0x7F</p> <p>f1 <i>value</i>, f2 <i>value</i>, z3 <i>value</i>, z4 <i>value</i>—SONET/SDH overhead bytes.</p> <p>Range: 0 through 255</p> <p>Default: 0x00</p> <p>s1 <i>value</i>—Synchronization message SONET overhead byte. This byte is normally controlled as a side effect of the system reference clock configuration and the state of the external clock coming from an interface if the system reference clocks have been configured to use an external reference.</p> <p>Range: 0 through 255</p> <p>Default: 0xCC</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH Header Byte Values to Identify Error Conditionsno-concatenate

cbit-parity

Syntax	(cbit-parity no-cbit-parity);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the no-cbit-parity statement is included. For all other interfaces, M13 framing is used when the no-cbit-parity statement is included.
Default	C-bit parity mode is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring E3 and T3 Parameters on ATM Interfaces</i> • <i>Disabling T3 C-Bit Parity Mode</i>

channelization

Syntax	channelization;
Hierarchy Level	[edit chassis fpc <i>slot-number</i> pic <i>pic-number</i>]
Release Information	Statement introduced in Junos OS Release 11.4.
Description	Enable the DS3/E3 MIC, MIC-3D-16CHE1-T1-CE, and MIC-3D-8CHOC3-4CHOC12 on MX Series routers with Queuing and Enhanced Queuing MPCs (MX-MPC1-3D-Q, MX-MPC2-3D-Q, MX-MPC2-3D-EQ, MPC2E-3D-NG, and MPC3E-3D-NG) or on MX80 routers to function in channelized mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207</i>

clocking

Syntax	<code>clocking (external [interface <i>interface-name</i>] internal);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. interface option added in Junos OS Release 8.2. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For interfaces that can use various clock sources, configure the source of the transmit clock on each interface.



NOTE: On Channelized SONET/SDH PICs, if you set the parent (or the master) controller clock to **external**, then you must set the child controller clocks to the default value—that is, **internal**.

For example, on the Channelized STM1 PIC, if the clock on the Channelized STM1 interface (which is the master controller) is set to **external**, then you must not configure the CE1 interface (which is the child controller) clock to **external**. Instead you must configure the CE1 interface clock to **internal**.

Options	external —The clock source is provided by the data communication equipment (DCE). interface <i>interface-name</i> —Configure clocking for the drop-and insert feature. When configuring this feature, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock. internal —Use the internal stratum 3 clock as the reference clock. Default: internal
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Clock Source• Configuring the Clock Source on SONET/SDH Interfaces• Clock Sources on Channelized Interfaces on page 8• Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 114• loop-timing

data-input

Syntax	<code>data-input (system interface <i>interface-name</i>);</code>
Hierarchy Level	<code>[edit interfaces <i>ds-pim</i>/0/<i>port:channel</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>On channelized T1/E1 interfaces partitioned into channels, you can insert time slots from one port directly into the other port on the same PIM, to replace time slots coming through the Routing Engine.</p> <p>To avoid slips, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock by including the clocking external interface <i>interface-name</i> statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level.</p>
Options	<p>system—Interface sends and receives data from the Routing Engine.</p> <p>interface <i>interface-name</i>—Interface sends and receives data from a specific interface.</p> <p>Default: Data is sent and received from the Routing Engine (system).</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 114 • <i>Junos OS Interfaces and Routing Configuration Guide</i> • clocking on page 354

dlci

Syntax	<code>dlci <i>dlci-identifier</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Frame Relay and Multilink Frame Relay (MLFR) user-to-network interface (UNI) network-to-network interface (NNI) encapsulation only, and for link services, voice services and point-to-point interfaces only, configure the data-link connection identifier (DLCI) for a permanent virtual circuit (PVC) or an switched virtual circuit (SVC).</p> <p>To configure a DLCI for a point-to-multipoint interface, use the multipoint-destination statement to specify the DLCI.</p>
Options	<p><i>dlci-identifier</i>—Data-link connection identifier.</p> <p>Range: 16 through 1022.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Data-Link Connection Identifiers on Channelized Interfaces on page 6• <i>Configuring Frame Relay DLCIs</i>• <i>Junos OS Services Interfaces Library for Routing Devices</i>• <i>encapsulation (Logical Interface)</i>• <i>multicast-dlci</i>• <i>multipoint-destination</i>

e1-options

Syntax	<pre>e1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; 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 <i>time-slot-range</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	<p>Configure E1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview on page 27 • Channelized STM1 Interfaces Overview on page 183 • E1 Interfaces Overview • T1 Interfaces Overview

family

```

Syntax  family family {
        accounting {
            destination-class-usage;
            source-class-usage {
                (input | output | input output);
            }
        }
        access-concentrator name;
        address address {
            ... the address subhierarchy appears after the main [edit interfaces interface-name unit
                logical-unit-number family family-name] hierarchy ...
        }
        bundle interface-name;
        core-facing;
        demux-destination {
            destination-prefix;
        }
        demux-source {
            source-prefix;
        }
        direct-connect;
        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 ];
        }
        interface-mode (access | trunk);
        ipsec-sa sa-name;
        keep-address-and-control;
        mac-validate (loose | strict);
        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;
        protocols [inet iso mpls];
        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 {
input;
output;
}
service {
input {
post-service-filter filter-name;
service-set service-set-name <service-filter filter-name>;
}
output {
service-set service-set-name <service-filter filter-name>;
}
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
maximum-seconds> <filter [aci]>;
(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;
vlan-id number;
vlan-id-list [number number-number];
address address {
arp ip-address (mac | multicast-mac) mac-address <publish>;
broadcast address;
destination address;
destination-profile name;
eui-64;
master-only;
multipoint-destination address dlci dlci-identifier;
multipoint-destination address {
epd-threshold cells;
inverse-arp;
oam-liveness {
up-count cells;
down-count cells;
}
oam-period (disable | seconds);
shaping {
(cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
sustained rate);
queue-length number;
}
vci vpi-identifier.vci-identifier;
}
preferred;
primary;
vrrp-group group-id {
(accept-data | no-accept-data);
advertise-interval seconds;
authentication-key key;
authentication-type authentication;
fast-interval milliseconds;

```

```
(preempt | no-preempt) {  
    hold-time seconds;  
}  
priority number;  
track {  
    interface interface-name {  
        bandwidth-threshold bits-per-second priority-cost priority;  
        priority-cost priority;  
    }  
    priority-hold-time seconds;  
    route prefix routing-instance instance-name priority-cost priority;  
}  
}  
virtual-address [ addresses ];  
}  
virtual-link-local-address ipv6-address;  
}
```

Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Option max-sessions-vs-a-ignore introduced in Junos OS Release 11.4.
Description	Configure protocol family information for the logical interface.



NOTE: Not all subordinate statements are available to every protocol family.

Options *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering



NOTE: This option is not supported on T4000 Type 5 FPCs.

- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation. You can optionally configure this protocol family for the logical interface on which you configure VPLS.
- **ethernet-switching**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite. You can configure this protocol family for the logical interface of CCC physical interfaces. When you use this encapsulation type, you can configure the **ccc** family only.
- **inet**—Internet Protocol version 4 suite. You must configure this protocol family for the logical interface to support IP protocol traffic, including Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Internet Control Message Protocol (ICMP), and Internet Protocol Control Protocol (IPCP).
- **inet6**—Internet Protocol version 6 suite. You must configure this protocol family for the logical interface to support IPv6 protocol traffic, including Routing Information Protocol for IPv6 (RIPng), Intermediate System-to-Intermediate System (IS-IS), BGP, and Virtual Router Redundancy Protocol for IPv6 (VRRP).
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite. You must configure this protocol family for the logical interface to support IS-IS traffic.
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15. You must configure this protocol or multilink Point-to-Point Protocol (MLPPP) for the logical interface to support multilink bundling.
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16. You must configure this protocol or **mlfr-end-to-end** for the logical interface to support link services and voice services bundling.
- **multilink-ppp**—Multilink Point-to-Point Protocol. You must configure this protocol (or **mlfr-end-to-end**) for the logical interface to support multilink bundling.
- **mpls**—Multiprotocol Label Switching (MPLS). You must configure this protocol family for the logical interface to participate in an MPLS path.
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite. You can configure this protocol family for the logical interface of TCC physical interfaces.

- **tnp**—Trivial Network Protocol. This protocol is used to communicate between the Routing Engine and the router's packet forwarding components. The Junos OS automatically configures this protocol family on the router's internal interfaces only, as discussed in *Understanding Internal Ethernet Interfaces*.
- **vpls**—(M Series and T Series routers only) Virtual private LAN service. You can optionally configure this protocol family for the logical interface on which you configure VPLS. VPLS provides an Ethernet-based point-to-multipoint Layer 2 VPN to connect customer edge (CE) routers across an MPLS backbone. When you configure a VPLS encapsulation type, the **family vpls** statement is assumed by default.

MX Series routers support dynamic profiles for VPLS pseudowires, VLAN identifier translation, and automatic bridge domain configuration.

For more information about VPLS, see the *Junos OS VPNs Library for Routing Devices* and the *Junos OS, Release 15.1*.

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	<ul style="list-style-type: none">• <i>Configuring the Protocol Family</i>

fast-aps-switch

Syntax	<code>fast-aps-switch;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> 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	<ul style="list-style-type: none"> • <i>Reducing APS Switchover Time in Layer 2 Circuits</i>

fcs

Syntax	fcs (16 32);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	<p>For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.</p> <p>On a channelized OC12 interface, the SONET/SDH fcs statement is not supported. To configure FCS on each DS3 channel, you must include the t3-options fcs statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports NxDS3 to NxVC3 to AU3 to STM.</p>
	<div>  <p>NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the fcs statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Options	<p>16—Use a 16-bit frame checksum on the interface.</p> <p>32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.</p> <p>Default: 16</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the E1 Frame Checksum Configuring the E3 Frame Checksum Configuring the SONET/SDH Frame Checksum Configuring the T1 Frame Checksum Configuring the T3 Frame Checksum

feac-loop-respond

Syntax	(feac-loop-respond no-feac-loop-respond);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For T3 interfaces only, configure the router so a remote CSU can place the local router into loopback.</p> <p>If you configure remote or local loopback with the T3 loopback statement, the router does not respond to FEAC requests from the CSU even if you include the feac-loop-respond statement in the configuration. For the router to respond, you must delete the loopback statement from the configuration.</p> <p>You must rollback the setting done on the remote CSU prior to deactivating the feac-loop-respond statement. If the remote CSU cannot comply, clear the remote loop through local configuration to achieve the cleanup. For example, configure remote loopback on the interface and then delete the remote loopback.</p>
Default	The router does not respond to FEAC requests.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring the T3 FEAC Response</i> • loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 373 • <i>remote-loopback-respond</i>

force

Syntax	<code>force (protect working);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform a forced switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch. It can be overridden by a signal failure on the protect circuit, thus causing a switch to the working circuit.
Options	protect —Request the circuit to become the protect circuit. working —Request the circuit to become the working circuit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Switching Between the Working and Protect Circuits</i>• request on page 383

framing (E1, E3, and T1 Interfaces)

Syntax	<code>framing (g704 g704-no-crc4 g.751 g.832 unframed sf esf);</code>
Hierarchy Level	[edit interfaces <i>ce1-fpc/pic/port</i>], [edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>at-fpc/pic/port</i> e3-options], [edit interfaces <i>e1-fpc/pic/port</i> e1-options], [edit interfaces <i>t1-fpc/pic/port</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Configure the framing format.




NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `framing` statement must be included at the [edit interfaces *ce1-fpc/pic/port*] or [edit interfaces *ct1-fpc/pic/port*] hierarchy level as appropriate.

Default	<code>esf</code> for T1 interfaces; <code>g704</code> for E1 interfaces. There is no default value for E3 over ATM interfaces.
Options	<p><code>esf</code>—Extended superframe (ESF) mode for T1 interfaces.</p> <p><code>g704</code>—G.704 framing format for E1 interfaces.</p> <p><code>g704-no-crc4</code>—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.</p> <p><code>g.751</code>—G.751 framing format for E3 over ATM interfaces.</p> <p><code>g.832</code>—G.832 framing format for E3 over ATM interfaces.</p> <p><code>sf</code>—Superframe (SF) mode for T1 interfaces.</p> <p><code>unframed</code>—Unframed mode for E1 interfaces.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring E1 Framing</i> • <i>Configuring E3 and T3 Parameters on ATM Interfaces</i> • <i>Configuring T1 Framing</i>

hold-time (APS)

Syntax	hold-time <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Hold-time value to use to determine whether a neighbor APS router is operational.
Options	<p><i>milliseconds</i>—Hold-time value.</p> <p>Range: 1 through 65,534 milliseconds</p> <p>Default: 3000 milliseconds (3 times the advertisement interval)</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• <i>Configuring APS Timers</i>• advertise-interval on page 343

idle-cycle-flag

Syntax	<code>idle-cycle-flag value;</code>
Hierarchy Level	<code>[edit interfaces e1-fpc/pic/port],</code> <code>[edit interfaces t1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name serial-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>idle-cycle-flag</code> statement must be included at the <code>[edit interfaces e1-fpc/pic/port]</code> or <code>[edit interfaces t1-fpc/pic/port]</code> hierarchy level as appropriate.</p> </div>	
Options	<p>value—Value to transmit in the idle cycles:</p> <ul style="list-style-type: none"> flags—Transmit the value 0x7E. ones—Transmit the value 0xFF (all ones). <p>Default: <code>Flags</code></p>
Required Privilege Level	<p><code>interface</code>—To view this statement in the configuration.</p> <p><code>interface-control</code>—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> <i>Configuring the E1 Idle Cycle Flag</i> <i>Configuring the E3 Idle Cycle Flag</i> <i>Configuring the T1 Idle Cycle Flag</i> <i>Configuring the T3 Idle Cycle Flag</i>

interface-type (Interfaces)

Syntax	<code>interface-type (bc coc1 ct1 ct3 dc ds so t1 t3);</code>
Hierarchy Level	[edit interfaces <i>interface-range</i> name no-partition], [edit interfaces <i>interface-range</i> name partition <i>partition-number</i>], [edit interfaces <i>interface-range</i> name partition <i>partition-number</i> oc-slice <i>oc-slice-range</i>], [edit interfaces <i>interface-range</i> name partition <i>partition-number</i> timeslot <i>timeslot-range</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For IQ and IQE interfaces only, configure the sublevel interface type.
Options	<p>bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>] 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.</p> <p>coc1—Channelized OC1 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc12-fpc/pic/port] hierarchy level.</p> <p>ct1—Channelized T1 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type ct3-fpc/pic/port<:channel>] hierarchy level.</p> <p>ct3—Channelized T3 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc1-fpc/pic/port:channel no-partition] hierarchy level.</p> <p>dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>] hierarchy level to create a (D) channel dc-pim/0/port to control the B-channels.</p> <p>ds—DS0 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type (ce1-fpc/pic/port ct1-fpc/pic/port<:channel>)] hierarchy level.</p> <p>so—SONET/SDH interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc12-fpc/pic/port] hierarchy level.</p> <p>t1—T1 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port)] hierarchy level.</p> <p>t3—T3 interface type. You can specify this interface type at the [edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port:channel no-partition)] hierarchy level.</p>

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview on page 27 • Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129 • Configuring Channelized T3 IQ Interfaces on page 209

invert-data

Syntax	invert-data;
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> e3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.



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

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E1 Data Inversion • Configuring E3 Data Inversion • Configuring T1 Data Inversion

lockout

Syntax	lockout;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a lockout of protection, forcing the use of the working circuit and locking out the protect circuit regardless of anything else.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Switching Between the Working and Protect Circuits</i>

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax	<code>loopback (local payload remote);</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces t1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name dsl-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name shdsl-options],</code> <code>[edit interfaces interface-name sonet-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure a loopback connection. To turn off the loopback capability, remove the loopback statement from the configuration.



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the `[edit interfaces t1-fpc/pic/port]` hierarchy level.



NOTE: When configuring CE1 or CT1 interfaces on the 16-port Channelized E1/T1 MIC (MIC-3D-16CHE1-T1-CE), you must include the **loopback** statement at the `[edit interfaces ce1-fpc/pic/port]` hierarchy level, or `[edit interfaces ct1-fpc/pic/port]`

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

Options **local**—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.

payload—For channelized T3, T1, and NxDSO IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDSO IQ interfaces do not support remote loopback.

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

Related Documentation

- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Configuring E1 Loopback Capability*
- *Configuring E3 Loopback Capability*
- *Configuring SONET/SDH Loopback Capability to Identify a Problem as Internal or External*
- *Configuring SHDSL Operating Mode on an ATM Physical Interface*
- *Configuring T1 Loopback Capability*
- *Configuring T3 Loopback Capability*
- [feac-loop-respond on page 365](#)

mtu

Syntax	<code>mtu bytes;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit interfaces <i>interface-range name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit local-switching interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols l2vpn interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols vpls],</p> <p>[edit protocols l2circuit local-switching interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i>],</p> <p>[edit protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols l2vpn interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols vpls]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for Layer 2 VPNs and VPLS introduced in Junos OS Release 10.4.</p> <p>Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.</p> <p>Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.</p> <p>Support at the [set interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>ccc</i>] hierarchy level introduced in Junos OS Release 12.3R3 for MX Series routers.</p>
Description	<p>Specify the maximum transmission unit (MTU) size for the media or protocol. The default MTU size depends on the device type. Changing the media MTU or protocol MTU causes an interface to be deleted and added again.</p> <p>To route jumbo data packets on an integrated routing and bridging (IRB) interface or routed VLAN interface (RVI) on EX Series switches, you must configure the jumbo MTU size on the member physical interfaces of the VLAN that you have associated with the IRB interface or RVI, as well as on the IRB interface or RVI itself (the interface named <i>irb</i> or <i>vlan</i>, respectively).</p>



CAUTION: For EX Series switches, setting or deleting the jumbo MTU size on an IRB interface or RVI while the switch is transmitting packets might cause packets to be dropped.



NOTE:

The MTU for an IRB interface is calculated by removing the Ethernet header overhead [6(DMAC)+6(SMAC)+2(EtherType)]. Because, the MTU is the lower value of the MTU configured on the IRB interface and the MTU configured on the IRB's associated bridge domain IFDs or IFLs, the IRB MTU is calculated as follows:

- In case of Layer 2 IFL configured with the `flexible-vlan-tagging` statement, the IRB MTU is calculated by including 8 bytes overhead (SVLAN+CVLAN).
 - In case of Layer 2 IFL configured with the `vlan-tagging` statement, the IRB MTU is calculated by including a single VLAN 4 bytes overhead.
-



NOTE:

- If a packet whose size is larger than the configured MTU size is received on the receiving interface, the packet is eventually dropped. The value considered for MRU (maximum receive unit) size is also the same as the MTU size configured on that interface.
- Not all devices allow you to set an MTU value, and some devices have restrictions on the range of allowable MTU values. You cannot configure an MTU for management Ethernet interfaces (fxp0, em0, or me0) or for loopback, multilink, and multicast tunnel devices.
- On ACX Series routers, you can configure the protocol MTU by including the `mtu` statement at the [edit interfaces *interface-name* unit *logical-unit-number* family inet] or [edit interfaces *interface-name* unit *logical-unit-number* family inet6] hierarchy level.
 - If you configure the protocol MTU at any of these hierarchy levels, the configured value is applied to all families that are configured on the logical interface.
 - If you are configuring the protocol MTU for both inet and inet6 families on the same logical interface, you must configure the same value for both the families. It is not recommended to configure different MTU size values for inet and inet6 families that are configured on the same logical interface.
- Starting in Release 14.2, MTU for IRB interfaces, is calculated by removing the Ethernet header overhead (6(DMAC)+6(SMAC)+2(EtherType)), and the MTU is a minimum of the two values:
 - Configured MTU
 - Associated bridge domain's physical or logical interface MTU
 - For Layer 2 logical interfaces configured with flexible-vlan-tagging, IRB MTU is calculated by including 8 bytes overhead (SVLAN+CVLAN).
 - For Layer 2 logical interfaces configured with vlan-tagging, IRB MTU is calculated by including single VLAN 4 bytes overhead.



NOTE: Changing the Layer 2 logical interface option from vlan-tagging to flexible-vlan-tagging or vice versa adjusts the logical interface MTU by 4 bytes with the existing MTU size. As a result, the Layer 2 logical interface is deleted and re-added, and the IRB MTU is re-computed appropriately.

For more information about configuring MTU for specific interfaces and router or switch combinations, see *Configuring the Media MTU*.

Options *bytes*—MTU size.

Range: 256 through 9192 bytes, 256 through 9216 (EX Series switch interfaces), 256 through 9500 bytes (Junos OS 12.1X48R2 for PTX Series routers)

Default: 1500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS), 1514 bytes (EX Series switch interfaces)

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

Release History Table

Release	Description
14.2	Starting in Release 14.2, MTU for IRB interfaces, is calculated by removing the Ethernet header overhead (6(DMAC)+6(SMAC)+2(EtherType)),

Related Documentation

- *Configuring the Media MTU*
- *Configuring the MTU for Layer 2 Interfaces*
- *Setting the Protocol MTU*

neighbor (Automatic Protection Switching for SONET/SDH)

Syntax *neighbor address;*

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

Release Information Statement introduced before Junos OS Release 7.4.

Description If you are configuring one router to be the working router and a second to be the protect router, configure the address of the remote interface. You configure this on one or both of the interfaces.

The address you specify for the neighbor must never be routed through the interface on which APS is configured, or instability will result. We strongly recommend that you directly connect the working and protect routers and that you configure the interface address of this shared network as the neighbor address.

Options *address*—Neighbor's address.

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

Related Documentation

- *Configuring Basic Automatic Protect Switching*

no-partition

Syntax	no-partition interface-type (e1 (cau4 so) (ct3 t3) so t3);
Hierarchy Level	<pre>[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]</pre>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.</p> <p>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.</p> <p>For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.</p> <p>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.</p> <p>For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.</p>
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	<p>The option used must correspond to the physical interface type:</p> <p>e1—E1 interface type.</p> <p>coc12 so—Channelized OC12 interface type, in SONET mode.</p> <p>cau4—Channelized AU-4 interface type.</p> <p>cstm1—SONET/SDH STM1 interface type, in SDH mode.</p> <p>ct3—Channelized T3 interface type.</p> <p>t3—T3 interface type.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview on page 27 • Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129 • Configuring an OC12/STM4 Interface on page 134

- [Configuring Channelized STM1 IQ and IQE Interfaces on page 193](#)
- [Configuring T3 IQ Interfaces on page 209](#)
- [partition on page 382](#)
- *no-partition*

no-termination-request

Syntax	no-termination-request;
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options], [edit interfaces lsq- <i>fpc/pic/port</i> lsq-failure-options]
Release Information	Statement introduced in Junos OS Release 7.4. Support at the [edit interfaces <i>interface-name</i> 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	<ul style="list-style-type: none">• Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces on page 128• Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 159• Configuring Link PIC Failover on Channelized STM1 Interfaces on page 198• <i>Junos OS Services Interfaces Library for Routing Devices</i>

oc-slice

Syntax	<code>oc-slice <i>oc-slice-range</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> partition <i>partition-number</i>]
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	<p>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.</p> <p>Range: For OC3 interfaces, 1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129

paired-group

Syntax	<code>paired-group <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure load sharing between two working protect circuit pairs.
Options	group-name —Circuit's group name, as configured with the protect-circuit or working-circuit statement.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring APS Load Sharing • working-circuit on page 400

partition

Syntax	<code>partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type <i>type</i> timeslots <i>time-slot-range</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	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	<p><i>partition-number</i>—Sublevel interface partition index.</p> <p>Range:</p> <ul style="list-style-type: none">• 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 NxDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces.• 0 through 31 (with 0 reserved for framing) for NxDS0 interfaces on channelized E1 IQ interfaces. <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Channelized E1 IQ and IQE Interfaces Overview on page 27• Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129• Configuring Channelized T3 IQ Interfaces on page 209• no-partition on page 379

protect-circuit

Syntax	<code>protect-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the protect router in an APS circuit pair. When the working interface fails, APS brings up the protection circuit and the traffic is moved to the protection circuit.
Options	<i>group-name</i> —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring Basic Automatic Protect Switching</i> • working-circuit on page 400

request

Syntax	<code>request (protect working);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform a manual switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch.
Options	<p>protect—Request that the circuit become the protect circuit.</p> <p>working—Request that the circuit become the working circuit.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring Switching Between the Working and Protect Circuits</i> • force on page 366

revert-time (Interfaces)

Syntax	<code>revert-time <i>seconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure APS revertive mode.
Default	APS operates in nonrevertive mode.
Options	<i>seconds</i> —Amount of time to wait after the working circuit has again become functional before making the working circuit active again. Range: 1 through 65,535 seconds Default: None (APS operates in nonrevertive mode)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Revertive Mode</i>

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	<ul style="list-style-type: none">• <i>Configuring SONET/SDH Parameters on ATM Interfaces</i>• Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 129• Channelized STM1 Interfaces Overview on page 183• <i>SONET/SDH Interfaces Overview</i>• <i>no-concatenate</i>

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>	
Options	filler —Wait two idle cycles between the start and end flags. shared —Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring E1 Start and End Flags</i> • <i>Configuring the E3 Start and End Flags</i> • <i>Configuring T1 Start and End Flags</i> • <i>Configuring T3 Start and End Flags</i>

switching-mode

Syntax	switching-mode (bidirectional unidirectional);
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For unchannelized OC3, OC12, and OC48 SONET/SDH interfaces on T Series routers only, configure the interface to interoperate with SONET/SDH line-terminating equipment (LTE) that is provisioned for unidirectional linear APS in 1+1 architecture.
Default	If the switching-mode statement is not configured, the mode is bidirectional, and the interface does not interoperate with a unidirectional SONET/SDH LTE.
Options	bidirectional —Support bidirectional mode only. unidirectional —Interoperate with a SONET/SDH LTE provisioned for unidirectional mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Switching Mode</i>

t1-options

Syntax	<pre> t1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; buildout <i>value</i>; 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 <i>time-slot-range</i>; } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	<p>Configure T1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>T1 Interfaces Overview</i>

t3-options

Syntax t3-options {
 atm-encapsulation (direct | plcp);
 bert-algorithm *algorithm*;
 bert-error-rate *rate*;
 bert-period *seconds*;
 (cbit-parity | no-cbit-parity);
 compatibility-mode (digital-link | kentrox | larscom) <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);
 start-end-flag *value*;
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The **long-buildout** statement is not supported for DS3 channels on a channelized OC12 interface.

On T3 interfaces, the default encapsulation is PPP.



For ATM1 interfaces, you can configure a subset of E3 options statements.

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 • *T3 Interfaces Overview*

timeslots

Syntax	<code>timeslots <i>time-slot-range</i>;</code>
Hierarchy Level	<code>[edit interfaces e1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i>],</code> <code>[edit interfaces <i>interface-name</i> t1-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E1 and T1 interfaces, allocate the specific time slots by number.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>timeslots</code> statement must be included at the <code>[edit interfaces e1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces t1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> </div>	
Options	<p><i>time-slot-range</i>—Actual time slot numbers allocated:</p> <p>Range: Ranges vary by interface type and configuration option as follows:</p> <ul style="list-style-type: none"> • 1 through 24 for T1 interfaces (0 is reserved) • 1 through 31 for 4-port E1 PICs (0 is reserved) • 1 through 31 for NxDS0 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-<i>options</i> 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 NxDS0)
<div>  <p>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.</p> </div>	
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Fractional E1 IQ and IQE Interfaces on page 31 • Configuring Fractional T1 IQ and IQE Interfaces on page 209

- *Configuring Fractional E1 Time Slots*
- *Configuring Fractional T1 Time Slots*
- [Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 114](#)

unit

```

Syntax  unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    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 {
            maximum-contexts number <force>;
            f-max-period number;
            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;
dlsi 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;
family family-name {
    ... the family subhierarchy appears after the main [edit interfaces interface-name unit
        logical-unit-number] hierarchy ...
}
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 {
    up-count cells;
    down-count cells;
}
oam-period (disable | seconds);

```

```

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 {
    mru size;
    mtu (size | use-lower-layer);
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    ipcp-suggest-dns-option;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-restart-timer milliseconds;
    pap {
        access-profile name;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
pppoe-underlying-options {
    access-concentrator name;
    direct-connect;
    dynamic-profile profile-name;
    max-sessions number;
}
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;
targeted-distribution;
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-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            (input | output | input output);
        }
    }
}
access-concentrator name;
address address {
    ... the address subhierarchy appears after the main [edit interfaces interface-name unit
    logical-unit-number family family-name] hierarchy ...
}
bundle interface-name;
core-facing;
demux-destination {
    destination-prefix;
}
demux-source {
    source-prefix;
}
direct-connect;
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];
}
interface-mode (access | trunk);
ipsec-sa sa-name;

```



```

keep-address-and-control;
mac-validate (loose | strict);
max-sessions number;
mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
protocols [inet iso mpls];
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 {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
(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;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address {
        dlci dlci-identifier;
        epd-threshold cells <plp1 cells>;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
    }
}

```

```


oam-period (disable | seconds);
shaping {
    (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
    sustained rate);
    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;
    track {
        interface interface-name {
            bandwidth-threshold bits-per-second priority-cost number;
        }
        priority-hold-time seconds;
        route ip-address/prefix-length routing-instance instance-name priority-cost cost;
    }
    virtual-address [addresses];
    virtual-link-local-address ipv6-address;
    vrrp-inherit-from {
        active-interface interface-name;
        active-group group-number;
    }
}
}
}
}

```

Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>], [edit interfaces interface-set <i>interface-set-name</i> interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.
Options	<p><i>logical-unit-number</i>—Number of the logical unit.</p> <p>Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces. 0 through 16,385 for all other static interface types.</p> <p>The remaining statements are explained separately.</p>

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring Logical Interface Properties</i> • <i>Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers</i> • <i>Junos OS Services Interfaces Library for Routing Devices</i>

vtmapping

Syntax	vtmapping (itu-t klm);
Hierarchy Level	[edit chassis fpc <i>number</i> pic <i>number</i>], [edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For the Channelized STM1 IQ PIC or Channelized STM1 PIC, configure virtual tributary mapping.</p> <p>For the Channelized STM1 PIC, you configure virtual tributary mapping at the [edit chassis fpc <i>number</i> pic <i>number</i>] hierarchy level.</p>
<div>  <p>NOTE: The vtmapping statement is not supported for cau4 interfaces on the Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP (H).</p> </div>	
Options	<p>itu-t—International Telephony Union standard.</p> <p>klm—KLM standard.</p> <p>Default: klm</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 183 • <i>Configuring the Junos OS to Support Channelized STM1 Interface Virtual Tributary Mapping</i>

working-circuit

Syntax	<code>working-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the working router in an APS circuit pair.
Options	<i>group-name</i> —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Basic Automatic Protect Switching</i>• protect-circuit on page 383

line-encoding


Syntax	<code>line-encoding (ami b8zs);</code>
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Set the line encoding format on the T1 interface.



NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the line-encoding statement must be included at the [edit interfaces *ct1-fpc/pic/port*] hierarchy level.

Default	The default line encoding is B8ZS.
Options	<i>ami</i> —Use Alternate Mark Inversion (AMI) line encoding. <i>b8zs</i> —Use bipolar with 8-zeros substitution (B8ZS) line encoding.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring T1 Line Encoding</i>

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1-fpc/pic/port], [edit interfaces t1-fpc/pic/port], [edit interfaces interface-name ds0-options], [edit interfaces interface-name e1-options], [edit interfaces interface-name e3-options], [edit interfaces interface-name t1-options], [edit interfaces interface-name t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-fpc/pic/port] or [edit interfaces t1-fpc/pic/port] hierarchy level as appropriate.</p> </div>	
Options	filler—Wait two idle cycles between the start and end flags. shared—Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring E1 Start and End Flags</i> • <i>Configuring the E3 Start and End Flags</i> • <i>Configuring T1 Start and End Flags</i> • <i>Configuring T3 Start and End Flags</i>


ds0-options

Syntax	<pre>ds0-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; byte-encoding (nx56 nx64); fcs (16 32); idle-cycle-flag (flags ones); invert-data; loopback <i>payload</i>; start-end-flag (filler shared); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure DS0-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Channelized DS3-to-DS0 Interfaces on page 213

long-buildout

Syntax	(long-buildout no-long-buildout);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure the T3 line buildout. A T3 interface has two settings for the T3 line buildout: a short setting, which is less than 255 feet (68 meters), and a long setting, which is greater than 255 feet and shorter than 450 feet (137 meters).</p> <p>This statement applies to copper-cable-based T3 interfaces only. You cannot configure a line buildout for a DS3 channel on a channelized OC12 interface, which runs over fiber-optic cable.</p>
Default	A T3 interface uses the short line buildout setting (no-long-buildout) for wires shorter than 255 feet (68 meters).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring the T3 Line Buildout</i>

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
<div> NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</div>	
Options	filler —Wait two idle cycles between the start and end flags. shared —Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring E1 Start and End Flags</i>• <i>Configuring the E3 Start and End Flags</i>• <i>Configuring T1 Start and End Flags</i>• <i>Configuring T3 Start and End Flags</i>

CHAPTER 16

Operational Commands

- show class-of-service interface
- show class-of-service forwarding-table
- show interfaces (Channelized DS3-to-DS0)
- show interfaces (Channelized DS3-to-DS1)
- show interfaces (Channelized E1 IQ)
- show interfaces (Channelized E1)
- show interfaces (Channelized OC12 IQ and IQE)
- show interfaces (Channelized OC12)
- show interfaces (Channelized OC3 IQ and IQE)
- show interfaces (Channelized STM1 IQ)
- show interfaces (Channelized STM1)
- show interfaces (Channelized T1 IQ)
- show interfaces (Channelized T3 IQ)
- show interfaces (Channelized E1)
- show interfaces (Channelized E1 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized E1)
- show interfaces (Channelized E1 IQ)
- show interfaces (Channelized T1 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized OC12)
- show interfaces (Channelized OC12 IQ and IQE)
- show interfaces (Channelized OC3 IQ and IQE)
- show interfaces (Aggregated SONET/SDH)
- show interfaces (Channelized DS3-to-DS0)
- show interfaces (Channelized DS3-to-DS1)
- show interfaces (Channelized E1 IQ)
- show interfaces (Channelized E1)

- `show interfaces` (Channelized OC12 IQ and IQE)
- `show interfaces` (Channelized OC12)
- `show interfaces` (Channelized OC3 IQ and IQE)
- `show interfaces` (Channelized OC48 IQ and IQE)
- `show interfaces` (Channelized STM1 IQ)
- `show interfaces` (Channelized STM1)
- `show interfaces` (Channelized T1 IQ)
- `show interfaces` (Channelized T3 IQ)
- `show interfaces` (SONET/SDH)
- `show interfaces` (T1, E1, or DS)
- `show interfaces` (T3 or E3)
- `show interfaces` (Channelized STM1)
- `show interfaces` (Channelized T1 IQ)
- `show interfaces` (T1, E1, or DS)
- `show interfaces` (Channelized DS3-to-DS0)
- `show interfaces` (Channelized DS3-to-DS1)
- `show interfaces` (Channelized T3 IQ)
- `show interfaces` (T1, E1, or DS)
- `show interfaces` (Channelized T1 IQ)
- `show interfaces` (T3 or E3)
- `show interfaces controller` (Channelized E1 IQ)
- `show interfaces controller` (Channelized OC12 IQ and IQE)
- `show interfaces controller` (Channelized OC3 IQ and IQE)
- `show interfaces controller` (Channelized STM1 IQ)
- `show interfaces controller` (Channelized T1 IQ)
- `show interfaces controller` (Channelized T3 IQ)

show class-of-service interface

Syntax `show class-of-service interface`
`<comprehensive | detail> <interface-name>`

Release Information Command introduced before Junos OS Release 7.4.
 Command introduced in Junos OS Release 9.0 for EX Series switches.
 Forwarding class map information added in Junos OS Release 9.4.
 Command introduced in Junos OS Release 11.1 for the QFX Series.
 Command introduced in Junos OS Release 12.1 for the PTX Series Packet Transport Routers.
 Command introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.
 Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
 Options **detail** and **comprehensive** introduced in Junos OS Release 11.4.
 Command introduced in Junos OS Release 15.1R3 on MX Series routers for enhanced subscriber management.

Description Display the logical and physical interface associations for the classifier, rewrite rules, and scheduler map objects.



NOTE: On routing platforms with dual Routing Engines, running this command on the backup Routing Engine, with or without any of the available options, is not supported and produces the following error message:

error: the class-of-service subsystem is not running

Options **none**—Display CoS associations for all physical and logical interfaces.

comprehensive—(M Series, MX Series, and T Series routers) (Optional) Display comprehensive quality-of-service (QoS) information about all physical and logical interfaces.

detail—(M Series, MX Series, and T Series routers) (Optional) Display QoS and CoS information based on the interface.

If the **interface** *interface-name* is a physical interface, the output includes:

- Brief QoS information about the physical interface
- Brief QoS information about the logical interface
- CoS information about the physical interface
- Brief information about filters or policers of the logical interface
- Brief CoS information about the logical interface

If the **interface** *interface-name* is a logical interface, the output includes:

- Brief QoS information about the logical interface

- Information about filters or policers for the logical interface
- CoS information about the logical interface

interface-name—(Optional) Display class-of-service (CoS) associations for the specified interface.

none—Display CoS associations for all physical and logical interfaces.

Required Privilege Level

view

Related Documentation

- *Verifying and Managing Junos OS Enhanced Subscriber Management*

List of Sample Output

[show class-of-service interface \(Physical\) on page 419](#)
[show class-of-service interface \(Logical\) on page 420](#)
[show class-of-service interface \(Gigabit Ethernet\) on page 420](#)
[show class-of-service interface \(ANCP\) on page 420](#)
[show class-of-service interface \(PPPoE Interface\) on page 420](#)
[show class-of-service interface \(DHCP Interface\) on page 420](#)
[show class-of-service interface \(T4000 Routers with Type 5 FPCs\) on page 421](#)
[show class-of-service interface detail on page 421](#)
[show class-of-service interface comprehensive on page 422](#)
[show class-of-service interface \(ACX Series Routers\) on page 433](#)
[show class-of-service interface \(PPPoE Subscriber Interface for Enhanced Subscriber Management\) on page 435](#)

Output Fields

[Table 40 on page 408](#) describes the output fields for the **show class-of-service interface** command. Output fields are listed in the approximate order in which they appear.

Table 40: show class-of-service interface Output Fields

Field Name	Field Description
Physical interface	Name of a physical interface.
Index	Index of this interface or the internal index of this object. (Enhanced subscriber management for MX Series routers) Index values for dynamic CoS traffic control profiles and dynamic scheduler maps are larger for enhanced subscriber management than they are for legacy subscriber management.
Dedicated Queues	Status of dedicated queues configured on an interface. Supported only on Trio MPC/MIC interfaces on MX Series routers. (Enhanced subscriber management for MX-Series routers) This field is not displayed for enhanced subscriber management.
Maximum usable queues	Number of queues you can configure on the interface.
Maximum usable queues	Maximum number of queues you can use.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Total non-default queues created	Number of queues created in addition to the default queues. Supported only on Trio MPC/MIC interfaces on MX Series routers. (Enhanced subscriber management for MX Series routers) This field is not displayed for enhanced subscriber management.
Rewrite Input IEEE Code-point	(QFX3500 switches only) IEEE 802.1p code point (priority) rewrite value. Incoming traffic from the Fibre Channel (FC) SAN is classified into the forwarding class specified in the native FC interface (NP_Port) fixed classifier and uses the priority specified as the IEEE 802.1p rewrite value.
Shaping rate	Maximum transmission rate on the physical interface. You can configure the shaping rate on the physical interface, or on the logical interface, but not on both. Therefore, the Shaping rate field is displayed for either the physical interface or the logical interface.
Scheduler map	Name of the output scheduler map associated with this interface. (Enhanced subscriber management for MX Series routers) The name of the dynamic scheduler map object is associated with a generated UID (for example, SMAP-1_UID1002) instead of with a subscriber interface.
Scheduler map forwarding class sets	(QFX Series only) Name of the output fabric scheduler map associated with a QFabric system Interconnect device interface.
Input shaping rate	For Gigabit Ethernet IQ2 PICs, maximum transmission rate on the input interface.
Input scheduler map	For Gigabit Ethernet IQ2 PICs, name of the input scheduler map associated with this interface.
Chassis scheduler map	Name of the scheduler map associated with the packet forwarding component queues.
Rewrite	Name and type of the rewrite rules associated with this interface.
Traffic-control-profile	Name of the associated traffic control profile. (Enhanced subscriber management for MX Series routers) The name of the dynamic traffic control profile object is associated with a generated UID (for example, TC_PROF_100_199_SERIES_UID1006) instead of with a subscriber interface.
Classifier	Name and type of classifiers associated with this interface.
Forwarding-class-map	Name of the forwarding map associated with this interface.
Congestion-notification	(QFX Series and EX4600 switches only) Congestion notification state, enabled or disabled .
Logical interface	Name of a logical interface.
Object	Category of an object: Classifier , Fragmentation-map (for LSQ interfaces only), Scheduler-map , Rewrite , Translation Table (for IQE PICs only), or traffic-class-map (for T4000 routers with Type 5 FPCs).
Name	Name of an object.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Type	Type of an object: dscp , dscp-ipv6 , exp , ieee-802.1 , ip , inet-precedence , or ieee-802.1ad (for traffic class map on T4000 routers with Type 5 FPCs)..
Link-level type	Encapsulation on the physical interface.
MTU	MTU size on the physical interface.
Speed	Speed at which the interface is running.
Loopback	Whether loopback is enabled and the type of loopback.
Source filtering	Whether source filtering is enabled or disabled.
Flow control	Whether flow control is enabled or disabled.
Auto-negotiation	(Gigabit Ethernet interfaces) Whether autonegotiation is enabled or disabled.
Remote-fault	(Gigabit Ethernet interfaces) Remote fault status. <ul style="list-style-type: none"> • Online—Autonegotiation is manually configured as online. • Offline—Autonegotiation is manually configured as offline.
Device flags	The Device flags field provides information about the physical device and displays one or more of the following values: <ul style="list-style-type: none"> • Down—Device has been administratively disabled. • Hear-Own-Xmit—Device receives its own transmissions. • Link-Layer-Down—The link-layer protocol has failed to connect with the remote endpoint. • Loopback—Device is in physical loopback. • Loop-Detected—The link layer has received frames that it sent, thereby detecting a physical loopback. • No-Carrier—On media that support carrier recognition, no carrier is currently detected. • No-Multicast—Device does not support multicast traffic. • Present—Device is physically present and recognized. • Promiscuous—Device is in promiscuous mode and recognizes frames addressed to all physical addresses on the media. • Quench—Transmission on the device is quenched because the output buffer is overflowing. • Recv-All-Multicasts—Device is in multicast promiscuous mode and therefore provides no multicast filtering. • Running—Device is active and enabled.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Interface flags	<p>The Interface flags field provides information about the physical interface and displays one or more of the following values:</p> <ul style="list-style-type: none"> • Admin-Test—Interface is in test mode and some sanity checking, such as loop detection, is disabled. • Disabled—Interface is administratively disabled. • Down—A hardware failure has occurred. • Hardware-Down—Interface is nonfunctional or incorrectly connected. • Link-Layer-Down—Interface keepalives have indicated that the link is incomplete. • No-Multicast—Interface does not support multicast traffic. • No-receive No-transmit—Passive monitor mode is configured on the interface. • Point-To-Point—Interface is point-to-point. • Pop all MPLS labels from packets of depth—MPLS labels are removed as packets arrive on an interface that has the pop-all-labels statement configured. The depth value can be one of the following: <ul style="list-style-type: none"> • 1—Takes effect for incoming packets with one label only. • 2—Takes effect for incoming packets with two labels only. • [1 2]—Takes effect for incoming packets with either one or two labels. • Promiscuous—Interface is in promiscuous mode and recognizes frames addressed to all physical addresses. • Recv-All-Multicasts—Interface is in multicast promiscuous mode and provides no multicast filtering. • SNMP-Traps—SNMP trap notifications are enabled. • Up—Interface is enabled and operational.
Flags	<p>The Logical interface flags field provides information about the logical interface and displays one or more of the following values:</p> <ul style="list-style-type: none"> • ACFC Encapsulation—Address control field Compression (ACFC) encapsulation is enabled (negotiated successfully with a peer). • Device-down—Device has been administratively disabled. • Disabled—Interface is administratively disabled. • Down—A hardware failure has occurred. • Clear-DF-Bit—GRE tunnel or IPsec tunnel is configured to clear the Don't Fragment (DF) bit. • Hardware-Down—Interface protocol initialization failed to complete successfully. • PFC—Protocol field compression is enabled for the PPP session. • Point-To-Point—Interface is point-to-point. • SNMP-Traps—SNMP trap notifications are enabled. • Up—Interface is enabled and operational.
Encapsulation	Encapsulation on the logical interface.
Admin	Administrative state of the interface (Up or Down).
Link	Status of physical link (Up or Down).
Proto	Protocol configured on the interface.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Input Filter	Names of any firewall filters to be evaluated when packets are received on the interface, including any filters attached through activation of dynamic service.
Output Filter	Names of any firewall filters to be evaluated when packets are transmitted on the interface, including any filters attached through activation of dynamic service.
Link flags	Provides information about the physical link and displays one or more of the following values: <ul style="list-style-type: none"> • ACFC—Address control field compression is configured. The Point-to-Point Protocol (PPP) session negotiates the ACFC option. • Give-Up—Link protocol does not continue connection attempts after repeated failures. • Loose-LCP—PPP does not use the Link Control Protocol (LCP) to indicate whether the link protocol is operational. • Loose-LMI—Frame Relay does not use the Local Management Interface (LMI) to indicate whether the link protocol is operational. • Loose-NCP—PPP does not use the Network Control Protocol (NCP) to indicate whether the device is operational. • Keepalives—Link protocol keepalives are enabled. • No-Keepalives—Link protocol keepalives are disabled. • PFC—Protocol field compression is configured. The PPP session negotiates the PFC option.
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.
CoS queues	Number of CoS queues configured.
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .
Statistics last cleared	Number and rate of bytes and packets received and transmitted on the physical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface.
IPv6 transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Input errors	<p>Input errors on the interface. The labels are explained in the following list:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops resulting from the traffic load exceeding the interface transmit or receive leaky bucket configuration. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. Layer 3 incomplete errors can be ignored by configuring the ignore-l3-incompletes statement. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • HS link FIFO overflows—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces.
Output errors	<p>Output errors on the interface. The labels are explained in the following list:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. <p>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the Drops field does not always use the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p> <ul style="list-style-type: none"> • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • HS link FIFO underflows—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • MTU errors—Number of packets whose size exceeds the MTU of the interface.
Egress queues	Total number of egress Maximum usable queues on the specified interface.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. <p>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the Dropped packets field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>
SONET alarms SONET defects	<p>(SONET) SONET media-specific alarms and defects that prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SONET PHY, SONET section, SONET line, and SONET path.</p>
SONET PHY	<p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. A state other than OK indicates a problem. <p>The SONET PHY field has the following subfields:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal
SONET section	<p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. A state other than OK indicates a problem. <p>The SONET section field has the following subfields:</p> <ul style="list-style-type: none"> • BIP-BI—Bit interleaved parity for SONET section overhead • SEF—Severely errored framing • LOS—Loss of signal • LOF—Loss of frame • ES-S—Errored seconds (section) • SES-S—Severely errored seconds (section) • SEFS-S—Severely errored framing seconds (section)

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
SONET line	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. A state other than OK indicates a problem. <p>The SONET line field has the following subfields:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-L—Remote error indication (near-end line) • RDI-L—Remote defect indication (near-end line) • AIS-L—Alarm indication signal (near-end line) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • ES-L—Errored seconds (near-end line) • SES-L—Severely errored seconds (near-end line) • UAS-L—Unavailable seconds (near-end line) • ES-LFE—Errored seconds (far-end line) • SES-LFE—Severely errored seconds (far-end line) • UAS-LFE—Unavailable seconds (far-end line)
SONET path	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. A state other than OK indicates a problem. <p>The SONET path field has the following subfields:</p> <ul style="list-style-type: none"> • BIP-B3—Bit interleaved parity for SONET section overhead • REI-P—Remote error indication • LOP-P—Loss of pointer (path) • AIS-P—Path alarm indication signal • RDI-P—Path remote defect indication • UNEQ-P—Path unequipped • PLM-P—Path payload (signal) label mismatch • ES-P—Errored seconds (near-end STS path) • SES-P—Severely errored seconds (near-end STS path) • UAS-P—Unavailable seconds (near-end STS path) • ES-PFE—Errored seconds (far-end STS path) • SES-PFE—Severely errored seconds (far-end STS path) • UAS-PFE—Unavailable seconds (far-end STS path)

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Received SONET overhead	<p>Values of the received and transmitted SONET overhead:</p> <ul style="list-style-type: none"> C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. F1—Section user channel byte. This byte is set aside for the purposes of users. K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. J0—Section trace. This byte is defined for STS-1 number 1 of an STS-N signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. S1—Synchronization status. The S1 byte is located in the first STS-1 number of an STS-N signal. Z3 and Z4—Allocated for future use.
Transmitted SONET overhead	
Received path trace	<p>SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.</p>
Transmitted path trace	
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> Policing bucket—Configured state of the receiving policer. Shaping bucket—Configured state of the transmitting shaper. Giant threshold—Giant threshold programmed into the hardware. Runt threshold—Runt threshold programmed into the hardware.
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> Destination slot—FPC slot number. PLP byte—Packet Level Protocol byte.
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> CoS transmit queue—Queue number and its associated user-configured forwarding class name. Bandwidth %—Percentage of bandwidth allocated to the queue. Bandwidth bps—Bandwidth allocated to the queue (in bps). Buffer %—Percentage of buffer space allocated to the queue. Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. Priority—Queue priority: low or high. Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.
Forwarding classes	Total number of forwarding classes supported on the specified interface.
Egress queues	Total number of egress Maximum usable queues on the specified interface.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Queue	Queue number.
Forwarding classes	Forwarding class name.
Queued Packets	Number of packets queued to this queue.
Queued Bytes	Number of bytes queued to this queue. The byte counts vary by PIC type.
Transmitted Packets	Number of packets transmitted by this queue. When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (displayed under the Packet Forwarding Engine Chassis Queues field) shows the prefragmentation values.
Transmitted Bytes	Number of bytes transmitted by this queue. The byte counts vary by PIC type.
Tail-dropped packets	Number of packets dropped because of tail drop.
RED-dropped packets	<p>Number of packets dropped because of random early detection (RED).</p> <ul style="list-style-type: none"> • (M Series and T Series routers only) On M320 and M120 routers and the T Series routers, the total number of dropped packets is displayed. On all other M Series routers, the output classifies dropped packets into the following categories: <ul style="list-style-type: none"> • Low, non-TCP—Number of low-loss priority non-TCP packets dropped because of RED. • Low, TCP—Number of low-loss priority TCP packets dropped because of RED. • High, non-TCP—Number of high-loss priority non-TCP packets dropped because of RED. • High, TCP—Number of high-loss priority TCP packets dropped because of RED. • (MX Series routers with enhanced DPCs, and T Series routers with enhanced FPCs only) The output classifies dropped packets into the following categories: <ul style="list-style-type: none"> • Low—Number of low-loss priority packets dropped because of RED. • Medium-low—Number of medium-low loss priority packets dropped because of RED. • Medium-high—Number of medium-high loss priority packets dropped because of RED. • High—Number of high-loss priority packets dropped because of RED. <p>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
RED-dropped bytes	<p>Number of bytes dropped because of RED. The byte counts vary by PIC type.</p> <ul style="list-style-type: none"> (M Series and T Series routers only) On M320 and M120 routers and the T Series routers, only the total number of dropped bytes is displayed. On all other M Series routers, the output classifies dropped bytes into the following categories: <ul style="list-style-type: none"> Low, non-TCP—Number of low-loss priority non-TCP bytes dropped because of RED. Low, TCP—Number of low-loss priority TCP bytes dropped because of RED. High, non-TCP—Number of high-loss priority non-TCP bytes dropped because of RED. High, TCP—Number of high-loss priority TCP bytes dropped because of RED. <p>NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>
Transmit rate	Configured transmit rate of the scheduler. The rate is a percentage of the total interface bandwidth.
Rate Limit	<p>Rate limiting configuration of the queue. Possible values are :</p> <ul style="list-style-type: none"> None—No rate limit. exact—Queue transmits at the configured rate.
Buffer size	Delay buffer size in the queue.
Priority	Scheduling priority configured as low or high .
Excess Priority	Priority of the excess bandwidth traffic on a scheduler: low , medium-low , medium-high , high , or none .
Drop profiles	<p>Display the assignment of drop profiles.</p> <ul style="list-style-type: none"> Loss priority—Packet loss priority for drop profile assignment. Protocol—Transport protocol for drop profile assignment. Index—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles. Name—Name of the drop profile. Type—Type of the drop profile: discrete or interpolated. Fill Level—Percentage fullness of a queue. Drop probability—Drop probability at this fill level.
Excess Priority	Priority of the excess bandwidth traffic on a scheduler.

Table 40: show class-of-service interface Output Fields (*continued*)

Field Name	Field Description
Drop profiles	<p>Display the assignment of drop profiles.</p> <ul style="list-style-type: none"> • Loss priority—Packet loss priority for drop profile assignment. • Protocol—Transport protocol for drop profile assignment. • Index—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles. • Name—Name of the drop profile. • Type—Type of the drop profile: discrete or interpolated. • Fill Level—Percentage fullness of a queue. • Drop probability—Drop probability at this fill level.
Adjustment information	<p>Display the assignment of shaping-rate adjustments on a scheduler node or queue.</p> <ul style="list-style-type: none"> • Adjusting application—Application that is performing the shaping-rate adjustment. <ul style="list-style-type: none"> • The adjusting application can appear as ancp LS-0, which is the Junos OS Access Node Control Profile process (ancpd) that performs shaping-rate adjustments on schedule nodes. • The adjusting application can appear as DHCP, which adjusts the shaping-rate and overhead-accounting class-of-service attributes based on DHCP option 82, suboption 9 (Vendor Specific Information). The shaping rate is based on the actual-data-rate-downstream attribute. The overhead accounting value is based on the access-loop-encapsulation attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode). • The adjusting application can also appear as pppoe, which adjusts the shaping-rate and overhead-accounting class-of-service attributes on dynamic subscriber interfaces in a broadband access network based on access line parameters in Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101]. This feature is supported on MPC/MIC interfaces on MX Series routers. The shaping rate is based on the actual-data-rate-downstream attribute. The overhead accounting value is based on the access-loop-encapsulation attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode). • Adjustment type—Type of adjustment: absolute or delta. • Configured shaping rate—Shaping rate configured for the scheduler node or queue. • Adjustment value—Value of adjusted shaping rate. • Adjustment target—Level of shaping-rate adjustment performed: node or queue. • Adjustment overhead-accounting mode—Configured shaping mode: frame or cell. • Adjustment overhead bytes—Number of bytes that the ANCP agent adds to or subtracts from the actual downstream frame overhead before reporting the adjusted values to CoS. • Adjustment target—Level of shaping-rate adjustment performed: node or queue. • Adjustment multicast index—

Sample Output

show class-of-service interface (Physical)

```

user@host> show class-of-service interface so-0/2/3
Physical interface: so-0/2/3, Index: 135
Maximum usable queues: 8, Queues in use: 4
Total non-default queues created: 4
Scheduler map: <default>, Index: 2032638653

Logical interface: fe-0/0/1.0, Index: 68, Dedicated Queues: no
Shaping rate: 32000

```

Object	Name	Type	Index
Scheduler-map	<default>		27
Rewrite	exp-default	exp	21
Classifier	exp-default	exp	5
Classifier	ipprec-compatibility	ip	8
Forwarding-class-map	exp-default	exp	5

show class-of-service interface (Logical)

```

user@host> show class-of-service interface so-0/2/3.0
Logical interface: so-0/2/3.0, Index: 68, Dedicated Queues: no
Shaping rate: 32000
Object      Name      Type      Index
Scheduler-map <default>
Rewrite     exp-default exp        21
Classifier   exp-default exp        5
Classifier   ipprec-compatibility ip        8
Forwarding-class-map exp-default exp        5

```

show class-of-service interface (Gigabit Ethernet)

```

user@host> show class-of-service interface ge-6/2/0
Physical interface: ge-6/2/0, Index: 175
Maximum usable queues: 4, Queues in use: 4
Scheduler map: <default>, Index: 2
Input scheduler map: <default>, Index: 3
Chassis scheduler map: <default-chassis>, Index: 4

```

show class-of-service interface (ANCP)

```

user@host> show class-of-service interface pp0.1073741842
Logical interface: pp0.1073741842, Index: 341
Object      Name      Type      Index
Traffic-control-profile TCP-CVLAN Output    12408
Classifier   dscp-ipv6-compatibility dscp-ipv6 9
Classifier   ipprec-compatibility ip        13

Adjusting application: ancp LS-0
Adjustment type: absolute
Configured shaping rate: 4000000
Adjustment value: 11228000
Adjustment overhead-accounting mode: Frame Mode
Adjustment overhead bytes: 50
Adjustment target: node

```

show class-of-service interface (PPPoE Interface)

```

user@host> show class-of-service interface pp0.1
Logical interface: pp0.1, Index: 85
Object      Name      Type      Index
Traffic-control-profile tcp-pppoe.o.pp0.1 Output    2726446535
Classifier   ipprec-compatibility ip        13

Adjusting application: PPPoE
Adjustment type: absolute
Adjustment value: 5000000
Adjustment overhead-accounting mode: cell
Adjustment target: node

```

show class-of-service interface (DHCP Interface)

```

user@host> show class-of-service interface demux0.1

```



```

Logical interface: pp0.1, Index: 85
  Object      Name      Type      Index
  Traffic-control-profile tcp-dhcp.o.demux0.1  Output    2726446535
  Classifier      ipprec-compatibility ip         13

Adjusting application: DHCP
Adjustment type: absolute
Adjustment value: 5000000
Adjustment overhead-accounting mode: cell
Adjustment target: node

```

show class-of-service interface (T4000 Routers with Type 5 FPCs)

```

user@host> show class-of-service interface xe-4/0/0
Physical interface: xe-4/0/0, Index: 153
  Maximum usable queues: 8, Queues in use: 4
  Shaping rate: 5000000000 bps
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: xe-4/0/0.0, Index: 77
    Object      Name      Type
  Index
    Classifier      ipprec-compatibility ip
    13

```

show class-of-service interface detail

```

user@host> show class-of-service interface ge-0/3/0 detail

Physical interface: ge-0/3/0, Enabled, Physical link is Up
  Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000

Physical interface: ge-0/3/0, Index: 138
  Maximum usable queues: 4, Queues in use: 5
  Shaping rate: 50000 bps
  Scheduler map: interface-scheduler-map, Index: 58414
  Input shaping rate: 10000 bps
  Input scheduler map: scheduler-map, Index: 15103
  Chassis scheduler map: <default-chassis>, Index: 4
  Congestion-notification: Disabled

Logical interface ge-0/3/0.0
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ] Encapsulation: ENET2
  inet
  mpls
Interface      Admin Link Proto Input Filter      Output Filter
ge-0/3/0.0    up    up    inet
              mpls
Interface      Admin Link Proto Input Policer      Output Policer
ge-0/3/0.0    up    up    inet
              mpls

Logical interface: ge-0/3/0.0, Index: 68
  Object      Name      Type      Index
  Rewrite      exp-default exp (mpls-any) 33
  Classifier      exp-default exp         10

```

Classifier	ipprec-compatibility	ip	13
------------	----------------------	----	----

```

Logical interface ge-0/3/0.1
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.2 ] Encapsulation: ENET2
  inet
Interface      Admin Link Proto Input Filter      Output Filter
ge-0/3/0.1     up   up   inet
Interface      Admin Link Proto Input Policer      Output Policer
ge-0/3/0.1     up   up   inet

Logical interface: ge-0/3/0.1, Index: 69
Object          Name                      Type          Index
Classifier       ipprec-compatibility     ip            13

```

show class-of-service interface comprehensive

```

user@host> show class-of-service interface ge-0/3/0 comprehensive
Physical interface: ge-0/3/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 601, Generation: 141
  Link-level type: Ethernet, MTU: 1518, Speed: 1000Mbps, BPDU Error: None,
  MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled, Flow
  control: Enabled,
  Auto-negotiation: Enabled, Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Schedulers     : 256
  Hold-times    : Up 0 ms, Down 0 ms
  Current address: 00:14:f6:f4:b4:5d, Hardware address: 00:14:f6:f4:b4:5d
  Last flapped   : 2010-09-07 06:35:22 PDT (15:14:42 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
IPv6 total statistics:
  Input bytes   : 0
  Output bytes  : 0
  Input packets: 0
  Output packets: 0
Ingress traffic statistics at Packet Forwarding Engine:
  Input bytes   : 0 0 bps
  Input packets: 0 0 pps
  Drop bytes   : 0 0 bps
  Drop packets: 0 0 pps
Label-switched interface (LSI) traffic statistics:
  Input bytes   : 0 0 bps
  Input packets: 0 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
  incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
  Resource errors: 0
Output errors:
  Carrier transitions: 5, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Ingress queues: 4 supported, 5 in use
Queue counters:      Queued packets  Transmitted packets  Dropped packets

0 af3                0                0                0

```

1 af2	0	0	0
2 ef2	0	0	0
3 ef1	0	0	0

Egress queues: 4 supported, 5 in use

Queue counters:	Queued packets	Transmitted packets	Dropped packets
0 af3	0	0	0
1 af2	0	0	0
2 ef2	0	0	0
3 ef1	0	0	0

Active alarms : None
Active defects : None

MAC statistics:

	Receive	Transmit
Total octets	0	0
Total packets	0	0
Unicast packets	0	0
Broadcast packets	0	0
Multicast packets	0	0
CRC/Align errors	0	0
FIFO errors	0	0
MAC control frames	0	0
MAC pause frames	0	0
Oversized frames	0	
Jabber frames	0	
Fragment frames	0	
VLAN tagged frames	0	
Code violations	0	

Filter statistics:

Input packet count	0	
Input packet rejects	0	
Input DA rejects	0	
Input SA rejects	0	
Output packet count		0
Output packet pad count		0
Output packet error count		0

CAM destination filters: 0, CAM source filters: 0

Autonegotiation information:

Negotiation status: Complete

Link partner:

Link mode: Full-duplex, Flow control: Symmetric/Asymmetric, Remote fault:

OK

Local resolution:

Flow control: Symmetric, Remote fault: Link OK

Packet Forwarding Engine configuration:

Destination slot: 0

CoS information:

Direction : Output

CoS transmit queue	Bandwidth	Buffer Priority
Limit		
	% bps	% usec
2 ef2	39 19500	0 120 high

none

Direction : Input

CoS transmit queue Limit		Bandwidth			Buffer	Priority
	%	bps	%	usec		
0 af3	30	3000	45	0		low
none						

Physical interface: ge-0/3/0, Enabled, Physical link is Up

Interface index: 138, SNMP ifIndex: 601

Forwarding classes: 16 supported, 5 in use

Ingress queues: 4 supported, 5 in use

Queue: 0, Forwarding classes: af3

Queued:

Packets	:	0	0 pps
Bytes	:	0	0 bps

Transmitted:

Packets	:	0	0 pps
Bytes	:	0	0 bps
Tail-dropped packets	:	Not Available	
RED-dropped packets	:	0	0 pps
RED-dropped bytes	:	0	0 bps

Queue: 1, Forwarding classes: af2

Queued:

Packets	:	0	0 pps
Bytes	:	0	0 bps

Transmitted:

Packets	:	0	0 pps
Bytes	:	0	0 bps
Tail-dropped packets	:	Not Available	
RED-dropped packets	:	0	0 pps
RED-dropped bytes	:	0	0 bps

Queue: 2, Forwarding classes: ef2

Queued:

Packets	:	0	0 pps
Bytes	:	0	0 bps

Transmitted:

Packets	:	0	0 pps
Bytes	:	0	0 bps
Tail-dropped packets	:	Not Available	
RED-dropped packets	:	0	0 pps
RED-dropped bytes	:	0	0 bps

Queue: 3, Forwarding classes: ef1

Queued:

Packets	:	0	0 pps
Bytes	:	0	0 bps

Transmitted:

Packets	:	0	0 pps
Bytes	:	0	0 bps
Tail-dropped packets	:	Not Available	
RED-dropped packets	:	0	0 pps
RED-dropped bytes	:	0	0 bps

Forwarding classes: 16 supported, 5 in use

Egress queues: 4 supported, 5 in use

Queue: 0, Forwarding classes: af3

Queued:

Packets	:	0	0 pps
Bytes	:	0	0 bps

Transmitted:

Packets	:	0	0 pps
Bytes	:	0	0 bps
Tail-dropped packets	:	Not Available	
RL-dropped packets	:	0	0 pps

```

    RL-dropped bytes      : 0 0 bps
    RED-dropped packets   : 0 0 pps
    RED-dropped bytes     : 0 0 bps
Queue: 1, Forwarding classes: af2
  Queued:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
  Transmitted:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   : 0 0 pps
    RL-dropped bytes     : 0 0 bps
    RED-dropped packets   : 0 0 pps
    RED-dropped bytes     : 0 0 bps
Queue: 2, Forwarding classes: ef2
  Queued:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
  Transmitted:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   : 0 0 pps
    RL-dropped bytes     : 0 0 bps
    RED-dropped packets   : 0 0 pps
    RED-dropped bytes     : 0 0 bps
Queue: 3, Forwarding classes: ef1
  Queued:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
  Transmitted:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   : 0 0 pps
    RL-dropped bytes     : 0 0 bps
    RED-dropped packets   : 0 0 pps
    RED-dropped bytes     : 0 0 bps

Packet Forwarding Engine Chassis Queues:
Queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
  Queued:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
  Transmitted:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
    Tail-dropped packets : 0 0 pps
    RED-dropped packets   : Not Available
    RED-dropped bytes     : Not Available
Queue: 1, Forwarding classes: af2
  Queued:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
  Transmitted:
    Packets              : 0 0 pps
    Bytes                : 0 0 bps
    Tail-dropped packets : 0 0 pps
    RED-dropped packets   : Not Available

```

```

    RED-dropped bytes      : Not Available
Queue: 2, Forwarding classes: ef2
Queued:
  Packets      :                0                0 pps
  Bytes       :                0                0 bps
Transmitted:
  Packets      :                0                0 pps
  Bytes       :                0                0 bps
  Tail-dropped packets :                0                0 pps
  RED-dropped packets : Not Available
  RED-dropped bytes  : Not Available
Queue: 3, Forwarding classes: ef1
Queued:
  Packets      :            108546                0 pps
  Bytes       :        12754752            376 bps
Transmitted:
  Packets      :            108546                0 pps
  Bytes       :        12754752            376 bps
  Tail-dropped packets :                0                0 pps
  RED-dropped packets : Not Available
  RED-dropped bytes  : Not Available

```

```

Physical interface: ge-0/3/0, Index: 138
Maximum usable queues: 4, Queues in use: 5
Shaping rate: 50000 bps

```

```
Scheduler map: interface-scheduler-map, Index: 58414
```

```

Scheduler: ef2, Forwarding class: ef2, Index: 39155
  Transmit rate: 39 percent, Rate Limit: none, Buffer size: 120 us, Buffer
Limit: none, Priority: high
  Excess Priority: unspecified
  Drop profiles:
    Loss priority  Protocol    Index    Name
    Low           any         1        < default-drop-profile>
    Medium low    any         1        < default-drop-profile>
    Medium high   any         1        < default-drop-profile>
    High          any         1        < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
    100         100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
    100         100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
    100         100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
    100         100
Input shaping rate: 10000 bps
Input scheduler map: scheduler-map

```

```
Scheduler map: scheduler-map, Index: 15103
```

```

Scheduler: af3, Forwarding class: af3, Index: 35058
  Transmit rate: 30 percent, Rate Limit: none, Buffer size: 45 percent, Buffer
Limit: none, Priority: low
  Excess Priority: unspecified
  Drop profiles:
    Loss priority  Protocol    Index    Name

```

```

Low          any          40582    green
Medium low   any          1        < default-drop-profile>
Medium high  any          1        < default-drop-profile>
High         any          18928    yellow
Drop profile: green, Type: discrete, Index: 40582
  Fill level  Drop probability
    50         0
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: yellow, Type: discrete, Index: 18928
  Fill level  Drop probability
    50         0
    100        100
Chassis scheduler map: < default-drop-profile>
Scheduler map: < default-drop-profile>, Index: 4

Scheduler: < default-drop-profile>, Forwarding class: af3, Index: 25
  Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
  Limit: none, Priority: low
  Excess Priority: low
  Drop profiles:
    Loss priority  Protocol  Index  Name
    Low           any       1      < default-drop-profile>
    Medium low     any       1      < default-drop-profile>
    Medium high    any       1      < default-drop-profile>
    High          any       1      < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100

Scheduler: < default-drop-profile>, Forwarding class: af2, Index: 25
  Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
  Limit: none, Priority: low
  Excess Priority: low
  Drop profiles:
    Loss priority  Protocol  Index  Name
    Low           any       1      < default-drop-profile>
    Medium low     any       1      < default-drop-profile>
    Medium high    any       1      < default-drop-profile>
    High          any       1      < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level  Drop probability
    100        100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1

```

```

Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100

Scheduler: < default-drop-profile>, Forwarding class: ef2, Index: 25
Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
Limit: none, Priority: low
Excess Priority: low
Drop profiles:
  Loss priority  Protocol    Index    Name
  Low            any         1        < default-drop-profile>
  Medium low     any         1        < default-drop-profile>
  Medium high    any         1        < default-drop-profile>
  High           any         1        < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100

Scheduler: < default-drop-profile>, Forwarding class: ef1, Index: 25
Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
Limit: none, Priority: low
Excess Priority: low
Drop profiles:
  Loss priority  Protocol    Index    Name
  Low            any         1        < default-drop-profile>
  Medium low     any         1        < default-drop-profile>
  Medium high    any         1        < default-drop-profile>
  High           any         1        < default-drop-profile>
Drop profile: , Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
Fill level      Drop probability
    100          100
Congestion-notification: Disabled
Forwarding class
priority Policing priority
af3      normal
af2      normal
ef2      normal
ef1      normal
ID        Queue  Restricted queue  Fabric
0         0      0                low
1         1      1                low
2         2      2                high
3         3      3                high

```



```

          normal
af1              4      4      0      low
          normal

```

Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152) (Generation 159)

Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.1] Encapsulation: ENET2

Traffic statistics:

```

Input bytes :      0
Output bytes :      0
Input packets:      0
Output packets:     0

```

Local statistics:

```

Input bytes :      0
Output bytes :      0
Input packets:      0
Output packets:     0

```

Transit statistics:

```

Input bytes :      0      0 bps
Output bytes :      0      0 bps
Input packets:      0      0 pps
Output packets:     0      0 pps

```

Protocol inet, MTU: 1500, Generation: 172, Route table: 0

Flags: Sendbcst-pkt-to-re

Input Filters: filter-in-ge-0/3/0.0-i,

Policer: Input: p1-ge-0/3/0.0-inet-i

Protocol mpls, MTU: 1488, Maximum labels: 3, Generation: 173, Route table: 0

Flags: Is-Primary

Output Filters: exp-filter,,,,,

Logical interface ge-1/2/0.0 (Index 347) (SNMP ifIndex 638) (Generation 156)

Forwarding class ID Queue Restricted queue Fabric priority Policing priority

SPU priority

```

best-effort      0  0      0      low      normal
low

```

Aggregate Forwarding-class statistics per forwarding-class

Aggregate Forwarding-class statistics:

Forwarding-class statistics:

Forwarding-class best-effort statistics:

```

Input unicast bytes:  0
Output unicast bytes:  0
Input unicast packets: 0
Output unicast packets: 0

```

```

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0
Output multicast packets: 0

```

Forwarding-class expedited-forwarding statistics:

```

Input unicast bytes:  0
Output unicast bytes:  0
Input unicast packets: 0
Output unicast packets: 0

```

```

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0

```

Output multicast packets: 0

IPv4 protocol forwarding-class statistics:

Forwarding-class statistics:

Forwarding-class best-effort statistics:

Input unicast bytes: 0
Output unicast bytes: 0
Input unicast packets: 0
Output unicast packets: 0

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0
Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:

Input unicast bytes: 0
Output unicast bytes: 0
Input unicast packets: 0
Output unicast packets: 0

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0
Output multicast packets: 0

IPv6 protocol forwarding-class statistics:

Forwarding-class statistics:

Forwarding-class best-effort statistics:

Input unicast bytes: 0
Output unicast bytes: 0
Input unicast packets: 0
Output unicast packets: 0

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0
Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:

Input unicast bytes: 0
Output unicast bytes: 0
Input unicast packets: 0
Output unicast packets: 0

Input multicast bytes: 0
Output multicast bytes: 0
Input multicast packets: 0
Output multicast packets: 0

Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152)

Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.1] Encapsulation: ENET2

Input packets : 0

Output packets: 0

Interface	Admin	Link	Proto	Input Filter	Output Filter
ge-0/3/0.0	up	up	inet	filter-in-ge-0/3/0.0-i	
			mpls		exp-filter
Interface	Admin	Link	Proto	Input Policer	Output Policer

```

ge-0/3/0.0      up      up
                  inet    p1-ge-0/3/0.0-inet-i
                  mpls

Filter: filter-in-ge-0/3/0.0-i
Counters:
Name                                     Bytes      Packets
count-filter-in-ge-0/3/0.0-i             0           0

Filter: exp-filter
Counters:
Name                                     Bytes      Packets
count-exp-seven-match                     0           0
count-exp-zero-match                      0           0
Policers:
Name                                     Packets
p1-ge-0/3/0.0-inet-i                     0

Logical interface: ge-0/3/0.0, Index: 68
Object      Name      Type      Index

Rewrite      exp-default      exp (mpls-any)      33

Rewrite rule: exp-default, Code point type: exp, Index: 33
Forwarding class      Loss priority      Code point
af3                    low                000
af3                    high               001
af2                    low                010
af2                    high               011
ef2                    low                100
ef2                    high               101
ef1                    low                110
ef1                    high               111
Object      Name      Type      Index

Classifier      exp-default      exp      10

Classifier: exp-default, Code point type: exp, Index: 10
Code point      Forwarding class      Loss priority
000              af3                low
001              af3                high
010              af2                low
011              af2                high
100              ef2                low
101              ef2                high
110              ef1                low
111              ef1                high
Object      Name      Type      Index

Classifier      ipprec-compatibility      ip      13

Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13
Code point      Forwarding class      Loss priority
000              af3                low
001              af3                high
010              af3                low
011              af3                high
100              af3                low
101              af3                high
110              ef1                low

```

111	ef1			high	
Forwarding class		ID	Queue	Restricted queue	Fabric
priority	Policing priority				
af3		0	0	0	low
	normal				
af2		1	1	1	low
	normal				
ef2		2	2	2	high
	normal				
ef1		3	3	3	high
	normal				
af1		4	4	0	low
	normal				

Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154) (Generation 160)

Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.2] Encapsulation: ENET2

Traffic statistics:

Input bytes : 0

Output bytes : 0

Input packets: 0

Output packets: 0

Local statistics:

Input bytes : 0

Output bytes : 0

Input packets: 0

Output packets: 0

Transit statistics:

Input bytes : 0 0 bps

Output bytes : 0 0 bps

Input packets: 0 0 pps

Output packets: 0 0 pps

Protocol inet, MTU: 1500, Generation: 174, Route table: 0

Flags: Sendbroadcast-pkt-to-re

Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154)

Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.2] Encapsulation: ENET2

Input packets : 0

Output packets: 0

Interface	Admin	Link	Proto	Input Filter	Output Filter
ge-0/3/0.1	up	up	mpls		
Interface	Admin	Link	Proto	Input Policer	Output Policer
ge-0/3/0.1	up	up	mpls		

Logical interface: ge-0/3/0.1, Index: 69

Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13

Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13

Code point	Forwarding class	Loss priority
000	af3	low
001	af3	high
010	af3	low
011	af3	high
100	af3	low
101	af3	high
110	ef1	low
111	ef1	high

Forwarding class priority	Policing priority	ID	Queue	Restricted queue	Fabric
af3	normal	0	0	0	low
af2	normal	1	1	1	low
ef2	normal	2	2	2	high
ef1	normal	3	3	3	high
af1	normal	4	4	0	low

show class-of-service interface (ACX Series Routers)

```
user@host-g11# show class-of-service interface
```

```
Physical interface: at-0/0/0, Index: 130
```

```
Maximum usable queues: 4, Queues in use: 4
```

```
Scheduler map: <default>, Index: 2
```

```
Congestion-notification: Disabled
```

```
Logical interface: at-0/0/0.0, Index: 69
```

```
Logical interface: at-0/0/0.32767, Index: 70
```

```
Physical interface: at-0/0/1, Index: 133
```

```
Maximum usable queues: 4, Queues in use: 4
```

```
Scheduler map: <default>, Index: 2
```

```
Congestion-notification: Disabled
```

```
Logical interface: at-0/0/1.0, Index: 71
```

```
Logical interface: at-0/0/1.32767, Index: 72
```

```
Physical interface: ge-0/1/0, Index: 146
```

```
Maximum usable queues: 8, Queues in use: 5
```

```
Scheduler map: <default>, Index: 2
```

```
Congestion-notification: Disabled
```

Object	Name	Type	Index
Rewrite	dscp-default	dscp	31
Classifier	d1	dscp	11331
Classifier	ci	ieee8021p	583

```
Logical interface: ge-0/1/0.0, Index: 73
```

Object	Name	Type	Index
Rewrite	custom-exp	exp (mpls-any)	46413

```
Logical interface: ge-0/1/0.1, Index: 74
```

```
Logical interface: ge-0/1/0.32767, Index: 75
```

```
Physical interface: ge-0/1/1, Index: 147
```

```
Maximum usable queues: 8, Queues in use: 5
```

```
Scheduler map: <default>, Index: 2
```

```
Congestion-notification: Disabled
```

Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13

```
Logical interface: ge-0/1/1.0, Index: 76
```

Physical interface: ge-0/1/2, Index: 148			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Rewrite	ri	ieee8021p (outer)	35392
Classifier	ci	ieee8021p	583
Physical interface: ge-0/1/3, Index: 149			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13
Logical interface: ge-0/1/3.0, Index: 77			
Object	Name	Type	Index
Rewrite	custom-exp2	exp (mpls-any)	53581
Physical interface: ge-0/1/4, Index: 150			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13
Physical interface: ge-0/1/5, Index: 151			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13
Physical interface: ge-0/1/6, Index: 152			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13
Physical interface: ge-0/1/7, Index: 153			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	d1	dscp	11331
Physical interface: ge-0/2/0, Index: 154			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13
Physical interface: ge-0/2/1, Index: 155			
Maximum usable queues: 8, Queues in use: 5			
Scheduler map: <default>, Index: 2			
Congestion-notification: Disabled			
Object	Name	Type	Index
Classifier	ipprec-compatibility	ip	13

```

Logical interface: ge-0/2/1.0, Index: 78

Logical interface: ge-0/2/1.32767, Index: 79

Physical interface: xe-0/3/0, Index: 156
Maximum usable queues: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object      Name      Type      Index
Classifier  ipprec-compatibility  ip      13

Logical interface: xe-0/3/0.0, Index: 80

Physical interface: xe-0/3/1, Index: 157
Maximum usable queues: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object      Name      Type      Index
Classifier  ipprec-compatibility  ip      13

Logical interface: xe-0/3/1.0, Index: 81

[edit]
user@host-g11#

```

show class-of-service interface (PPPoE Subscriber Interface for Enhanced Subscriber Management)

```

user@host> show class-of-service interface pp0.3221225474
  Logical interface: pp0.3221225475, Index: 3221225475
Object      Name      Type      Index
Traffic-control-profile TC_PROF_100_199_SERIES_UID1006 Output  4294967312
Scheduler-map SMAP-1_UID1002 Output  4294967327
Rewrite-Output ieee-rewrite ieee8021p 60432
Rewrite-Output rule1 ip 50463

Adjusting application: PPPoE IA tags
Adjustment type: absolute
Configured shaping rate: 11000000
Adjustment value: 5000000
Adjustment target: node

Adjusting application: ucac
Adjustment type: delta
Configured shaping rate: 5000000
Adjustment value: 100000
Adjustment target: node

```

show class-of-service forwarding-table

List of Syntax	Syntax on page 436 Syntax (TX Matrix and TX Matrix Plus Router) on page 436
Syntax	show class-of-service forwarding-table
Syntax (TX Matrix and TX Matrix Plus Router)	show class-of-service forwarding-table <lcc number> <sfc number>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 11.1 for the QFX Series. Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Display the entire class-of-service (CoS) configuration as it exists in the forwarding table. Executing this command is equivalent to executing all show class-of-service forwarding-table commands in succession.
Options	<p>lcc number—(TX Matrix and TX Matrix Plus router only) (Optional) On a TX Matrix router, display the forwarding table configuration for a specific T640 router (or line-card chassis) configured in a routing matrix. On a TX Matrix Plus router, display the forwarding table configuration for a specific router (or line-card chassis) configured in the routing matrix.</p> <p>Replace <i>number</i> with the following values depending on the LCC configuration:</p> <ul style="list-style-type: none">• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.• 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.• 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix. <p>sfc number—(TX Matrix Plus routers only) (Optional) Display the forwarding table configuration for the TX Matrix Plus router. Replace <i>number</i> with 0.</p>
Required Privilege Level	view
List of Sample Output	show class-of-service forwarding-table on page 437 show class-of-service forwarding-table lcc (TX Matrix Plus Router) on page 438
Output Fields	See the output field descriptions for show class-of-service forwarding-table commands: <ul style="list-style-type: none">• <i>show class-of-service forwarding-table classifier</i>• <i>show class-of-service forwarding-table classifier mapping</i>• <i>show class-of-service forwarding-table drop-profile</i>

- *show class-of-service forwarding-table fabric scheduler-map*
- *show class-of-service forwarding-table rewrite-rule*
- *show class-of-service forwarding-table rewrite-rule mapping*
- *show class-of-service forwarding-table scheduler-map*

Sample Output

show class-of-service forwarding-table

```

user@host> show class-of-service forwarding-table
Classifier table index: 9, # entries: 8, Table type: EXP
Entry #   Code point   Forwarding-class #   PLP
0         000           0                   0
1         001           0                   1
2         010           1                   0
3         011           1                   1
4         100           2                   0
5         101           2                   1
6         110           3                   0
7         111           3                   1

Interface      Index      Table Index/      Q num      Table type
sp-0/0/0.1001   66         11                11         IPv4 precedence
sp-0/0/0.2001   67         11                11         IPv4 precedence
sp-0/0/0.16383  68         11                11         IPv4 precedence
fe-0/0/0.0      69         11                11         IPv4 precedence

Interface: sp-0/0/0 (Index: 129, Map index: 2, Map type: FINAL,
Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
  Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
  Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

Interface: fe-0/0/0 (Index: 137, Map index: 2, Map type: FINAL,
Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
  Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
  Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

Interface: fe-0/0/1 (Index: 138, Map index: 2, Map type: FINAL,
Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
  Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
  Priority low

```

PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

...

RED drop profile index: 1, # entries: 1

Entry	Fullness(%)	Drop Probability(%)
0	100	100

show class-of-service forwarding-table lcc (TX Matrix Plus Router)

user@host> show class-of-service forwarding-table lcc 0
lcc0-re0:

Classifier table index: 9, # entries: 64, Table type: IPv6 DSCP

Entry #	Code point	Forwarding-class #	PLP
0	000000	0	0
1	000001	0	0
2	000010	0	0
3	000011	0	0
4	000100	0	0
5	000101	0	0
6	000110	0	0
7	000111	0	0
8	001000	0	0
9	001001	0	0
10	001010	0	0
11	001011	0	0
12	001100	0	0
13	001101	0	0
14	001110	0	0
15	001111	0	0
16	010000	0	0
17	010001	0	0
18	010010	0	0
19	010011	0	0
20	010100	0	0
21	010101	0	0
22	010110	0	0
23	010111	0	0
24	011000	0	0
25	011001	0	0
26	011010	0	0
27	011011	0	0
28	011100	0	0
29	011101	0	0
30	011110	0	0
31	011111	0	0
32	100000	0	0
33	100001	0	0
34	100010	0	0
35	100011	0	0
36	100100	0	0
37	100101	0	0
38	100110	0	0
39	100111	0	0
40	101000	0	0
41	101001	0	0
42	101010	0	0
43	101011	0	0

44	101100	0	0
45	101101	0	0
46	101110	0	0
...			

show interfaces (Channelized DS3-to-DS0)

Syntax	<pre>show interfaces ds-fpc/pic/port:t1channel:ds0channel <brief detail extensive> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.
Options	<p>ds-fpc/pic/port:t1channel:ds0channel—Display standard information about the specified channelized DS3-to-DS0 interface.</p> <p>brief detail extensive—(Optional) Display the specified level of output interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized DS3-to-DS0) on page 448
Output Fields	Table 41 on page 440 lists the output fields for the show interfaces (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 41: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link’s status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last seen hh:mm:ss ago). 	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Not-configured—LCP is not configured on the interface. Opened—LCP negotiation is successful. 	detail extensive none
NCP state	<p>(PPP) Network Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Not-configured—NCP is not configured on the interface. Opened—NCP negotiation is successful. 	detail extensive none

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication). • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone hh:mm:ss ago</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. 	extensive
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 alarms	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	detail extensive none
DS1 defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	
T1 media	Counts of T1 media-specific errors. <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error event • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • LES—Line error seconds • ES—Errored seconds • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • BES—Bit error seconds • UAS—Unavailable seconds 	extensive

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Remote defect indication • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CCV—C-bit coding violation • LES—Line error seconds • PES—P-bit errored seconds • PSES—P-bit errored seconds (section) • CES—C-bit errored seconds • CSES—C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none

Table 41: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	detail extensive none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```

user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  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 : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :                6814          16 bps
    Output bytes  :             28840          72 bps
    Input packets :                568           0 pps
    Output packets:                893           0 pps
  Input errors:

```

```

Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
HS link CRC errors: 0
Output errors:
Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1  alarms   : None
DS3  alarms   : None
DS1  defects  : None
DS3  defects  : None
T1  media:
Seconds      Count  State
SEF          0        0 OK
BEE          5        1 OK
AIS          0        0 OK
LOF          0        0 OK
LOS          0        0 OK
YELLOW       17        1 OK
BPV          0         0
EXZ          0         0
LCV          5       27765
PCV          0         0
CS           0         0
LES          0
ES           0
SES          5
SEFS         10
BES          0
UAS          0
DS3  media:
Seconds      Count  State
PLL Lock     0         0 OK
Reframing    0         0 OK
AIS          0         0 OK
LOF          0         0 OK
LOS          0         0 OK
IDLE         0         0 OK
YELLOW       0         0 OK
BPV          1       65535
EXZ          1       65535
LCV          2     131070
PCV          1       1825
CCV          0         0
LES          1
PES          1
PSES         1
CES          0
CSES         0
SEFS         0
UAS          0
Interface transmit queues:
      B/W  WRR  Packets      Bytes      Drops      Errors
Queue0  95  95      0         0         0         0
Queue1   5   5     893     28840         0         0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots      : 1-10
Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

```

```
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x01)
  CoS information:      CoS transmit queue      Bandwidth      Buffer
Priority  Limit
          %      bps  %      usec
0 best-effort      95      608000  95      0      low  none
3 network-control  5      32000   5      0      low  none
Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
(Generation 943)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 949, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 1849
```

show interfaces (Channelized DS3-to-DS1)

Syntax	<code>show interfaces t1-fpc/pic/port:t1channel</code> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.
Options	<p>t1-fpc/pic/port:t1channel—Display standard information about the specified channelized DS3-to-DS1 interface.</p> <p>brief detail extensive terse—(Optional) Display brief, detail, extensive, or terse information about the interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (channelized DS3-to-DS1) on page 451
Output Fields	See the output field table for the show interfaces (Channelized DS3-to-DS0) command .

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```

user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  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 : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:

```

```

Not-configured
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          944          16 bps
  Output bytes :        1162          16 bps
  Input packets:          66           0 pps
  Output packets:         82           0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1  alarms : None
DS3  alarms : None
DS1  defects : None
DS3  defects : None
T1 media:
  Seconds      Count  State
  SEF          0        0 OK
  BEE         11         5 OK
  AIS         28         1 OK
  LOF         27         1 OK
  LOS          0         0 OK
  YELLOW      23         1 OK
  BPV          0         0
  EXZ          0         0
  LCV         11      20574
  PCV          0         0
  CS           0         0
  LES         28
  ES          28
  SES         39
  SEFS        50
  BES         0
  UAS         0
DS3 media:
  Seconds      Count  State
  PLL Lock     0         0 OK
  Reframing    0         0 OK
  AIS          0         0 OK
  LOF          1         1 OK
  LOS          1         1 OK
  IDLE         0         0 OK
  YELLOW      0         0 OK
  BPV          2     131070
  EXZ          3     49910
  LCV          5    180980
  PCV          2       327
  CCV         12    264558
  LES         3
  PES         3
  PSES        2
  CES        13
  CSES       13
  SEFS        1
  UAS        35
Interface transmit queues:
  B/W  WRR  Packets  Bytes  Drops  Errors
Queue0  95  95      0      0      0      0
Queue1   5   5      82    1162    0      0

```



```

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00) CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      usec
  0 best-effort            95      608000  95      0      low  none
  3 network-control        5      32000   5      0      low  none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Bandwidth: 0
Protocol inet, MTU: 1500, Generation: 576, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 977

```

show interfaces (Channelized E1 IQ)

Syntax	<code>show interfaces (ce1-fpc/pic/port type-fpc/pic/port<:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.
Options	<p>type-fpc/pic/port:<channel>—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, type is ce. For the clear channel, type is e1. At the first level of channelization, type is ds.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces (Channelized E1 IQ) (Physical) on page 454</p> <p>show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 455</p> <p>show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 456</p> <p>show interfaces detail (Clear Channel E1) on page 457</p>
Output Fields	For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```

user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal, Speed:
E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  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
Last flapped : 2002-10-04 17:52:51 PDT (00:32:57 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
DS1 alarms : None
DS1 defects : None

```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```

user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
Interface index: 151, SNMP ifIndex: 63, Generation: 34
Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
Loopback: None, FCS: 16,
Parent: ce1-0/3/4 Interface index 150
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
CHAP state: Closed
CoS queues : 4 supported, 4 maximum usable queues
Last flapped : Never
Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 6070570 224 bps
  Input packets: 0 0 pps
  Output packets: 209330 0 pps
Input errors:
  Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
HDLC configuration:
  Giant threshold: 1528, Runt threshold: 2
  Timeslots : 1
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
  Route table: 0

```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```

user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times    : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent           : 0
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 timeout : 0
  CoS queues : 4 supported, 4 maximum usable queues
  Last flapped : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  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: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x01)

Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
    Input bytes : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  Local statistics:
    Input bytes : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  Transit statistics:
    Input bytes : 0 0 bps
    Output bytes : 0 0 bps
    Input packets: 0 0 pps
    Output packets: 0 0 pps
  Protocol mlfrr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
table: 0
  DLCI 10
    Flags: Active
    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 :1 Inactive DLCI :0

```

show interfaces detail (Clear Channel E1)

```

user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...

```

show interfaces (Channelized E1)

Syntax	<pre>show interfaces ds-fpc/pic/port:ds0channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information the specified channelized E1 interface.
Options	<p>ds-fpc/pic/port:ds0channel—Display standard information about the specified channelized E1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized E1) on page 466
Output Fields	Table 42 on page 458 lists the output fields for the show interfaces (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> Interval <i>seconds</i>—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. Down-count <i>number</i>—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. Up-count <i>number</i>—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago) Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings). 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone (hour:minute:second ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	<p>Number of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets larger than the MTU threshold. • Resource errors—Sum of transmit drops. 	extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The E1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBS—Far-end block error • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encodingHDB3—Line encoding used. 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each DSO channel on the Channelized E1 to DSO PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSx BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> Input bytes—Number of bytes received on the interface. Output bytes—Number of bytes transmitted on the interface. Input packets—Number of packets received on the interface. Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> Active—Set when the link is active and the DTE and DCE are exchanging information. Down—Set when link is active, but no information is received from the DCE. Unconfigured—Set when the corresponding DLCI in the DCE is not configured. Configured—Set when the corresponding DLCI in the DCE is configured. Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> Active DLCI—Number of active DLCIs. Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

```

Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
Interface index: 163, SNMP ifIndex: 37, Generation: 46
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags   : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported, 4 maximum usable queues
Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 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, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
DS1 alarms   : LOF, LOS
DS1 defects  : LOF, LOS
E1 media:
Seconds      Count  State
SEF          982318    1 Defect Active
BEE           0         0 OK
AIS           0         0 OK
LOF          982318    1 Defect Active
LOS          982318    1 Defect Active
YELLOW        0         0 OK
BPV           1         1
EXZ           1         1
LCV           1         1
PCV           1         2
CS            0         0
FEBE          1         9
LES           1
ES           982318
SES           982318
SEFS          982318
BES           1
UAS           0
Interface transmit queues:
      B/W  WRR    Packets    Bytes    Drops    Errors
Queue0  95  95         0         0         0         0
Queue1   5   5         0         0         0         0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots      : 31
Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared
DS1 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^11 - 1, 0.152 and 0.153 (2047 type),
Pseudorandom (8)
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 2 (0x1b)
CoS information:
CoS transmit queue    Bandwidth    Buffer    Priority    Limit

```

		%	bps	%	usec		
0	best-effort	95	1945600	95	0	low	none
3	network-control	5	102400	5	0	low	none

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: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	show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 470 show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 470 show interfaces extensive (Channelized OC12 IQ) (Physical) on page 470 show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 471 show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 471 show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 471 show interfaces extensive (DS0 on Channelized OC12 IQ) on page 471 show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 471 show interfaces extensive (T1 on Channelized OC12 IQ) on page 472
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 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
...
```

show interfaces (Channelized OC12)

Syntax	<code>show interfaces t3-fpc/pic/port:t3channel</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index snmp-index></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified channelized OC12 interface.
Options	<p><code>t3-fpc/pic/port:t3channel</code>—Display standard information about the specified channelized OC12 interface.</p> <p><code>brief detail extensive terse</code>—(Optional) Display the specified level of output.</p> <p><code>descriptions</code>—(Optional) Display interface description strings.</p> <p><code>media</code>—(Optional) Display media-specific information about network interfaces.</p> <p><code>snmp-index snmp-index</code>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><code>statistics</code>—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized OC12) on page 473
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
HDLCD 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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
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 OC3 IQ and IQE)

Syntax	<pre>show interfaces (type-fpc/pic/port <:channel><:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.
Options	<p>type-fpc/pic/port:channel:channel:channel—Interface type with optional corresponding channel levels. The interface type can be one of the following:</p> <ul style="list-style-type: none"> type-fpc/pic/port—For the physical interface, type is coc3. For the clear channel, type is so (for OC3). type-fpc/pic/port:channel—At the first level of channelization, type can be coc1 (channelized OC1), ct3 (from coc1), or t3 (from coc1). type-fpc/pic/port:channel:channel—At the second level of channelization, type can be ct1 (from coc1 or ct3) or t1 (from coc1 or ct3). type-fpc/pic/port:channel:channel:channel—At the third level of channelization, type can be ds (from ct1). <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (Channelized OC3 IQ) (Physical) on page 491</p> <p>show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 492</p> <p>show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 493</p> <p>show interfaces extensive (DSO on Channelized OC3 IQ) on page 494</p>
Output Fields	Table 43 on page 478 lists the output fields for the show interfaces (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 43: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be Internal or External . Clocking is configured and displayed only for channel 0.	All levels
Framing mode	Framing mode: SONET or SDH .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16-bit .	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI). The format is (ANSI or ITU) LMI settings: <i>value, value... nn</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	All levels
LMI statistics	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last sent hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hh:mm:ss timezone year-month-day (hh:mm:ss ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
DS1 alarms DS1 defects	<p>Elor T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 or E1 media-specific error types are:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bit error seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • HS link FIFO overflows—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • HS link FIFO underflows—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Egress queues	Total number of egress queues supported on the specified interface.	detail extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
Active alarms	Defects that can prevent the interface from passing packets:	detail extensive
Active defects	<ul style="list-style-type: none"> • None—There are no active defects or alarms. • LOF—Loss of frame. 	
SONET alarms	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	All levels
SONET defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SONET PHY , SONET section , SONET line , and SONET path .	

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET vt	<p>SONET virtual-tributary (VT) alarms and defects:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-V—Remote error indication (near-end VT) • LOP-V—Loss of pointer (near-end VT) • AIS-V—Alarm indication signal (near-end VT) • RDI-V—Remote defect indication (near-end VT) • UNEQ-V—Unequipped (near-end VT) • PLM-V—Payload label mismatch (near-end VT) • ES-V—Errored seconds (near-end VT) • SES-V—Severely errored seconds (near-end VT) • UAS-V—Unavailable seconds (near-end VT) • ES-VFE—Errored seconds (far-end VT) • SES-VFE—Severely errored seconds (far-end VT) • UAS-VFE—Unavailable seconds (far-end VT) 	extensive
SONET PHY	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SONET section	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B1—Bit interleaved parity for SONET section overhead • SEF—Severely errored framing • LOS—Loss of signal • LOL—Loss of light • LOF—Loss of frame • ES-S—Errored seconds (section) • SES-S—Severely errored seconds (section) • SEFS-S—Severely errored framing seconds (section) 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET line	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-L—Remote error indication (near-end line) • RDI-L—Remote defect indication (near-end line) • AIS-L—Alarm indication signal (near-end line) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • ES-L—Errored seconds (near-end line) • SES-L—Severely errored seconds (near-end line) • UAS-L—Unavailable seconds (near-end line) • ES-LFE—Errored seconds (far-end line) • SES-LFE—Severely errored seconds (far-end line) • UAS-LFE—Unavailable seconds (far-end line) 	extensive
SONET path	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B3—Bit interleaved parity for SONET section overhead • REI-P—Remote error indication • LOP-P—Loss of pointer (path) • AIS-P—Path alarm indication signal • RDI-P—Path remote defect indication • UNEQ-P—Path unequipped • PLM-P—Path payload (signal) label mismatch • ES-P—Errored seconds (near-end STS path) • SES-P—Severely errored seconds (near-end STS path) • UAS-P—Unavailable seconds (near-end STS path) • ES-PFE—Errored seconds (far-end STS path) • SES-PFE—Severely errored seconds (far-end STS path) • UAS-PFE—Unavailable seconds (far-end STS path) 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SONET overhead	Values of the received and transmitted SONET/SDH overhead:	extensive
Transmitted SONET overhead	<p>F1—Section user channel byte. This byte is set aside for the purposes of users.</p> <p>S1—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-N. Bits 5 through 8 convey the synchronization status of the network element.</p> <p>Z3 and Z4—Path overhead.</p> <p>V5—Virtual Tributary (VT) path overhead byte.</p>	
SDH alarms	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.	All levels
SDH defects	<p>NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the show interface coc3 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i>. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mode—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling. It can be Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. It can be Disabled or display units in kbps. • FEAC loopback—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
BERT configuration	<p>(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. <ul style="list-style-type: none"> • Input rate—Rate of bits and packets received on the interface. • Output rate—Rate of bits and packets transmitted on the interface. 	detail extensive
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 43: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```

user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0

```

```

Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
Loopback: None, Parent: None
Device flags   : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
Statistics last cleared: Never
SONET alarms   : PLL, LOS
SONET defects  : PLL, LOF, LOS, SEF, AIS-L
SONET PHY:
  Seconds      Count  State
  PLL Lock     681767  1  PLL Lock Error
  PHY Light     0       0  OK
SONET section:
  BIP-B1        0       0
  SEF           681767  1  Defect Active
  LOS           681767  1  Defect Active
  LOF           681767  1  Defect Active
  ES-S          681767
  SES-S         681767
  SEFS-S        681767
SONET line:
  BIP-B2        0       0
  REI-L         0       0
  RDI-L         0       0  OK
  AIS-L         681767  1  Defect Active
  BERR-SF       0       0  OK
  BERR-SD       0       0  OK
  ES-L          681767
  SES-L         681767
  UAS-L         681757
  ES-LFE        0
  SES-LFE       0
  UAS-LFE       0
Received SONET overhead:
  F1   : 0x00, J0   : 0x00, K1   : 0xff, K2   : 0xff
  S1   : 0xff
Transmitted SONET overhead:
  F1   : 0x00, J0   : 0x01, K1   : 0x00, K2   : 0x00
  S1   : 0x00

```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
Interface index: 133, SNMP ifIndex: 27, Generation: 16
Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

Loopback: None, Parent: coc3-0/0/0
Interface index 128
Device flags   : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-02-04 14:51:07 PST (00:00:35 ago)
Statistics last cleared: Never
SONET alarms   : None
SONET defects  : AIS-P
SONET path:

```



```

BIP-B3          0          0
REI-P           0          0
LOP-P           0          0 OK
AIS-P           36         1 Defect Active
RDI-P           0          0 OK
UNEQ-P          0          0 OK
PLM-P           0          0 OK
ES-P            36
SES-P            36
UAS-P            26
ES-PFE          0
SES-PFE          0
UAS-PFE          0
Received SONET overhead:
  C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace: router-1 coc1-0/0/0:1
  6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
  30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 134, SNMP ifIndex: 62, Generation: 17
Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
Device flags   : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
Statistics last cleared: Never
DS1 alarms     : None
DS1 defects    : AIS, LOF
T1 media:
  Seconds      Count  State
SEF            1       1 OK
BEE            1       1 OK
AIS           18       1 Defect Active
LOF           18       1 Defect Active
LOS            0       0 OK
YELLOW         0       0 OK
BPV            0       0
EXZ            0       0
LCV            0       0
PCV            0       0
CS             0       0
LES           18
ES            18

```

```

SES                      18
SEFS                     18
BES                      0
UAS                      14
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms   : None
SONET defects  : None
SONET vt:
  BIP-BIP2      0          0
  REI-V         0          0
  LOP-V         0          0 OK
  AIS-V        19          1 Defect Active
  RDI-V        19          1 Defect Active
  UNEQ-V        0          0 OK
  PLM-V        19          1 Defect Active
  ES-V         19
  SES-V        19
  UAS-V         9
  ES-VFE       0
  SES-VFE      0
  UAS-VFE      0
Received SONET overhead:
  V5           : 0x07, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5           : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ds-0/0/0:1:1
Physical interface: ds-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 135, SNMP ifIndex: 63, Generation: 18
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1 Interface index 134
Device flags   : Present Running
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : Keepalives
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : Never
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, Runts: 0, Giants: 0,
Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort              0              0              0

1 expedited-fo             0              0              0

```

2 assured-forw	0	0	0
3 network-cont	0	0	0

HDLC configuration:

Giant threshold: 1514, Runt threshold: 2

Timeslots : 1-5

Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared

DS0 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

Packet Forwarding Engine configuration:

Destination slot: 0, PLP byte: 4 (0x00)

show interfaces (Channelized STM1 IQ)

Syntax	<code>show interfaces (type-fpc/pic/port <:channel><:channel>)</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index snmp-index></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized STM1 IQ interface.
Options	<p>type-fpc/pic/port:channel:channel—Interface type with optional corresponding channel levels. The interface type can be one of the following types:</p> <ul style="list-style-type: none"> type-fpc/pic/port:channel—For the physical channelized STM1 IQ interface, type is cstm1. For the clear channel, type is so. For channelization, the STM1 IQ interface must be converted to interface type cau4. type-fpc/pic/port:channel—At the first level of channelization, type can be ce1 or e1 (clear channel or fractional channel from cau4). type-fpc/pic/port:channel:channel—At the second level of channelization, type is ds (from ce1). <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces (Channelized STM1 IQ) (Physical) on page 496 show interfaces (Channelized AU-4) (Physical) on page 497 show interfaces (Channelized E1) (Physical) on page 497 show interfaces (DS) on page 498
Output Fields	See the output field table for the show interfaces (Channelized STM1) command.

Sample Output

show interfaces (Channelized STM1 IQ) (Physical)

```
user@host> show interfaces cstm1-0/0/0
```

```

Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 35
Link-level type: Frame-relay, Controller, Clocking: Internal, SDH mode,
Speed: OC3, Loopback: None, Parent: None 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
Last flapped : 2003-02-06 15:01:56 PST (07:15:06 ago)
...

```

show interfaces (Channelized AU-4) (Physical)

```

user@host> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
Interface index: 147, SNMP ifIndex: 36
Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: cstm1-0/0/0 Interface index 146
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags : None
Last flapped : 2003-02-06 19:36:31 PST (02:40:42 ago)
SDH alarms : None
SDH defects : None
...

```

show interfaces (Channelized E1) (Physical)

```

user@host> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
Interface index: 169, SNMP ifIndex: 288
Link-level type: Frame-relay, Controller, Clocking: Internal, Speed: E1,
Loopback: None, Framing: G704, Parent: cau4-0/0/0 Interface index 147
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
Last flapped   : 2003-02-06 22:05:23 PST (00:13:45 ago)
DS1  alarms    : None
DS1  defects   : None
SDH   alarms   : None
SDH   defects  : None
...

```

show interfaces (DS)

```

user@host> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 289
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: Illegal, FCS: 16, Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS Queues: 8 maximum usable queues, 4 in use
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  Egress queues: 8 supported, 4 in use
...
Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.134.1.0/30, Local: 10.134.1.1
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
...

```

show interfaces (Channelized STM1)

Syntax	<pre>show interfaces e1-fpc/pic/port:elchannel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized STM1 interface.
Options	<p>e1-fpc/pic/port:elchannel—Display standard status information about the specified channelized STM1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized STM1, SDH) on page 510
Output Fields	Table 44 on page 499 lists the output fields for the show interfaces (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 44: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> intervalseconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
ANSI LMI settings or ITU LMI settings	<p>(Frame Relay) Local Management Interface settings. The format is (ANSI or ITU) LMI settings: <i>value, value...xx</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1- 255) n392dce—DCE error threshold (1-10) n392dte—DTE error threshold (1-10) n393dce—DCE monitored event count (1-10) n393dte—DTE monitored event count (1-10) t391dte—DTE polling timer (5-30 seconds) t392dce—DCE polling verification timer (5-30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgment was received. • Conf-ack-sent—Acknowledgment was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgment was received. • Conf-ack-sent—Acknowledgment was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. 	extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none
SDH alarms SDH defects	<p>SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.</p> <p>NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the show interface cstm1 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	All levels

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS-S—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. 	extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH tu	<p>Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • TU-BIP-2—Bit interleaved parity for SONET line overhead • TU-FEBE—(near-end TU) • TU-LOP—Loss of pointer (near-end TU) • TU-AIS—Alarm indication signal (near-end TU) • TU-FERF—(near-end TU) • TU-UNEQ—Unequipped (near-end TU) • TU-PLM—Payload label mismatch (near-end TU) • TU-ES—Errored seconds (near-end TU) • TU-SES—Severely errored seconds (near-end TU) • TU-UAS—Unavailable seconds (near-end TU) • TU-ES-FE—Errored seconds (far-end TU) • TU-SES-FE—Severely errored seconds (far-end TU) • TU-UAS-FE—Unavailable seconds (far-end TU) 	extensive
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i> signal. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none

Table 44: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```

user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  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 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          592          48 bps
  Output bytes  :          644          48 bps
  Input packets :           46           0 pps
  Output packets:           46           0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms   : None
DS1 defects  : None
SDH alarms   : None
SDH defects  : None
E1 media:
  Seconds      Count  State
SEF            0        0 OK
BEE            0        0 OK
AIS           124        1 OK
LOF           124        1 OK
LOS            0        0 OK
YELLOW         0        0 OK
BPV            0         0
EXZ            0         0
LCV            0         0
PCV            0         0
CS             0         0
FEBE           0         0
LES           124
ES            125
SES           124
SEFS          124
BES            0
UAS            37
Interface transmit queues:
      B/W  WRR  Packets      Bytes      Drops      Errors
Queue0   95  95         0         0         0         0
Queue1    5   5       529       6348         0         0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SDH PHY:
  Seconds      Count  State
PLL Lock       0        0 OK
PHY Light      0        0 OK
SDH regenerator section:
  RS-BIP8       0        0
  OOF           125        1 OK
  LOS           125        1 OK
  LOF           125        1 OK
  RS-ES         125
  RS-SES        125
  RS-SEFS       125
SDH multiplex section:
  MS-BIP24      0        0
  MS-FEBE       0        0

```

```

MS-FERF          0          0 OK
MS-AIS           125        1 OK
BERR-SF          0          0 OK
BERR-SD          0          0 OK
MS-ES            125
MS-SES           125
MS-UAS           115
MS-ES-FE         0
MS-SES-FE        0
MS-UAS-FE        0
SDH path:
HP-BIP8          0          0
HP-FEBE          0          0
HP-LOP           0          0 OK
HP-AIS           125        1 OK
HP-FERF          0          0 OK
HP-UNEQ          0          0 OK
HP-PLM           125        1 OK
HP-ES            125
HP-SES           125
HP-UAS           115
HP-ES-FE         0
HP-SES-FE        0
HP-UAS-FE        0
SDH tu:
TU-BIP2          0          0
TU-FEBE          124        1
TU-LOP           0          0 OK
TU-AIS           124        1 OK
TU-FERF          124        1 OK
TU-UNEQ          0          0 OK
TU-PLM           124        1 OK
TU-ES            125
TU-SES           125
TU-UAS           115
TU-ES-FE         0
TU-SES-FE        0
TU-UAS-FE        0
Received SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
V5(cmp) : 0x02
Transmitted SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
Z4      : 0x00, V5      : 0x02
Received path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      usec
0 best-effort            95      1945600  95      0      low  none
3 network-control        5       102400   5      0      low  none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 575, Route table: 0

```

```
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 975
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 T1 IQ)

Syntax	<pre>show interfaces (ct1-fpc/pic/port type-fpc/pic/port<:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced in Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none"> type-fpc/pic/port—For the physical channelized T1 IQ interface, type is ct1. type-fpc/pic/port:channel—For the clear channel, type is t1. At the first level of channelization, type can be ct1 or t1. type-fpc/pic/port:channel:channel—At the second level of channelization, type can be ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (CT1) on page 522</p> <p>show interfaces extensive (T1) on page 523</p> <p>show interfaces extensive (DS0) on page 524</p>
Output Fields	Table 45 on page 514 lists the output fields for the show interfaces (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error event • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Line encoding	Line encoding used: B8ZS or AMI .	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used: B8ZS or AMI. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle Flag—Idle cycle flags. • Start end Flag—Start and end flag. 	extensive

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSO or DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (CT1)

```

user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 32, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
DS1 alarms     : None
DS1 defects    : None
T1 media:
      Seconds      Count  State
      SEF          0       0 OK
      BEE          0       0 OK
      AIS          0       0 OK
      LOF          0       0 OK
      LOS          0       0 OK
      YELLOW       0       0 OK
      BPV          0       0
      EXZ          0       0
      LCV          0       0
      PCV          0       0
      CS           0       0
      LES          0
      ES           0
      SES          0
      SEFS         0
      BES          0

```

```

UAS                                0
Line encoding: B8ZS
Buildout       : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (T1)

```

user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 33, Generation: 61
  Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
  Parent: ct1-0/2/0 Interface index 148
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 timeout : 0
Nonmatching DCE-end DLCIs:
  2
Hold-times   : Up 0 ms, Down 0 ms
CoS queues   : 4 supported
Last flapped : 2005-09-07 15:43:47 PDT (00:00:06 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   : 0          0 bps
  Output bytes  : 14         0 bps
  Input packets : 0          0 pps
  Output packets : 1         0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     1          1          0
DS1 alarms   : None

```

```

DS1  defects  : None
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : All active
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
  flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

```

show interfaces extensive (DS0)

```

user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
  Interface index: 157, SNMP ifIndex: 52, Generation: 46
  Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
  Speed: 640kbps, Loopback: None, FCS:16,
  Parent: ct1-0/1/0 Interface index 143
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 8 (last seen 00:00:12 ago)
  Output: 8 (last sent 00:00:07 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 : 2005-08-18 15:23:46 PDT (00:03:17 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
Traffic statistics:
  Input bytes  : 840          0 bps
  Output bytes : 912          0 bps
  Input packets: 25          0 pps
  Output packets: 26         0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,

```



```

    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
Queue counters:
    Queued packets    Transmitted packets    Dropped packets
0 best-effort        0                    0                    0
1 expedited-fo       0                    0                    0
2 assured-forw       0                    0                    0
3 network-cont       26                   26                   0
HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots       : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
    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 T3 IQ)

Syntax	<code>show interfaces (ct3-fpc/pic/port type-fpc/pic/port<:channel><:channel>)</code> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none">• type-fpc/pic/port—For the physical channelized T3 IQ interface, type is ct3.• type-fpc/pic/port:channel—For the clear channel, type is t3. At the first level of channelization, type can be ct1 or t1.• type-fpc/pic/port:channel:channel—At the second level of channelization, type is ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized T3 IQ) (Physical) on page 527 show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 527 show interfaces extensive (DSO on Channelized T3 IQ) on page 527
Output Fields	See the output field table for the show interfaces (Channelized T1 IQ) command.

Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DSO on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces (Channelized E1)

Syntax	<pre>show interfaces ds-fpc/pic/port:ds0channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information the specified channelized E1 interface.
Options	<p>ds-fpc/pic/port:ds0channel—Display standard information about the specified channelized E1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized E1) on page 536
Output Fields	Table 42 on page 458 lists the output fields for the show interfaces (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> • Interval <i>seconds</i>—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • Down-count <i>number</i>—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • Up-count <i>number</i>—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago) Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings). 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone (hour:minute:second ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	<p>Number of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets larger than the MTU threshold. • Resource errors—Sum of transmit drops. 	extensive
DS1 alarms	<p>E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none
DS1 defects		

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The E1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBS—Far-end block error • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encodingHDB3—Line encoding used. 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each DSO channel on the Channelized E1 to DSO PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSx BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> Input bytes—Number of bytes received on the interface. Output bytes—Number of bytes transmitted on the interface. Input packets—Number of packets received on the interface. Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> Active—Set when the link is active and the DTE and DCE are exchanging information. Down—Set when link is active, but no information is received from the DCE. Unconfigured—Set when the corresponding DLCI in the DCE is not configured. Configured—Set when the corresponding DLCI in the DCE is configured. Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> Active DLCI—Number of active DLCIs. Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

```

Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 4 supported, 4 maximum usable queues
  Last flapped  : 2005-12-28 14:44:06 PST (00:00:30 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, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  DS1 alarms   : LOF, LOS
  DS1 defects  : LOF, LOS
  E1 media:
    Seconds      Count  State
    SEF          982318    1 Defect Active
    BEE           0         0 OK
    AIS           0         0 OK
    LOF          982318    1 Defect Active
    LOS          982318    1 Defect Active
    YELLOW        0         0 OK
    BPV           1         1
    EXZ           1         1
    LCV           1         1
    PCV           1         2
    CS            0         0
    FEBE          1         9
    LES           1
    ES           982318
    SES           982318
    SEFS          982318
    BES           1
    UAS           0
  Interface transmit queues:
    B/W  WRR  Packets  Bytes  Drops  Errors
  Queue0  95  95      0      0      0      0
  Queue1   5   5      0      0      0      0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, 0.152 and 0.153 (2047 type),
    Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue  Bandwidth  Buffer  Priority  Limit

```

		%	bps	%	usec		
0	best-effort	95	1945600	95	0	low	none
3	network-control	5	102400	5	0	low	none

show interfaces (Channelized E1 IQ)

Syntax	<code>show interfaces (ce1-fpc/pic/port type-fpc/pic/port<:channel>)</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index snmp-index></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.
Options	<p>type-fpc/pic/port:<channel>—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, type is ce. For the clear channel, type is e1. At the first level of channelization, type is ds.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces (Channelized E1 IQ) (Physical) on page 539 show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 540 show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 541 show interfaces detail (Clear Channel E1) on page 542
Output Fields	For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```

user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,  Speed:
E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  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
Last flapped : 2002-10-04 17:52:51 PDT (00:32:57 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
DS1 alarms : None
DS1 defects : None

```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```

user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
Interface index: 151, SNMP ifIndex: 63, Generation: 34
Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
Loopback: None, FCS: 16,
Parent: ce1-0/3/4 Interface index 150
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
CHAP state: Closed
CoS queues : 4 supported, 4 maximum usable queues
Last flapped : Never
Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 6070570 224 bps
  Input packets: 0 0 pps
  Output packets: 209330 0 pps
Input errors:
  Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
HDLC configuration:
  Giant threshold: 1528, Runt threshold: 2
  Timeslots : 1
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```



```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
  Route table: 0

```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```

user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times    : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent           : 0
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 timeout : 0
  CoS queues : 4 supported, 4 maximum usable queues
  Last flapped : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  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: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x01)

Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol mlfrr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
table: 0
  DLCI 10
    Flags: Active
    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 :1 Inactive DLCI :0

```

show interfaces detail (Clear Channel E1)

```

user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...

```

show interfaces (T1, E1, or DS)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is t1-<i>fpc/pic/port</i>, whereas the E1 interface type is e1-<i>fpc/pic/port</i>, and DS interface type is ds-<i>fpc/pic/port:channel</i>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>Understanding Interfaces on ACX Series Universal Access Routers</i>
List of Sample Output	<p>show interfaces (T1, IMA Link) on page 555</p> <p>show interfaces (T1, PPP) on page 556</p> <p>show interfaces detail (T1, PPP) on page 556</p> <p>show interfaces extensive (T1 CRC Errors) on page 557</p> <p>show interfaces extensive (T1, PPP) on page 557</p> <p>show interfaces (E1, Frame Relay) on page 559</p> <p>show interfaces detail (E1, Frame Relay) on page 560</p> <p>show interfaces extensive (E1, Frame Relay) on page 561</p> <p>show interfaces (E1, IMA Link) on page 563</p> <p>show interfaces extensive (T1, TDM-CCC-SATOP) on page 564</p> <p>show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 565</p>
Output Fields	Table 47 on page 544 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 47: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics or (Input packets, Output packets). Flags can be one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 47: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	<p>Information related to the circuit emulation statistics.</p> <ul style="list-style-type: none"> • CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). • CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). • CE Rx Forwarded—Number of forwarded bytes. • CE Strayed—Number of stray packets. • CE Lost—Number of lost packets. • CE Malformed—Number of malformed packets • CE Misinserted—Number of misinserted packets. • CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). • CE Dropped—Number of dropped packets during resynchronization • CE Overrun Events—Number of overrun events. • CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1, IMA Link)

```

user@host> show interfaces t1-1/0/0
IMA Link alarms   : None
IMA Link defects  : LIF, LODS
IMA Link state:
  Line           : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end  : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0           0  OK
LODS                  0           0  OK
Err-ICP               0           0  OK
IV                    0           0  OK
Rx-FC                  0           0  OK
Tx-FC                  0           0  OK
FE-Defects            0           0
FE-Rx-FC              0           0
FE-Tx-FC              0           0
Rx-ICP                0           0
Rx-Stuff              0           0
Tx-ICP                0          11
Tx-Stuff              0           0
Rx-SES                 0
Rx-UAS                 0
Rx-UUS                 1
Tx-UUS                 0
FE-Rx-SES              0
FE-Rx-UAS              0
FE-Rx-UUS              0
FE-Tx-UUS              0

```

show interfaces (T1, PPP)

```

user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1 alarms    : None
  DS1 defects    : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T1, PPP)

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 798 0 bps
    Input packets: 0 0 pps
    Output packets: 42 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0


```

2 assured-forw          0          0          0
3 network-cont          40         40          0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 14, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 18

```

show interfaces extensive (T1 CRC Errors)

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
Interface index: 179, SNMP ifIndex: 79, Generation: 180
:
:
DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
DS1  defects  : AIS, LOF, CRC Major, CRC Minor
T1 media:
      Seconds      Count  State
SEF          1          1  OK
BEE          1          1  OK
AIS        1128          1 Defect Active
LOF        1128          1 Defect Active
LOS          0          0  OK
YELLOW       0          0  OK
CRC Major   154          1 Defect Active
CRC Minor   154          1 Defect Active
BPV          0          0
EXZ          0          0
LCV          0          0
PCV          0          0
CS           0          0
CRC         154        15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
    Output: 0 (last sent: never)
LCP state: Down

```

```

NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes  :                0                0 bps
Output bytes :               817               72 bps
Input packets:                0                0 pps
Output packets:              43                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo              0                0                0
2 assured-forw              0                0                0
3 network-cont              42               42                0

DS1  alarms   : None
DS1  defects  : None
T1  media:      Seconds      Count  State
SEF              1           1  OK
BEE              0           0  OK
AIS              0           0  OK
LOF              1           1  OK
LOS              0           0  OK
YELLOW           1           1  OK
BPV              1           1
EXZ              1           1
LCV              1        65535
PCV              1        1023
CS               0           0
LES              1
ES               1
SES              1
SEFS             1
BES              0
UAS              0

HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS
Buildout       : 0 to 132 feet
Byte encoding: Nx64K, 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

```

```

Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %          bps          %          usec
0 best-effort             95          1459200     95           0           low      none
3 network-control         5           76800       5            0           low      none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags      : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags       : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 1
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues      : 8 supported
  Last flapped    : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1 alarms     : None
  DS1 defects    : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 1500
    Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:13 sec, Last down: 00:01:13 ago

```

```

        Input packets : 0
        Output packets: 0
    DLCI statistics:
        Active DLCI  :0  Inactive DLCI  :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 2
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 225 56 bps
    Input packets: 0 0 pps
    Output packets: 15 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

  DS1 alarms : None
  DS1 defects : None
  DS1 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 e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:

```

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:18 sec, Last down: 00:01:18 ago
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
Enquiries sent : 10
Full enquiries sent : 2
Enquiry responses received : 0
Full enquiry responses received : 0
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 timeout : 1
CoS queues : 8 supported

```

```

Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :           0           0 bps
  Output bytes  :          225           0 bps
  Input packets :           0           0 pps
  Output packets:          15           0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets

  0 limited              0              0              0
  1 expedited-fo         0              0              0
  2 real-plus            0              0              0
  3 network-cont         15             15              0

DS1  alarms   : None
DS1  defects  : None
E1  media:
      Seconds      Count  State
SEF              0         0  OK
BEE              5         5  OK
AIS              0         0  OK
LOF             245        15  OK
LOS             245         4  OK
YELLOW           0        11  OK
BPV              0         0
EXZ              9         9
LCV              0         0
PCV              0         0
CS               0         0
FEBE             0         0
LES              0
ES               0
SES              0
SEFS             0
BES              0
UAS             271

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, 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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue  Bandwidth  Buffer  Priority  Limit
                       %      bps      %      usec
  0 limited           95    1945600  95        0      low    none

```

```

3 network-control 5 102400 5 0 low none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1, IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:

```

	Seconds	Count	State
LIF		0	
LODS		0	
Err-ICP		0	
IV		0	
Rx-FC		0	
Tx-FC		0	
FE-Defects		0	
FE-Rx-FC		0	
FE-Tx-FC		0	
Rx-ICP		0	
Rx-Stuff		0	
Tx-ICP		11	
Tx-Stuff		0	
Rx-SES	0		
Rx-UAS	0		
Rx-UUS	1		
Tx-UUS	0		

```

FE-Rx-SES          0
FE-Rx-UAS          0
FE-Rx-UUS          0
FE-Tx-UUS          0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host> show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
  DS1 alarms        : None
  DS1 defects       : None
  T1 media:

```

	Seconds	Count	State
SEF	0	0	OK
BEE	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	0	0	OK
CRC Major	0	0	OK
CRC Minor	0	0	OK
BPV	0	0	
EXZ	0	0	
LCV	0	0	
PCV	0	0	
CS	0	0	
CRC	0	0	
LES	0		
ES	0		
SES	0		
SEFS	0		
BES	0		
UAS	0		

```

  SAToP configuration:
    Payload size: 192

```



```

Idle pattern: 0xFF
Octet aligned: Disabled
Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms : None
SONET defects : AIS-V, RDI-V
SONET vt:
  BIP-BIP2          0          0
  REI-V             0          0
  LOP-V             0          0 OK
  AIS-V             2          0 Defect Active
  RDI-V             2          0 Defect Active
  UNEQ-V            0          0 OK
  PLM-V             0          0 OK
  ES-V              0
  SES-V              0
  UAS-V             2
  ES-VFE            0
  SES-VFE            0
  UAS-VFE            0
Received SONET overhead:
V5 : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5 : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
  0 best-effort           95      1459200    95      0      low
none
  3 network-control       5       76800     5       0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
CE info      Packets      Bytes      Count
CE Tx        1005        192960
CE Rx        1004        192768
CE Rx Forwarded      0
CE Strayed          0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          1005      192960
CE Overrun Events    0
CE Underrun Events   0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host> show interfaces ds-1/0/0:1:1 extensive
```

```

Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort           0              0              0
    1 expedited-fo         0              0              0
    2 assured-forw         0              0              0
    3 network-cont         0              0              0

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control

  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue      Bandwidth      Buffer Priority
Limit
    0 best-effort          95      1459200    95      0      low
none
    3 network-control      5       76800     5       0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation 549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info      Packets      Bytes  Count
  CE Tx        0            0
  CE Rx        35712        6856704
  CE Rx Forwarded      0
  CE Strayed          0
  CE Lost             0
  CE Malformed        0
  CE Misinserted      0
  CE AIS dropped       0
  CE Dropped          0            0
  CE Overrun Events          0

```

```
CE Underrun Events                1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```

show interfaces (Channelized E1)

Syntax	<pre>show interfaces ds-fpc/pic/port:ds0channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information the specified channelized E1 interface.
Options	<p>ds-fpc/pic/port:ds0channel—Display standard information about the specified channelized E1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized E1) on page 576
Output Fields	Table 42 on page 458 lists the output fields for the show interfaces (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> Interval <i>seconds</i>—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. Down-count <i>number</i>—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. Up-count <i>number</i>—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago) Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings). 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone (hour:minute:second ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	<p>Number of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets larger than the MTU threshold. • Resource errors—Sum of transmit drops. 	extensive
DS1 alarms	E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	detail extensive none
DS1 defects	<p>Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The E1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBS—Far-end block error • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encodingHDB3—Line encoding used. 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each DSO channel on the Channelized E1 to DSO PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSx BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> Input bytes—Number of bytes received on the interface. Output bytes—Number of bytes transmitted on the interface. Input packets—Number of packets received on the interface. Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> Active—Set when the link is active and the DTE and DCE are exchanging information. Down—Set when link is active, but no information is received from the DCE. Unconfigured—Set when the corresponding DLCI in the DCE is not configured. Configured—Set when the corresponding DLCI in the DCE is configured. Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> Active DLCI—Number of active DLCIs. Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

```

Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 4 supported, 4 maximum usable queues
  Last flapped  : 2005-12-28 14:44:06 PST (00:00:30 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, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  DS1 alarms   : LOF, LOS
  DS1 defects  : LOF, LOS
  E1 media:
    Seconds      Count  State
    SEF          982318    1 Defect Active
    BEE           0         0 OK
    AIS           0         0 OK
    LOF          982318    1 Defect Active
    LOS          982318    1 Defect Active
    YELLOW        0         0 OK
    BPV           1         1
    EXZ           1         1
    LCV           1         1
    PCV           1         2
    CS            0         0
    FEBE          1         9
    LES           1
    ES           982318
    SES           982318
    SEFS          982318
    BES           1
    UAS           0
  Interface transmit queues:
    B/W  WRR  Packets  Bytes  Drops  Errors
  Queue0  95  95      0      0      0      0
  Queue1   5   5      0      0      0      0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, 0.152 and 0.153 (2047 type),
    Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue  Bandwidth  Buffer  Priority  Limit

```

		%	bps	%	usec		
0	best-effort	95	1945600	95	0	low	none
3	network-control	5	102400	5	0	low	none

show interfaces (Channelized E1 IQ)

Syntax	<code>show interfaces (ce1-fpc/pic/port type-fpc/pic/port<:channel>)</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index snmp-index></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.
Options	<p>type-fpc/pic/port:<channel>—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, type is ce. For the clear channel, type is e1. At the first level of channelization, type is ds.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces (Channelized E1 IQ) (Physical) on page 579 show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 580 show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 581 show interfaces detail (Clear Channel E1) on page 582
Output Fields	For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```

user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,  Speed:
E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  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
Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
DS1 alarms    : None
DS1 defects    : None

```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```

user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
Interface index: 151, SNMP ifIndex: 63, Generation: 34
Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
Loopback: None, FCS: 16,
Parent: ce1-0/3/4 Interface index 150
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
CHAP state: Closed
CoS queues   : 4 supported, 4 maximum usable queues
Last flapped : Never
Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
Traffic statistics:
  Input bytes   : 0                0 bps
  Output bytes  : 6070570          224 bps
  Input packets : 0                0 pps
  Output packets: 209330          0 pps
Input errors:
  Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
HDLC configuration:
  Giant threshold: 1528, Runt threshold: 2
  Timeslots      : 1
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```



```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
  Route table: 0

```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```

user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times    : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent           : 0
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 timeout : 0
  CoS queues : 4 supported, 4 maximum usable queues
  Last flapped : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  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: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x01)

Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol mlfrr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
table: 0
  DLCI 10
    Flags: Active
    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 :1 Inactive DLCI :0

```

show interfaces detail (Clear Channel E1)

```

user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...

```

show interfaces (Channelized T1 IQ)

Syntax	<pre>show interfaces (ct1-fpc/pic/port type-fpc/pic/port<:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced in Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none"> type-fpc/pic/port—For the physical channelized T1 IQ interface, type is ct1. type-fpc/pic/port:channel—For the clear channel, type is t1. At the first level of channelization, type can be ct1 or t1. type-fpc/pic/port:channel:channel—At the second level of channelization, type can be ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (CT1) on page 591</p> <p>show interfaces extensive (T1) on page 592</p> <p>show interfaces extensive (DS0) on page 593</p>
Output Fields	Table 45 on page 514 lists the output fields for the show interfaces (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error event • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Line encoding	Line encoding used: B8ZS or AMI .	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used: B8ZS or AMI. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle Flag—Idle cycle flags. • Start end Flag—Start and end flag. 	extensive

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSO or DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (CT1)

```

user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 32, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
DS1 alarms     : None
DS1 defects    : None
T1 media:
      Seconds      Count  State
      SEF          0        0  OK
      BEE          0        0  OK
      AIS          0        0  OK
      LOF          0        0  OK
      LOS          0        0  OK
      YELLOW       0        0  OK
      BPV          0         0
      EXZ          0         0
      LCV          0         0
      PCV          0         0
      CS           0         0
      LES          0
      ES           0
      SES          0
      SEFS         0
      BES          0

```

```

UAS                                0
Line encoding: B8ZS
Buildout      : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (T1)

```

user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 33, Generation: 61
  Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
  Parent: ct1-0/2/0 Interface index 148
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 timeout : 0
Nonmatching DCE-end DLCIs:
  2
Hold-times   : Up 0 ms, Down 0 ms
CoS queues   : 4 supported
Last flapped : 2005-09-07 15:43:47 PDT (00:00:06 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   : 0          0 bps
  Output bytes  : 14         0 bps
  Input packets : 0          0 pps
  Output packets: 1          0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     1          1          0
DS1 alarms   : None

```

```

DS1  defects  : None
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : All active
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
  flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

```

show interfaces extensive (DS0)

```

user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
  Interface index: 157, SNMP ifIndex: 52, Generation: 46
  Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
  Speed: 640kbps, Loopback: None, FCS:16,
  Parent: ct1-0/1/0 Interface index 143
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 8 (last seen 00:00:12 ago)
  Output: 8 (last sent 00:00:07 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 : 2005-08-18 15:23:46 PDT (00:03:17 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
Traffic statistics:
  Input bytes  : 840 0 bps
  Output bytes : 912 0 bps
  Input packets: 25 0 pps
  Output packets: 26 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,

```

```

    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets
    0 best-effort      0                0                0
    1 expedited-fo     0                0                0
    2 assured-forw     0                0                0
    3 network-cont     26               26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots       : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
  Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
      Generation: 39
  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 (T1, E1, or DS)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is t1-<i>fpc/pic/port</i>, whereas the E1 interface type is e1-<i>fpc/pic/port</i>, and DS interface type is ds-<i>fpc/pic/port</i>:<channel>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>Understanding Interfaces on ACX Series Universal Access Routers</i>
List of Sample Output	show interfaces (T1, IMA Link) on page 607 show interfaces (T1, PPP) on page 608 show interfaces detail (T1, PPP) on page 608 show interfaces extensive (T1 CRC Errors) on page 609 show interfaces extensive (T1, PPP) on page 609 show interfaces (E1, Frame Relay) on page 611 show interfaces detail (E1, Frame Relay) on page 612 show interfaces extensive (E1, Frame Relay) on page 613 show interfaces (E1, IMA Link) on page 615 show interfaces extensive (T1, TDM-CCC-SATOP) on page 616 show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 617
Output Fields	Table 47 on page 544 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 50: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics or (Input packets, Output packets). Flags can be one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 50: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. <ul style="list-style-type: none"> • CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). • CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). • CE Rx Forwarded—Number of forwarded bytes. • CE Strayed—Number of stray packets. • CE Lost—Number of lost packets. • CE Malformed—Number of malformed packets • CE Misinserted—Number of misinserted packets. • CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). • CE Dropped—Number of dropped packets during resynchronization • CE Overrun Events—Number of overrun events. • CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1, IMA Link)

```

user@host> show interfaces t1-1/0/0
IMA Link alarms   : None
IMA Link defects  : LIF, LODS
IMA Link state:
  Line           : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end  : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0           0  OK
LODS                  0           0  OK
Err-ICP               0           0  OK
IV                    0           0  OK
Rx-FC                  0           0  OK
Tx-FC                  0           0  OK
FE-Defects            0           0
FE-Rx-FC              0           0
FE-Tx-FC              0           0
Rx-ICP                0           0
Rx-Stuff              0           0
Tx-ICP                0          11
Tx-Stuff              0           0
Rx-SES                 0
Rx-UAS                 0
Rx-UUS                 1
Tx-UUS                 0
FE-Rx-SES              0
FE-Rx-UAS              0
FE-Rx-UUS              0
FE-Tx-UUS              0

```

show interfaces (T1, PPP)

```

user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1 alarms    : None
  DS1 defects   : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T1, PPP)

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 798 0 bps
    Input packets: 0 0 pps
    Output packets: 42 0 pps
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort    0 0 0
    1 expedited-fo  0 0 0

```

```

2 assured-forw          0          0          0
3 network-cont          40         40          0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 14, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 18

```

show interfaces extensive (T1 CRC Errors)

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
Interface index: 179, SNMP ifIndex: 79, Generation: 180
:
:
DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
DS1  defects  : AIS, LOF, CRC Major, CRC Minor
T1 media:
      Seconds      Count  State
SEF          1          1  OK
BEE          1          1  OK
AIS        1128          1 Defect Active
LOF        1128          1 Defect Active
LOS          0          0  OK
YELLOW       0          0  OK
CRC Major   154          1 Defect Active
CRC Minor   154          1 Defect Active
BPV          0          0
EXZ          0          0
LCV          0          0
PCV          0          0
CS           0          0
CRC         154        15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
    Output: 0 (last sent: never)
LCP state: Down

```

```

NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes  :                0                0 bps
Output bytes :               817               72 bps
Input packets:                0                0 pps
Output packets:              43                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo                0                0                0
2 assured-forw                0                0                0
3 network-cont              42                42                0

DS1  alarms   : None
DS1  defects  : None
T1  media:      Seconds      Count  State
SEF              1           1  OK
BEE              0           0  OK
AIS              0           0  OK
LOF              1           1  OK
LOS              0           0  OK
YELLOW           1           1  OK
BPV              1           1
EXZ              1           1
LCV              1        65535
PCV              1        1023
CS               0           0
LES              1
ES               1
SES              1
SEFS             1
BES              0
UAS              0

HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS
Buildout       : 0 to 132 feet
Byte encoding: Nx64K, 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

```

```

Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %          bps          %          usec
0 best-effort             95          1459200     95           0          low      none
3 network-control         5           76800       5           0          low      none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags      : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags        : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                : 10
    Full enquiries sent           : 1
    Enquiry responses received    : 0
    Full enquiry responses received : 0
  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 timeout   : 1
  CoS queues      : 8 supported
  Last flapped    : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1 alarms     : None
  DS1 defects    : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 1500
    Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:13 sec, Last down: 00:01:13 ago

```

```

        Input packets : 0
        Output packets: 0
    DLCI statistics:
        Active DLCI  :0  Inactive DLCI  :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 2
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 225 56 bps
    Input packets: 0 0 pps
    Output packets: 15 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

  DS1 alarms : None
  DS1 defects : None
  DS1 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 e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:

```



```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:18 sec, Last down: 00:01:18 ago
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
Enquiries sent : 10
Full enquiries sent : 2
Enquiry responses received : 0
Full enquiry responses received : 0
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 timeout : 1
CoS queues : 8 supported

```

```

Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :                0                0 bps
  Output bytes  :               225                0 bps
  Input packets :                0                0 pps
  Output packets:               15                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets

  0 limited              0                0                0
  1 expedited-fo        0                0                0
  2 real-plus           0                0                0
  3 network-cont        15               15                0

DS1  alarms   : None
DS1  defects  : None
E1  media:
  Seconds      Count  State
SEF            0       0  OK
BEE            5       5  OK
AIS            0       0  OK
LOF           245      15  OK
LOS           245       4  OK
YELLOW         0      11  OK
BPV            0       0
EXZ            9       9
LCV            0       0
PCV            0       0
CS             0       0
FEBE           0       0
LES            0
ES             0
SES            0
SEFS           0
BES            0
UAS           271

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, 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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue  Bandwidth  Buffer  Priority  Limit
                       %      bps      %      usec
  0 limited           95    1945600  95       0      low    none

```

```

3 network-control 5 102400 5 0 low none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1, IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:

```

	Seconds	Count	State
LIF		0	
LODS		0	
Err-ICP		0	
IV		0	
Rx-FC		0	
Tx-FC		0	
FE-Defects		0	
FE-Rx-FC		0	
FE-Tx-FC		0	
Rx-ICP		0	
Rx-Stuff		0	
Tx-ICP		11	
Tx-Stuff		0	
Rx-SES	0		
Rx-UAS	0		
Rx-UUS	1		
Tx-UUS	0		

```

FE-Rx-SES          0
FE-Rx-UAS          0
FE-Rx-UUS          0
FE-Tx-UUS          0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host> show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
  DS1  alarms       : None
  DS1  defects      : None
  T1  media:

```

	Seconds	Count	State
SEF	0	0	OK
BEE	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	0	0	OK
CRC Major	0	0	OK
CRC Minor	0	0	OK
BPV	0	0	
EXZ	0	0	
LCV	0	0	
PCV	0	0	
CS	0	0	
CRC	0	0	
LES	0		
ES	0		
SES	0		
SEFS	0		
BES	0		
UAS	0		

```

  SAToP configuration:
    Payload size: 192

```

```

Idle pattern: 0xFF
Octet aligned: Disabled
Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms : None
SONET defects : AIS-V, RDI-V
SONET vt:
  BIP-BIP2          0          0
  REI-V             0          0
  LOP-V             0          0 OK
  AIS-V             2          0 Defect Active
  RDI-V             2          0 Defect Active
  UNEQ-V            0          0 OK
  PLM-V             0          0 OK
  ES-V              0
  SES-V             0
  UAS-V             2
  ES-VFE            0
  SES-VFE           0
  UAS-VFE           0
Received SONET overhead:
V5 : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5 : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
  0 best-effort           95      1459200    95      0      low
none
  3 network-control       5       76800     5       0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
CE info      Packets      Bytes      Count
CE Tx        1005         192960
CE Rx        1004         192768
CE Rx Forwarded      0
CE Strayed           0
CE Lost              0
CE Malformed         0
CE Misinserted       0
CE AIS dropped        0
CE Dropped           1005         192960
CE Overrun Events      0
CE Underrun Events     0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host> show interfaces ds-1/0/0:1:1 extensive
```

```

Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort    0                0                0
    1 expedited-fo   0                0                0
    2 assured-forw   0                0                0
    3 network-cont   0                0                0

  Queue number:    Mapped forwarding classes
    0              best-effort
    1              expedited-forwarding
    2              assured-forwarding
    3              network-control

  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue
    Limit
    0 best-effort    95      1459200    95      0      low
  none
    3 network-control 5       76800     5       0      low
  none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info
    Packets  Bytes  Count
  CE Tx      0      0
  CE Rx    35712  6856704
  CE Rx Forwarded 0
  CE Strayed      0
  CE Lost         0
  CE Malformed    0
  CE Misinserted  0
  CE AIS dropped   0
  CE Dropped      0      0
  CE Overrun Events      0

```

```
CE Underrun Events                1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```

show interfaces (Channelized OC12)

Syntax	<pre>show interfaces t3-fpc/pic/port:t3channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified channelized OC12 interface.
Options	<p>t3-fpc/pic/port:t3channel—Display standard information about the specified channelized OC12 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized OC12) on page 620
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
HDLCD 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 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  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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
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: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	show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 625 show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 625 show interfaces extensive (Channelized OC12 IQ) (Physical) on page 625 show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 626 show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 626 show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 626 show interfaces extensive (DS0 on Channelized OC12 IQ) on page 626 show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 626 show interfaces extensive (T1 on Channelized OC12 IQ) on page 627
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 (DSO 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 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
...
```

show interfaces (Channelized OC3 IQ and IQE)

Syntax	<pre>show interfaces (<i>type-fpc/pic/port <:channel><:channel><:channel></i>) <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.
Options	<p><i>type-fpc/pic/port:channel:channel:channel</i>—Interface type with optional corresponding channel levels. The interface type can be one of the following:</p> <ul style="list-style-type: none"> <i>type-fpc/pic/port</i>—For the physical interface, <i>type</i> is coc3. For the clear channel, <i>type</i> is so (for OC3). <i>type-fpc/pic/port:channel</i>—At the first level of channelization, <i>type</i> can be coc1 (channelized OC1), ct3 (from coc1), or t3 (from coc1). <i>type-fpc/pic/port:channel:channel</i>—At the second level of channelization, <i>type</i> can be ct1 (from coc1 or ct3) or t1 (from coc1 or ct3). <i>type-fpc/pic/port:channel:channel:channel</i>—At the third level of channelization, <i>type</i> can be ds (from ct1). <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (Channelized OC3 IQ) (Physical) on page 642</p> <p>show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 643</p> <p>show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 644</p> <p>show interfaces extensive (DSO on Channelized OC3 IQ) on page 645</p>
Output Fields	Table 43 on page 478 lists the output fields for the show interfaces (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 51: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be Internal or External . Clocking is configured and displayed only for channel 0.	All levels
Framing mode	Framing mode: SONET or SDH .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16-bit .	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI). The format is (ANSI or ITU) LMI settings: <i>value</i>, <i>value... nn</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	All levels
LMI statistics	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last sent hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hh:mm:ss timezone year-month-day (hh:mm:ss ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
DS1 alarms DS1 defects	<p>Elor T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 or E1 media-specific error types are:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bit error seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • HS link FIFO overflows—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • HS link FIFO underflows—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Egress queues	Total number of egress queues supported on the specified interface.	detail extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
Active alarms	Defects that can prevent the interface from passing packets:	detail extensive
Active defects	<ul style="list-style-type: none"> • None—There are no active defects or alarms. • LOF—Loss of frame. 	
SONET alarms	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	All levels
SONET defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SONET PHY , SONET section , SONET line , and SONET path .	

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET vt	<p>SONET virtual-tributary (VT) alarms and defects:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-V—Remote error indication (near-end VT) • LOP-V—Loss of pointer (near-end VT) • AIS-V—Alarm indication signal (near-end VT) • RDI-V—Remote defect indication (near-end VT) • UNEQ-V—Unequipped (near-end VT) • PLM-V—Payload label mismatch (near-end VT) • ES-V—Errored seconds (near-end VT) • SES-V—Severely errored seconds (near-end VT) • UAS-V—Unavailable seconds (near-end VT) • ES-VFE—Errored seconds (far-end VT) • SES-VFE—Severely errored seconds (far-end VT) • UAS-VFE—Unavailable seconds (far-end VT) 	extensive
SONET PHY	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SONET section	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B1—Bit interleaved parity for SONET section overhead • SEF—Severely errored framing • LOS—Loss of signal • LOL—Loss of light • LOF—Loss of frame • ES-S—Errored seconds (section) • SES-S—Severely errored seconds (section) • SEFS-S—Severely errored framing seconds (section) 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET line	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-L—Remote error indication (near-end line) • RDI-L—Remote defect indication (near-end line) • AIS-L—Alarm indication signal (near-end line) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • ES-L—Errored seconds (near-end line) • SES-L—Severely errored seconds (near-end line) • UAS-L—Unavailable seconds (near-end line) • ES-LFE—Errored seconds (far-end line) • SES-LFE—Severely errored seconds (far-end line) • UAS-LFE—Unavailable seconds (far-end line) 	extensive
SONET path	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B3—Bit interleaved parity for SONET section overhead • REI-P—Remote error indication • LOP-P—Loss of pointer (path) • AIS-P—Path alarm indication signal • RDI-P—Path remote defect indication • UNEQ-P—Path unequipped • PLM-P—Path payload (signal) label mismatch • ES-P—Errored seconds (near-end STS path) • SES-P—Severely errored seconds (near-end STS path) • UAS-P—Unavailable seconds (near-end STS path) • ES-PFE—Errored seconds (far-end STS path) • SES-PFE—Severely errored seconds (far-end STS path) • UAS-PFE—Unavailable seconds (far-end STS path) 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SONET overhead	Values of the received and transmitted SONET/SDH overhead:	extensive
Transmitted SONET overhead	<p>F1—Section user channel byte. This byte is set aside for the purposes of users.</p> <p>S1—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-N. Bits 5 through 8 convey the synchronization status of the network element.</p> <p>Z3 and Z4—Path overhead.</p> <p>V5—Virtual Tributary (VT) path overhead byte.</p>	
SDH alarms	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.	All levels
SDH defects	<p>NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the show interface coc3 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i>. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mode—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling. It can be Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. It can be Disabled or display units in kbps. • FEAC loopback—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
BERT configuration	<p>(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. <ul style="list-style-type: none"> • Input rate—Rate of bits and packets received on the interface. • Output rate—Rate of bits and packets transmitted on the interface. 	detail extensive
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 51: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```

user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0

```

```

Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
Loopback: None, Parent: None
Device flags : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
CoS queues : 4 supported
Last flapped : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
Statistics last cleared: Never
SONET alarms : PLL, LOS
SONET defects : PLL, LOF, LOS, SEF, AIS-L
SONET PHY:
  Seconds      Count      State
  PLL Lock     681767      1 PLL Lock Error
  PHY Light     0          0 OK
SONET section:
  BIP-B1        0          0
  SEF           681767      1 Defect Active
  LOS           681767      1 Defect Active
  LOF           681767      1 Defect Active
  ES-S          681767
  SES-S         681767
  SEFS-S        681767
SONET line:
  BIP-B2        0          0
  REI-L         0          0
  RDI-L         0          0 OK
  AIS-L         681767      1 Defect Active
  BERR-SF       0          0 OK
  BERR-SD       0          0 OK
  ES-L          681767
  SES-L         681767
  UAS-L         681757
  ES-LFE        0
  SES-LFE       0
  UAS-LFE       0
Received SONET overhead:
  F1 : 0x00, J0 : 0x00, K1 : 0xff, K2 : 0xff
  S1 : 0xff
Transmitted SONET overhead:
  F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
  S1 : 0x00

```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
Interface index: 133, SNMP ifIndex: 27, Generation: 16
Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

Loopback: None, Parent: coc3-0/0/0
Interface index 128
Device flags : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
CoS queues : 4 supported
Last flapped : 2005-02-04 14:51:07 PST (00:00:35 ago)
Statistics last cleared: Never
SONET alarms : None
SONET defects : AIS-P
SONET path:

```

```

BIP-B3                0          0
REI-P                 0          0
LOP-P                 0          0 OK
AIS-P                 36          1 Defect Active
RDI-P                 0          0 OK
UNEQ-P                0          0 OK
PLM-P                 0          0 OK
ES-P                  36
SES-P                  36
UAS-P                  26
ES-PFE                 0
SES-PFE                 0
UAS-PFE                 0
Received SONET overhead:
  C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
Received path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace: router-1 coc1-0/0/0:1
6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 134, SNMP ifIndex: 62, Generation: 17
Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
Device flags   : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
Statistics last cleared: Never
DS1 alarms    : None
DS1 defects   : AIS, LOF
T1 media:
  Seconds      Count  State
SEF            1       1 OK
BEE            1       1 OK
AIS           18       1 Defect Active
LOF           18       1 Defect Active
LOS            0       0 OK
YELLOW         0       0 OK
BPV            0       0
EXZ            0       0
LCV            0       0
PCV            0       0
CS             0       0
LES           18
ES            18

```



```

SES                      18
SEFS                     18
BES                      0
UAS                      14
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms   : None
SONET defects  : None
SONET vt:
  BIP-BIP2      0          0
  REI-V         0          0
  LOP-V         0          0 OK
  AIS-V        19          1 Defect Active
  RDI-V        19          1 Defect Active
  UNEQ-V        0          0 OK
  PLM-V        19          1 Defect Active
  ES-V         19
  SES-V        19
  UAS-V         9
  ES-VFE       0
  SES-VFE      0
  UAS-VFE      0
Received SONET overhead:
  V5       : 0x07, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5       : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ds-0/0/0:1:1
Physical interface: ds-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 135, SNMP ifIndex: 63, Generation: 18
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1 Interface index 134
Device flags   : Present Running
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : Keepalives
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : Never
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, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort      0              0              0
  1 expedited-fo     0              0              0

```

2 assured-forw	0	0	0
3 network-cont	0	0	0

HDLC configuration:

Giant threshold: 1514, Runt threshold: 2

Timeslots : 1-5

Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared**DS0 BERT configuration:**

BERT time period: 10 seconds, Elapsed: 0 seconds

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

Packet Forwarding Engine configuration:

Destination slot: 0, PLP byte: 4 (0x00)

show interfaces (Aggregated SONET/SDH)

Syntax	<pre>show interfaces <i>asnumber</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified aggregated SONET/SDH interface.
Options	<p><i>asnumber</i>—Display standard information about the specified aggregated SONET/SDH interface.</p> <p><i>brief detail extensive terse</i>—(Optional) Display brief, detail, or extensive information about the interface.</p> <p><i>descriptions</i>—(Optional) Display interface description strings.</p> <p><i>media</i>—(Optional) Display media-specific information about network interfaces.</p> <p><i>snmp-index snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><i>statistics</i>—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Understanding Aggregated SONET/SDH Interfaces
List of Sample Output	show interfaces (Aggregated SONET) on page 651 show interfaces brief (Aggregated SONET) on page 651 show interfaces detail (Aggregated SONET) on page 651 show interfaces extensive (Aggregated SONET) on page 652
Output Fields	Table 52 on page 647 lists the output fields for the show interfaces (aggregated SONET/SDH) command. Output fields are listed in the approximate order in which they appear.

Table 52: Aggregated SONET/SDH show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 52: Aggregated SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Minimum links needed	Number of child links that must be operational for the aggregated interface to be operational.	detail extensive none
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. 	All levels
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 52: Aggregated SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	<p>Number of bytes and packets received and transmitted on the physical interface, and the traffic rate in bits per seconds (bps).</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface whose definitions are as follows:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • Resource errors—Sum of transmit drops. 	extensive
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Egress queues	Total number of egress queues supported on the specified interface.	detail extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels

Table 52: Aggregated SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Index	Logical interface's index number (which reflects its initialization sequence).	detail extensive none
SNMP ifIndex	Logical interface's SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Interface bandwidth.	detail extensive none
Statistics	<p>Information about fragments and packets received and sent by the router. All references to traffic direction (input or output) are defined with respect to the router. Input fragments received by the router are assembled into input packets; output packets are segmented into output fragments for transmission out of the router.</p> <p>Statistics include input and output counts for packets, packets per second (pps), bytes, and bytes per second (Bps) for the following entities:</p> <ul style="list-style-type: none"> • Bundle—Information about bundles. • Link—Information about links used in the multilink operation. 	detail extensive none
<i>protocol-family</i>	Protocol family configured on the logical interface. If the protocol is inet , the source and destination address are also displayed.	brief
Protocol	Protocol family configured on the logical interface.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under <i>Common Output Fields Description</i> .	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 52: Aggregated SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive

Sample Output

show interfaces (Aggregated SONET)

```

user@host> show interfaces as0
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : Never
  Input rate     : 216 bps (1 pps)
  Output rate    : 48 bps (0 pps)

Logical interface as0.0 (Index 79) (SNMP ifIndex 55)
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
  Bandwidth: 311040kbps
  Statistics
    Packets      pps      Bytes      bps
  Bundle:
    Input :      1178      1      11772      176
    Output:         0         0         0         0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.100.1.1, Local: 10.100.1.2

```

show interfaces brief (Aggregated SONET)

```

user@host> show interfaces as0 brief
Physical interface: as0, Enabled, Physical link is Up
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3

Logical interface as0.0
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
  inet 10.100.1.2 --> 10.100.1.1

```

show interfaces detail (Aggregated SONET)

```

user@host> show interfaces as0 detail
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000

```

```

Link flags      : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Last flapped   : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          15888          272 bps
  Output bytes :          6189          48 bps
  Input packets:          1547           2 pps
  Output packets:          393           0 pps
Egress queues: 4 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort          0              0              0
  1 expedited-fo         0              0              0
  2 assured-forw         0              0              0
  3 network-cont        196806          196806            0

```

```

Logical interface as0.0 (Index 79) (SNMP ifIndex 55) (Generation 18)
Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
Bandwidth: 311040kbps
Statistics      Packets      pps      Bytes      bps
Bundle:
  Input :          1334          2      13332      232
  Output:           0           0           0           0
Link:
  so-0/0/0.0 <-- down
    Input :           0           0           0           0
    Output:           0           0           0           0
  so-0/0/1.0
    Input :          541          1      5406      120
    Output:           0           0           0           0
  so-0/0/2.0
    Input :          793          1      7926      112
    Output:           0           0           0           0
Protocol inet, MTU: 4470, Generation: 38, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.100.1.1, Local: 10.100.1.2, Broadcast: Unspecified,
Generation: 40

```

show interfaces extensive (Aggregated SONET)

```

userhost1> show interfaces as0 extensive
Physical interface: as0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Link flags     : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Last flapped   : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          17562          136 bps
  Output bytes :           6862           72 bps
  Input packets:          1710           1 pps
  Output packets:          436           0 pps

```


Input errors:

Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
 Policed discards: 0, Resource errors: 0

Output errors:

Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
 Resource errors: 0

Egress queues: 4 supported, 4 in use

Queue counters:	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	196848	196848	0

Logical interface as0.0 (Index 79) (SNMP ifIndex 55) (Generation 18)

Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP

Bandwidth: 311040kbps

Statistics	Packets	pps	Bytes	bps
------------	---------	-----	-------	-----

Bundle:

Input :	1475	1	14742	136
Output:	0	0	0	0

Link:

so-0/0/0.0 <-- down

Input :	0	0	0	0
Output:	0	0	0	0

so-0/0/1.0

Input :	598	0	5976	24
Output:	0	0	0	0

so-0/0/2.0

Input :	877	1	8766	112
Output:	0	0	0	0

Protocol inet, MTU: 4470, Generation: 38, Route table: 0

Flags: None

Addresses, Flags: Is-Preferred Is-Primary

Destination: 10.100.1.1, Local: 10.100.1.2, Broadcast: Unspecified,
 Generation: 40

show interfaces (Channelized DS3-to-DS0)

Syntax	<pre>show interfaces ds-fpc/pic/port:t1channel:ds0channel <brief detail extensive> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.
Options	<p>ds-fpc/pic/port:t1channel:ds0channel—Display standard information about the specified channelized DS3-to-DS0 interface.</p> <p>brief detail extensive—(Optional) Display the specified level of output interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized DS3-to-DS0) on page 662
Output Fields	Table 41 on page 440 lists the output fields for the show interfaces (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 53: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link’s status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value, value...xx seconds, where value can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last seen hh:mm:ss ago). 	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Not-configured—LCP is not configured on the interface. Opened—LCP negotiation is successful. 	detail extensive none
NCP state	<p>(PPP) Network Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Not-configured—NCP is not configured on the interface. Opened—NCP negotiation is successful. 	detail extensive none

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication). • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone hh:mm:ss ago</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. 	extensive
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 alarms	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	detail extensive none
DS1 defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	
T1 media	Counts of T1 media-specific errors. <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error event • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • LES—Line error seconds • ES—Errored seconds • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • BES—Bit error seconds • UAS—Unavailable seconds 	extensive

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Remote defect indication • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CCV—C-bit coding violation • LES—Line error seconds • PES—P-bit errored seconds • PSES—P-bit errored seconds (section) • CES—C-bit errored seconds • CSES—C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none

Table 53: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	detail extensive none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```

user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  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 : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :           6814           16 bps
    Output bytes  :          28840           72 bps
    Input packets :           568           0 pps
    Output packets:           893           0 pps
  Input errors:

```

Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
 L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
 HS link CRC errors: 0

Output errors:

Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0

DS1 alarms : None

DS3 alarms : None

DS1 defects : None

DS3 defects : None

T1 media:	Seconds	Count	State
SEF	0	0	OK
BEE	5	1	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	17	1	OK
BPV	0	0	
EXZ	0	0	
LCV	5	27765	
PCV	0	0	
CS	0	0	
LES	0		
ES	0		
SES	5		
SEFS	10		
BES	0		
UAS	0		

DS3 media:	Seconds	Count	State
PLL Lock	0	0	OK
Reframing	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
IDLE	0	0	OK
YELLOW	0	0	OK
BPV	1	65535	
EXZ	1	65535	
LCV	2	131070	
PCV	1	1825	
CCV	0	0	
LES	1		
PES	1		
PSES	1		
CES	0		
CSES	0		
SEFS	0		
UAS	0		

Interface transmit queues:

	B/W	WRR	Packets	Bytes	Drops	Errors
Queue0	95	95	0	0	0	0
Queue1	5	5	893	28840	0	0

HDLC configuration:

Giant threshold: 1514, Runt threshold: 3

Timeslots : 1-10

Byte encoding: Nx64K, Data inversion: Disabled

DS3 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Algorithm: 2^15 - 1, Induced error rate: 10e-0

DS1 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

```
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x01)
  CoS information:    CoS transmit queue      Bandwidth      Buffer
Priority  Limit
           %          bps  %          usec
  0 best-effort      95    608000  95          0    low  none
  3 network-control  5     32000   5          0    low  none
Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
(Generation 943)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 949, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 1849
```

show interfaces (Channelized DS3-to-DS1)

Syntax	<pre>show interfaces t1-fpc/pic/port:t1channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.
Options	<p>t1-fpc/pic/port:t1channel—Display standard information about the specified channelized DS3-to-DS1 interface.</p> <p>brief detail extensive terse—(Optional) Display brief, detail, extensive, or terse information about the interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (channelized DS3-to-DS1) on page 665
Output Fields	See the output field table for the show interfaces (Channelized DS3-to-DS0) command.

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```
user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  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 : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mp1s:
```

```

Not-configured
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          944          16 bps
  Output bytes :        1162          16 bps
  Input packets:          66           0 pps
  Output packets:         82           0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1  alarms : None
DS3  alarms : None
DS1  defects : None
DS3  defects : None
T1 media:
  Seconds      Count  State
SEF           0         0 OK
BEE          11         5 OK
AIS          28         1 OK
LOF          27         1 OK
LOS           0         0 OK
YELLOW       23         1 OK
BPV           0         0
EXZ           0         0
LCV          11       20574
PCV           0         0
CS            0         0
LES          28
ES           28
SES          39
SEFS         50
BES           0
UAS           0
DS3 media:
  Seconds      Count  State
PLL Lock      0         0 OK
Reframing     0         0 OK
AIS           0         0 OK
LOF           1         1 OK
LOS           1         1 OK
IDLE          0         0 OK
YELLOW        0         0 OK
BPV           2       131070
EXZ           3       49910
LCV           5       180980
PCV           2        327
CCV          12       264558
LES           3
PES           3
PSES          2
CES           13
CSES          13
SEFS           1
UAS           35
Interface transmit queues:
  B/W  WRR  Packets  Bytes  Drops  Errors
Queue0  95  95      0      0      0      0
Queue1   5   5      82    1162    0      0

```

```

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00) CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %             bps    %       usec
  0 best-effort           95           608000 95         0      low  none
  3 network-control       5            32000  5         0      low  none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Bandwidth: 0
Protocol inet, MTU: 1500, Generation: 576, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 977

```

show interfaces (Channelized E1 IQ)

Syntax	<code>show interfaces (ce1-fpc/pic/port type-fpc/pic/port<:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.
Options	<p>type-fpc/pic/port:<channel>—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, type is ce. For the clear channel, type is e1. At the first level of channelization, type is ds.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces (Channelized E1 IQ) (Physical) on page 668</p> <p>show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 669</p> <p>show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 670</p> <p>show interfaces detail (Clear Channel E1) on page 671</p>
Output Fields	For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```

user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal, Speed:
E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  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
Last flapped : 2002-10-04 17:52:51 PDT (00:32:57 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
DS1 alarms : None
DS1 defects : None

```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```

user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
Interface index: 151, SNMP ifIndex: 63, Generation: 34
Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
Loopback: None, FCS: 16,
Parent: ce1-0/3/4 Interface index 150
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
CHAP state: Closed
CoS queues : 4 supported, 4 maximum usable queues
Last flapped : Never
Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 6070570 224 bps
  Input packets: 0 0 pps
  Output packets: 209330 0 pps
Input errors:
  Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
HDLC configuration:
  Giant threshold: 1528, Runt threshold: 2
  Timeslots : 1
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
  Route table: 0

```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```

user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times    : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent           : 0
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 timeout : 0
  CoS queues : 4 supported, 4 maximum usable queues
  Last flapped : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  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: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
    Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared

```

```

DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x01)

Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
    Input bytes : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  Local statistics:
    Input bytes : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  Transit statistics:
    Input bytes : 0 0 bps
    Output bytes : 0 0 bps
    Input packets: 0 0 pps
    Output packets: 0 0 pps
  Protocol mlfrr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
table: 0
  DLCI 10
    Flags: Active
    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 :1 Inactive DLCI :0

```

show interfaces detail (Clear Channel E1)

```

user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...

```

show interfaces (Channelized E1)

Syntax	<pre>show interfaces ds-fpc/pic/port:ds0channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information the specified channelized E1 interface.
Options	<p>ds-fpc/pic/port:ds0channel—Display standard information about the specified channelized E1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized E1) on page 680
Output Fields	Table 42 on page 458 lists the output fields for the show interfaces (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> Interval <i>seconds</i>—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. Down-count <i>number</i>—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. Up-count <i>number</i>—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago) Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings). 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone (hour:minute:second ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	<p>Number of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets larger than the MTU threshold. • Resource errors—Sum of transmit drops. 	extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The E1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBS—Far-end block error • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encodingHDB3—Line encoding used. 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each DSO channel on the Channelized E1 to DSO PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSx BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

Table 54: Channelized E1 and Channelized E1 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> Input bytes—Number of bytes received on the interface. Output bytes—Number of bytes transmitted on the interface. Input packets—Number of packets received on the interface. Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> Active—Set when the link is active and the DTE and DCE are exchanging information. Down—Set when link is active, but no information is received from the DCE. Unconfigured—Set when the corresponding DLCI in the DCE is not configured. Configured—Set when the corresponding DLCI in the DCE is configured. Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> Active DLCI—Number of active DLCIs. Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

```

Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
Interface index: 163, SNMP ifIndex: 37, Generation: 46
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags   : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported, 4 maximum usable queues
Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 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, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
DS1 alarms   : LOF, LOS
DS1 defects  : LOF, LOS
E1 media:
Seconds      Count  State
SEF          982318    1 Defect Active
BEE           0         0 OK
AIS           0         0 OK
LOF          982318    1 Defect Active
LOS          982318    1 Defect Active
YELLOW        0         0 OK
BPV           1         1
EXZ           1         1
LCV           1         1
PCV           1         2
CS            0         0
FEBE          1         9
LES           1
ES           982318
SES           982318
SEFS          982318
BES           1
UAS           0
Interface transmit queues:
      B/W  WRR    Packets    Bytes    Drops    Errors
Queue0   95   95         0         0         0         0
Queue1    5    5         0         0         0         0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots      : 31
Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared
DS1 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^11 - 1, 0.152 and 0.153 (2047 type),
Pseudorandom (8)
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 2 (0x1b)
CoS information:
CoS transmit queue    Bandwidth    Buffer    Priority    Limit

```

		%	bps	%	usec		
0	best-effort	95	1945600	95	0	low	none
3	network-control	5	102400	5	0	low	none

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: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	show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 684 show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 684 show interfaces extensive (Channelized OC12 IQ) (Physical) on page 684 show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 685 show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 685 show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 685 show interfaces extensive (DS0 on Channelized OC12 IQ) on page 685 show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 685 show interfaces extensive (T1 on Channelized OC12 IQ) on page 686
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 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
...
```

show interfaces (Channelized OC12)

Syntax	<code>show interfaces t3-fpc/pic/port:t3channel</code> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified channelized OC12 interface.
Options	<p><code>t3-fpc/pic/port:t3channel</code>—Display standard information about the specified channelized OC12 interface.</p> <p><code>brief detail extensive terse</code>—(Optional) Display the specified level of output.</p> <p><code>descriptions</code>—(Optional) Display interface description strings.</p> <p><code>media</code>—(Optional) Display media-specific information about network interfaces.</p> <p><code>snmp-index <i>snmp-index</i></code>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><code>statistics</code>—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized OC12) on page 687
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
HDLCD 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  t3-0/3/0:0:0.....
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00  t3-0/3/0:0:0.....
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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
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 OC3 IQ and IQE)

Syntax	<pre>show interfaces (<i>type-fpc/pic/port</i> <:<i>channel</i>><:<i>channel</i>><:<i>channel</i>>) <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.
Options	<p><i>type-fpc/pic/port:channel:channel:channel</i>—Interface type with optional corresponding channel levels. The interface type can be one of the following:</p> <ul style="list-style-type: none"> <i>type-fpc/pic/port</i>—For the physical interface, <i>type</i> is coc3. For the clear channel, <i>type</i> is so (for OC3). <i>type-fpc/pic/port:channel</i>—At the first level of channelization, <i>type</i> can be coc1 (channelized OC1), ct3 (from coc1), or t3 (from coc1). <i>type-fpc/pic/port:channel:channel</i>—At the second level of channelization, <i>type</i> can be ct1 (from coc1 or ct3) or t1 (from coc1 or ct3). <i>type-fpc/pic/port:channel:channel:channel</i>—At the third level of channelization, <i>type</i> can be ds (from ct1). <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (Channelized OC3 IQ) (Physical) on page 705</p> <p>show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 706</p> <p>show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 707</p> <p>show interfaces extensive (DSO on Channelized OC3 IQ) on page 708</p>
Output Fields	Table 43 on page 478 lists the output fields for the show interfaces (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 55: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be Internal or External . Clocking is configured and displayed only for channel 0.	All levels
Framing mode	Framing mode: SONET or SDH .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16-bit .	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI). The format is (ANSI or ITU) LMI settings: <i>value, value... nn</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	All levels
LMI statistics	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last sent hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hh:mm:ss timezone year-month-day (hh:mm:ss ago)</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS Queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
DS1 alarms DS1 defects	<p>Elor T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 or E1 media-specific error types are:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bit error seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • HS link FIFO overflows—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • Resource errors—Sum of transmit drops. 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • HS link FIFO underflows—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Egress queues	Total number of egress queues supported on the specified interface.	detail extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
Active alarms	Defects that can prevent the interface from passing packets:	detail extensive
Active defects	<ul style="list-style-type: none"> • None—There are no active defects or alarms. • LOF—Loss of frame. 	
SONET alarms	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	All levels
SONET defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SONET PHY , SONET section , SONET line , and SONET path .	

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET vt	<p>SONET virtual-tributary (VT) alarms and defects:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-V—Remote error indication (near-end VT) • LOP-V—Loss of pointer (near-end VT) • AIS-V—Alarm indication signal (near-end VT) • RDI-V—Remote defect indication (near-end VT) • UNEQ-V—Unequipped (near-end VT) • PLM-V—Payload label mismatch (near-end VT) • ES-V—Errored seconds (near-end VT) • SES-V—Severely errored seconds (near-end VT) • UAS-V—Unavailable seconds (near-end VT) • ES-VFE—Errored seconds (far-end VT) • SES-VFE—Severely errored seconds (far-end VT) • UAS-VFE—Unavailable seconds (far-end VT) 	extensive
SONET PHY	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SONET section	<p>Counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B1—Bit interleaved parity for SONET section overhead • SEF—Severely errored framing • LOS—Loss of signal • LOL—Loss of light • LOF—Loss of frame • ES-S—Errored seconds (section) • SES-S—Severely errored seconds (section) • SEFS-S—Severely errored framing seconds (section) 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET line	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-L—Remote error indication (near-end line) • RDI-L—Remote defect indication (near-end line) • AIS-L—Alarm indication signal (near-end line) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • ES-L—Errored seconds (near-end line) • SES-L—Severely errored seconds (near-end line) • UAS-L—Unavailable seconds (near-end line) • ES-LFE—Errored seconds (far-end line) • SES-LFE—Severely errored seconds (far-end line) • UAS-LFE—Unavailable seconds (far-end line) 	extensive
SONET path	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information:</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B3—Bit interleaved parity for SONET section overhead • REI-P—Remote error indication • LOP-P—Loss of pointer (path) • AIS-P—Path alarm indication signal • RDI-P—Path remote defect indication • UNEQ-P—Path unequipped • PLM-P—Path payload (signal) label mismatch • ES-P—Errored seconds (near-end STS path) • SES-P—Severely errored seconds (near-end STS path) • UAS-P—Unavailable seconds (near-end STS path) • ES-PFE—Errored seconds (far-end STS path) • SES-PFE—Severely errored seconds (far-end STS path) • UAS-PFE—Unavailable seconds (far-end STS path) 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SONET overhead	Values of the received and transmitted SONET/SDH overhead:	extensive
Transmitted SONET overhead	<p>F1—Section user channel byte. This byte is set aside for the purposes of users.</p> <p>S1—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-N. Bits 5 through 8 convey the synchronization status of the network element.</p> <p>Z3 and Z4—Path overhead.</p> <p>V5—Virtual Tributary (VT) path overhead byte.</p>	
SDH alarms	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.	All levels
SDH defects	<p>NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the show interface coc3 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i>. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mode—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling. It can be Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. It can be Disabled or display units in kbps. • FEAC loopback—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
BERT configuration	<p>(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. <ul style="list-style-type: none"> • Input rate—Rate of bits and packets received on the interface. • Output rate—Rate of bits and packets transmitted on the interface. 	detail extensive
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 55: Channelized OC show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```

user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0

```

```

Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
Loopback: None, Parent: None
Device flags : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
CoS queues : 4 supported
Last flapped : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
Statistics last cleared: Never
SONET alarms : PLL, LOS
SONET defects : PLL, LOF, LOS, SEF, AIS-L
SONET PHY:
  Seconds      Count      State
  PLL Lock     681767      1 PLL Lock Error
  PHY Light     0          0 OK
SONET section:
  BIP-B1        0          0
  SEF           681767      1 Defect Active
  LOS           681767      1 Defect Active
  LOF           681767      1 Defect Active
  ES-S          681767
  SES-S         681767
  SEFS-S        681767
SONET line:
  BIP-B2        0          0
  REI-L         0          0
  RDI-L         0          0 OK
  AIS-L         681767      1 Defect Active
  BERR-SF       0          0 OK
  BERR-SD       0          0 OK
  ES-L          681767
  SES-L         681767
  UAS-L         681757
  ES-LFE        0
  SES-LFE       0
  UAS-LFE       0
Received SONET overhead:
  F1 : 0x00, J0 : 0x00, K1 : 0xff, K2 : 0xff
  S1 : 0xff
Transmitted SONET overhead:
  F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
  S1 : 0x00

```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
Interface index: 133, SNMP ifIndex: 27, Generation: 16
Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

Loopback: None, Parent: coc3-0/0/0
Interface index 128
Device flags : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
CoS queues : 4 supported
Last flapped : 2005-02-04 14:51:07 PST (00:00:35 ago)
Statistics last cleared: Never
SONET alarms : None
SONET defects : AIS-P
SONET path:

```

```

BIP-B3                0          0
REI-P                 0          0
LOP-P                 0          0 OK
AIS-P                 36         1 Defect Active
RDI-P                 0          0 OK
UNEQ-P                0          0 OK
PLM-P                 0          0 OK
ES-P                  36
SES-P                  36
UAS-P                  26
ES-PFE                 0
SES-PFE                 0
UAS-PFE                 0
Received SONET overhead:
  C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace: router-1 coc1-0/0/0:1
  6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
  30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 134, SNMP ifIndex: 62, Generation: 17
Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
Device flags   : Present Running Down 16384
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
Statistics last cleared: Never
DS1 alarms    : None
DS1 defects   : AIS, LOF
T1 media:
  Seconds      Count  State
  SEF          1       1 OK
  BEE          1       1 OK
  AIS          18       1 Defect Active
  LOF          18       1 Defect Active
  LOS          0       0 OK
  YELLOW       0       0 OK
  BPV          0       0
  EXZ          0       0
  LCV          0       0
  PCV          0       0
  CS           0       0
  LES         18
  ES          18

```

```

SES                      18
SEFS                     18
BES                      0
UAS                      14
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms   : None
SONET defects  : None
SONET vt:
  BIP-BIP2      0          0
  REI-V         0          0
  LOP-V         0          0 OK
  AIS-V        19          1 Defect Active
  RDI-V        19          1 Defect Active
  UNEQ-V        0          0 OK
  PLM-V        19          1 Defect Active
  ES-V         19
  SES-V        19
  UAS-V         9
  ES-VFE       0
  SES-VFE      0
  UAS-VFE      0
Received SONET overhead:
  V5           : 0x07, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5           : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```

user@host> show interfaces extensive ds-0/0/0:1:1
Physical interface: ds-0/0/0:1:1, Enabled, Physical link is Down
Interface index: 135, SNMP ifIndex: 63, Generation: 18
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1 Interface index 134
Device flags   : Present Running
Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
Link flags     : Keepalives
Hold-times    : Up 0 ms, Down 0 ms
CoS queues    : 4 supported
Last flapped  : Never
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, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort      0              0              0

  1 expedited-fo     0              0              0

```


2 assured-forw	0	0	0
3 network-cont	0	0	0

HDLC configuration:

Giant threshold: 1514, Runt threshold: 2

Timeslots : 1-5

Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared**DS0 BERT configuration:**

BERT time period: 10 seconds, Elapsed: 0 seconds

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

Packet Forwarding Engine configuration:

Destination slot: 0, PLP byte: 4 (0x00)

show interfaces (Channelized OC48 IQ and IQE)

Syntax	<pre>show interfaces coc48-fpc/pic/port:channel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 12.3.
Description	Display status information about the specified channelized OC48 interface.
Options	<p>coc48-fpc/pic/port:channel—Display standard information about the specified channelized OC48 interface as shown in the sample output.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized OC48 IQ) on page 710
Output Fields	See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (Channelized OC48 IQ)

```
user@host> show interfaces coc48-4/1/0 extensive
Physical interface: coc48-4/1/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 550, Generation: 141
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC48,
Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-07-10 01:55:53 PDT (00:50:07 ago)
  Statistics last cleared: Never
  Interface preservation: disabled
  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                    0          0 OK
LOS                    0          0 OK
LOF                    0          0 OK
ES-S                   0
SES-S                   0
SEFS-S                  0
SONET line:
BIP-B2                 0          0
REI-L                  0
RDI-L                  0          0 OK
AIS-L                  0          0 OK
BERR-SF                0          0 OK
BERR-SD                0          0 OK
ES-L                   0
SES-L                  0
UAS-L                  0
ES-LFE                 0
SES-LFE                 0
UAS-LFE                 0
Received SONET overhead:
F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
S1      : 0x00
Transmitted SONET overhead:
F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
S1      : 0x00

```

show interfaces (Channelized STM1 IQ)

Syntax	<pre>show interfaces (type-fpc/pic/port <:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized STM1 IQ interface.
Options	<p>type-fpc/pic/port:channel:channel—Interface type with optional corresponding channel levels. The interface type can be one of the following types:</p> <ul style="list-style-type: none"> type-fpc/pic/port:channel—For the physical channelized STM1 IQ interface, type is cstm1. For the clear channel, type is so. For channelization, the STM1 IQ interface must be converted to interface type cau4. type-fpc/pic/port:channel—At the first level of channelization, type can be ce1 or e1 (clear channel or fractional channel from cau4). type-fpc/pic/port:channel:channel—At the second level of channelization, type is ds (from ce1). <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces (Channelized STM1 IQ) (Physical) on page 712 show interfaces (Channelized AU-4) (Physical) on page 713 show interfaces (Channelized E1) (Physical) on page 713 show interfaces (DS) on page 714
Output Fields	See the output field table for the show interfaces (Channelized STM1) command.

Sample Output

show interfaces (Channelized STM1 IQ) (Physical)

```
user@host> show interfaces cstm1-0/0/0
```

```

Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 35
Link-level type: Frame-relay, Controller, Clocking: Internal, SDH mode,
Speed: OC3, Loopback: None, Parent: None 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
Last flapped : 2003-02-06 15:01:56 PST (07:15:06 ago)
...

```

show interfaces (Channelized AU-4) (Physical)

```

user@host> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
Interface index: 147, SNMP ifIndex: 36
Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: cstm1-0/0/0 Interface index 146
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags : None
Last flapped : 2003-02-06 19:36:31 PST (02:40:42 ago)
SDH alarms : None
SDH defects : None
...

```

show interfaces (Channelized E1) (Physical)

```

user@host> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
Interface index: 169, SNMP ifIndex: 288
Link-level type: Frame-relay, Controller, Clocking: Internal, Speed: E1,
Loopback: None, Framing: G704, Parent: cau4-0/0/0 Interface index 147
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
Last flapped   : 2003-02-06 22:05:23 PST (00:13:45 ago)
DS1  alarms   : None
DS1  defects  : None
SDH   alarms  : None
SDH   defects : None
...

```

show interfaces (DS)

```

user@host> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 289
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: Illegal, FCS: 16, Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS Queues: 8 maximum usable queues, 4 in use
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  Egress queues: 8 supported, 4 in use
...
Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.134.1.0/30, Local: 10.134.1.1
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
...

```

show interfaces (Channelized STM1)

Syntax	<pre>show interfaces e1-fpc/pic/port:elchannel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized STM1 interface.
Options	<p>e1-fpc/pic/port:elchannel—Display standard status information about the specified channelized STM1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized STM1, SDH) on page 726
Output Fields	Table 44 on page 499 lists the output fields for the show interfaces (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 56: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> intervalseconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
ANSI LMI settings or ITU LMI settings	<p>(Frame Relay) Local Management Interface settings. The format is (ANSI or ITU) LMI settings: <i>value, value...xx</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1- 255) n392dce—DCE error threshold (1-10) n392dte—DTE error threshold (1-10) n393dce—DCE monitored event count (1-10) n393dte—DTE monitored event count (1-10) t391dte—DTE polling timer (5-30 seconds) t392dce—DCE polling verification timer (5-30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> Unknown messages received—Number of received packets that do not fall into any category. Asynchronous updates received—Number of link status peer changes received. Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgment was received. Conf-ack-sent—Acknowledgment was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Not-configured—LCP is not configured on the interface. Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgment was received. Conf-ack-sent—Acknowledgment was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Not-configured—NCP is not configured on the interface. Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> Chap-Chal-received—Challenge was received but response not yet sent. Chap-Chal-sent—Challenge was sent. Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) Chap-Resp-sent—Response was sent for the challenge received. Closed—CHAP authentication is incomplete. Failure—CHAP authentication failed. Not-configured—CHAP is not configured on the interface. Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. 	extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none
SDH alarms SDH defects	<p>SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.</p> <p>NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the show interface cstm1 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	All levels

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS-S—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. 	extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH tu	<p>Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • TU-BIP-2—Bit interleaved parity for SONET line overhead • TU-FEBE—(near-end TU) • TU-LOP—Loss of pointer (near-end TU) • TU-AIS—Alarm indication signal (near-end TU) • TU-FERF—(near-end TU) • TU-UNEQ—Unequipped (near-end TU) • TU-PLM—Payload label mismatch (near-end TU) • TU-ES—Errored seconds (near-end TU) • TU-SES—Severely errored seconds (near-end TU) • TU-UAS—Unavailable seconds (near-end TU) • TU-ES-FE—Errored seconds (far-end TU) • TU-SES-FE—Severely errored seconds (far-end TU) • TU-UAS-FE—Unavailable seconds (far-end TU) 	extensive
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i> signal. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none

Table 56: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```

user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  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 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :           592           48 bps
  Output bytes  :           644           48 bps
  Input packets :            46            0 pps
  Output packets:            46            0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms   : None
DS1 defects  : None
SDH alarms   : None
SDH defects  : None
E1 media:
  Seconds      Count  State
SEF            0       0 OK
BEE            0       0 OK
AIS           124       1 OK
LOF           124       1 OK
LOS            0       0 OK
YELLOW         0       0 OK
BPV            0       0
EXZ            0       0
LCV            0       0
PCV            0       0
CS             0       0
FEBE           0       0
LES           124
ES            125
SES           124
SEFS          124
BES            0
UAS            37
Interface transmit queues:
      B/W  WRR  Packets      Bytes      Drops      Errors
Queue0   95  95         0         0         0         0
Queue1    5   5       529       6348         0         0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SDH PHY:
  Seconds      Count  State
PLL Lock       0       0 OK
PHY Light      0       0 OK
SDH regenerator section:
  RS-BIP8       0       0
  OOF           125       1 OK
  LOS           125       1 OK
  LOF           125       1 OK
  RS-ES         125
  RS-SES        125
  RS-SEFS       125
SDH multiplex section:
  MS-BIP24       0       0
  MS-FEBE        0       0

```

```

MS-FERF          0          0 OK
MS-AIS          125        1 OK
BERR-SF          0          0 OK
BERR-SD          0          0 OK
MS-ES           125
MS-SES           125
MS-UAS           115
MS-ES-FE         0
MS-SES-FE        0
MS-UAS-FE        0
SDH path:
HP-BIP8          0          0
HP-FEBE          0          0
HP-LOP           0          0 OK
HP-AIS          125        1 OK
HP-FERF          0          0 OK
HP-UNEQ          0          0 OK
HP-PLM           125        1 OK
HP-ES           125
HP-SES           125
HP-UAS           115
HP-ES-FE         0
HP-SES-FE        0
HP-UAS-FE        0
SDH tu:
TU-BIP2          0          0
TU-FEBE          124        1
TU-LOP           0          0 OK
TU-AIS          124        1 OK
TU-FERF          124        1 OK
TU-UNEQ          0          0 OK
TU-PLM           124        1 OK
TU-ES           125
TU-SES           125
TU-UAS           115
TU-ES-FE         0
TU-SES-FE        0
TU-UAS-FE        0
Received SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
V5(cmp) : 0x02
Transmitted SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
Z4      : 0x00, V5      : 0x02
Received path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      usec
  0 best-effort            95      1945600  95      0      low  none
  3 network-control        5       102400   5      0      low  none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 575, Route table: 0

```

```
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 975
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 T1 IQ)

Syntax	<pre>show interfaces (ct1-fpc/pic/port type-fpc/pic/port<:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced in Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none"> type-fpc/pic/port—For the physical channelized T1 IQ interface, type is ct1. type-fpc/pic/port:channel—For the clear channel, type is t1. At the first level of channelization, type can be ct1 or t1. type-fpc/pic/port:channel:channel—At the second level of channelization, type can be ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (CT1) on page 738</p> <p>show interfaces extensive (T1) on page 739</p> <p>show interfaces extensive (DS0) on page 740</p>
Output Fields	Table 45 on page 514 lists the output fields for the show interfaces (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error event • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Line encoding	Line encoding used: B8ZS or AMI .	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used: B8ZS or AMI. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle Flag—Idle cycle flags. • Start end Flag—Start and end flag. 	extensive

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSO or DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 57: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (CT1)

```

user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 32, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
DS1 alarms     : None
DS1 defects    : None
T1 media:
      Seconds      Count  State
      SEF          0        0  OK
      BEE          0        0  OK
      AIS          0        0  OK
      LOF          0        0  OK
      LOS          0        0  OK
      YELLOW       0        0  OK
      BPV          0        0
      EXZ          0        0
      LCV          0        0
      PCV          0        0
      CS           0        0
      LES          0
      ES           0
      SES          0
      SEFS         0
      BES          0

```

```

UAS                                0
Line encoding: B8ZS
Buildout       : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (T1)

```

user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 33, Generation: 61
  Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
  Parent: ct1-0/2/0 Interface index 148
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 timeout : 0
Nonmatching DCE-end DLCIs:
  2
Hold-times   : Up 0 ms, Down 0 ms
CoS queues   : 4 supported
Last flapped : 2005-09-07 15:43:47 PDT (00:00:06 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes  : 0          0 bps
  Output bytes : 14         0 bps
  Input packets: 0          0 pps
  Output packets: 1         0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     1          1          0
DS1 alarms   : None

```

```

DS1  defects   : None
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : All active
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
  flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

```

show interfaces extensive (DS0)

```

user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
  Interface index: 157, SNMP ifIndex: 52, Generation: 46
  Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
  Speed: 640kbps, Loopback: None, FCS:16,
  Parent: ct1-0/1/0 Interface index 143
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 8 (last seen 00:00:12 ago)
  Output: 8 (last sent 00:00:07 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 : 2005-08-18 15:23:46 PDT (00:03:17 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
Traffic statistics:
  Input bytes   : 840          0 bps
  Output bytes  : 912          0 bps
  Input packets: 25           0 pps
  Output packets: 26          0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,

```



```

L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets
0 best-effort      0                0                0
1 expedited-fo     0                0                0
2 assured-forw     0                0                0
3 network-cont     26               26               0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 2
Timeslots       : 1-10
Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared
DS0 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 26, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
Generation: 39
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 T3 IQ)

Syntax	<code>show interfaces (ct3-fpc/pic/port type-fpc/pic/port<:channel><:channel>)</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index snmp-index></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none">• type-fpc/pic/port—For the physical channelized T3 IQ interface, type is ct3.• type-fpc/pic/port:channel—For the clear channel, type is t3. At the first level of channelization, type can be ct1 or t1.• type-fpc/pic/port:channel:channel—At the second level of channelization, type is ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized T3 IQ) (Physical) on page 743 show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 743 show interfaces extensive (DSO on Channelized T3 IQ) on page 743
Output Fields	See the output field table for the show interfaces (Channelized T1 IQ) command.

Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DSO on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces (SONET/SDH)

Syntax	<code>show interfaces so-fpc/pic/port</code> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified SONET/SDH interface.
Options	so-fpc/pic/port —Display standard information about the specified SONET/SDH 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 <i>snmp-index</i> —(Optional) Display information for the specified SNMP index of the interface. statistics —(Optional) Display static interface statistics.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• <i>SONET/SDH Interfaces Overview</i>
List of Sample Output	show interfaces (SDH Mode, PPP) on page 757 show interfaces brief (SDH Mode, PPP) on page 758 show interfaces detail (SDH Mode, PPP) on page 758 show interfaces extensive (SDH Mode, PPP) on page 759 show interfaces brief (SONET Mode, Frame Relay) on page 761 show interfaces (SONET Mode, Frame Relay) on page 761 show interfaces detail (SONET Mode, Frame Relay) on page 762 show interfaces extensive (SONET Mode, Frame Relay) on page 764 show interfaces extensive (OC768-over-4xOC192 Mode) on page 766 show interfaces detail (IPv6 Tracking) on page 769 show interfaces (Shared Interface) on page 770
Output Fields	Table 58 on page 745 lists the output fields for the show interfaces (SONET/SDH) command. Output fields are listed in the approximate order in which they appear.

Table 58: SONET/SDH show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source: Internal or External . Clocking is configured and displayed only for channel 0.	All levels
Framing mode	Framing mode: SONET or SDH .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Shared-interface	Indicates whether the routing domain is the owner or non-owner of the shared interface. If the routing domain is the Root System Domain (RSD), the value is Owner . If the routing domain is a Protected System Domain (PSD) under the RSD, the value is Non-owner .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI). The format is (ANSI or ITU) LMI settings: <i>value</i>, <i>value</i>... <i>xx</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1-255) • n392dce—DCE error threshold (1-10) • n392dte—DTE error threshold (1-10) • n393dce—DCE monitored event count (1-10) • n393dte—DTE monitored event count (1-10) • t391dte—DTE polling timer (5-30 seconds) • t392dce—DCE polling verification timer (5-30 seconds) 	All levels
LMI	Input: <i>value (hh:mm:ss ago)</i> , Output: <i>value (hh:mm:ss ago)</i>	brief none
LMI statistics	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: <i>nn</i> (last seen <i>hh:mm:ss ago</i>). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: <i>nn</i> (last sent <i>hh:mm:ss ago</i>). 	detail extensive
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	All levels
Keepalive or Keepalive statistics	(PPP and HDLC) Information about keepalive packets. <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format hh:mm:ss. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format hh:mm:ss. 	All levels
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
CoS queues	Number of CoS queues configured.	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface, and the traffic rate in bits per seconds (bps). <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Label-switched interface (LSI) traffic statistics	<p>(Frame Relay) LSI traffic statistics:</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes and speed, in bits per second (bps), received on the interface. • Output packets—Number of packets and speed, in bps, transmitted on the interface. 	extensive
Input errors	<p>Input errors on the interface whose definitions are as follows:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—Number of frames received that are smaller than the runt threshold. • Giants—Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • HS link FIFO overflows—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. 	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • HS link FIFO underflows—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • MTU errors—Number of packets whose size exceeds the MTU of the interface. 	extensive
IPv6 transit statistics	<p>Number of transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Egress queues	Total number of egress queues supported on the specified interface.	detail extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	extensive
SONET alarms SONET defects	(SONET) SONET media-specific alarms and defects that prevents the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SONET PHY , SONET section , SONET line , and SONET path .	All levels
Link	(For 4-port OC192c PIC operating in OC768-over-4xOC192 mode) The link number. Errors and alarms are displayed for each link.	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET PHY	<p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SONET section	<p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B1—Bit interleaved parity for SONET section overhead • SEF—Severely errored framing • LOL—Loss of light • LOF—Loss of frame • ES-S—Errored seconds (section) • SES-S—Severely errored seconds (section) • SEFS-S—Severely errored framing seconds (section) 	extensive
SONET line	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B2—Bit interleaved parity for SONET line overhead • REI-L—Remote error indication (near-end line) • RDI-L—Remote defect indication (near-end line) • AIS-L—Alarm indication signal (near-end line) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • ES-L—Errored seconds (near-end line) • SES-L—Severely errored seconds (near-end line) • UAS-L—Unavailable seconds (near-end line) • ES-LFE—Errored seconds (far-end line) • SES-LFE—Severely errored seconds (far-end line) • UAS-LFE—Unavailable seconds (far-end line) 	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SONET path	<p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • BIP-B3—Bit interleaved parity for SONET section overhead • REI-P—Remote error indication • LOP-P—Loss of pointer (path) • AIS-P—Path alarm indication signal • RDI-P—Path remote defect indication • UNEQ-P—Path unequipped • PLM-P—Path payload (signal) label mismatch • ES-P—Errored seconds (near-end STS path) • SES-P—Severely errored seconds (near-end STS path) • UAS-P—Unavailable seconds (near-end STS path) • ES-PFE—Errored seconds (far-end STS path) • SES-PFE—Severely errored seconds (far-end STS path) • UAS-PFE—Unavailable seconds (far-end STS path) 	extensive
Received SONET overhead Transmitted SONET overhead	<p>Values of the received and transmitted SONET overhead:</p> <ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i>. • Z3 and Z4—Allocated for future use. 	extensive
SDH alarms SDH defects	<p>SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.</p>	All levels

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—Alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive
Received SDH overhead Transmitted SDH overhead	<p>Values of the received and transmitted SONET overhead:</p> <ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i>. • Z3 and Z4—Allocated for future use. 	extensive
Received path trace Transmitted path trace	<p>SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.</p>	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
HDLC configuration	Information about the HDLC configuration. <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. 	extensive
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
PPP parameters	The PPP loopback clear timer value.	extensive

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Shared interface	Provides the following information: <ul style="list-style-type: none"> shared with—(RSD only) Indicates which PSD owns the logical shared interface. For example, psd3. peer interface—(PSD only) Lists the logical tunnel interface that peers with the logical shared interface. For example, ut-2/1/0.2. tunnel token—Specifies the receive (RX) and transmit (TX) tunnel tokens. For example, Rx: 5.519, Tx: 13.514. 	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
<i>protocol-family</i>	Protocol family configured on the logical interface. If the protocol is inet , the IP address of the interface is also displayed.	brief
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	detail extensive none
AS bundle	(If the logical interface is configured as part of an aggregated SONET bundle.) AS bundle number.	detail extensive
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none

Table 58: SONET/SDH show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address of the interface.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces (SDH Mode, PPP)

```

user@host> show interfaces so-0/0/0
Physical interface: so-0/0/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 66
Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, FCS: 16, Payload scrambler: Enabled
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 30 (00:00:07 ago), Output: 29 (00:00:05 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mp1s:
Not-configured
CHAP state: Closed
CoS queues : 4 supported, 4 maximum usable queues
Last flapped : 2006-03-24 13:20:56 PST (00:05:09 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
SDH alarms : None
SDH defects : None

Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43)

```

```

Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3
Protocol iso, MTU: 4470
  Flags: Protocol-Down
Protocol mpls, MTU: 4458, Maximum labels: 3
  Flags: Protocol-Down, Is-Primary

```

show interfaces brief (SDH Mode, PPP)

```

user@host> show interfaces so-0/0/0 brief
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 25 (00:00:01 ago), Output: 24 (00:00:04 ago)
  SDH alarms    : None
  SDH defects   : None

Logical interface so-0/0/0.0
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
  inet 10.0.12.1/30
  iso
  mpls

```

show interfaces detail (SDH Mode, PPP)

```

user@host> show interfaces so-0/0/0 detail
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 66, Generation: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 33 (last seen 00:00:05 ago)
    Output: 32 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues   : 4 supported, 4 maximum usable queues
  Last flapped : 2006-03-24 13:20:56 PST (00:05:38 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :           862           0 bps
    Output bytes  :          3592          64 bps
    Input packets :           70           0 pps
    Output packets:          330           0 pps
  Egress queues: 4 supported, 4 in use
  Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort                0                0                0

```

```

1 expedited-fo          0          0          0
2 assured-forw          0          0          0
3 network-cont          329        329        0

SDH  alarms   : None
SDH  defects  : None

Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43) (Generation 19)
Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
Protocol inet, MTU: 4470, Generation: 48, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3,
    Generation: 48
  Protocol iso, MTU: 4470, Generation: 49, Route table: 0
    Flags: Protocol-Down
  Protocol mpls, MTU: 4458, Maximum labels: 3, Generation: 50, Route table: 0
    Flags: Protocol-Down, Is-Primary

```

show interfaces extensive (SDH Mode, PPP)

```

user@host> show interfaces so-0/0/0 extensive
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 66, Generation: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 36 (last seen 00:00:01 ago)
    Output: 35 (last sent 00:00:10 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues   : 4 supported, 4 maximum usable queues
  Last flapped : 2006-03-24 13:20:56 PST (00:06:08 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes :          922          0 bps
    Output bytes:         3850         64 bps
    Input packets:           75          0 pps
    Output packets:        356          0 pps
  Label-switched interface (LSI) traffic statistics:
    Input bytes :           0          0 bps
    Input packets:          0          0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 218, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 2, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0,
    HS link FIFO underflows: 0, MTU errors: 0
  Egress queues: 4 supported, 4 in use

```

Queue counters:	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	354	354	0

SDH alarms : None

SDH defects : None

SDH PHY:	Seconds	Count	State
PLL Lock	0	0	OK
PHY Light	2	1	OK

SDH regenerator section:

RS-BIP8	0	0	
OOF	3	8	OK
LOS	3	2	OK
LOF	3	2	OK
RS-ES	3		
RS-SES	3		
RS-SEFS	3		

SDH multiplex section:

MS-BIP24	0	0	
MS-FEBE	0	0	
MS-FERF	3	2	OK
MS-AIS	2	1	OK
BERR-SF	0	0	OK
BERR-SD	0	0	OK
MS-ES	3		
MS-SES	3		
MS-UAS	0		
MS-SES-FE	3		
MS-UAS-FE	0		

SDH path:

HP-BIP8	0	0	
HP-FEBE	0	0	
HP-LOP	1	1	OK
HP-AIS	2	1	OK
HP-FERF	3	2	OK
HP-UNEQ	0	0	OK
HP-PLM	1	1	OK
HP-ES	3		
HP-SES	3		
HP-UAS	0		
HP-ES-FE	3		
HP-SES-FE	3		
HP-UAS-FE	0		

Received SDH overhead:

F1	: 0x00, J0	: 0x00, K1	: 0x00, K2	: 0x00
S1	: 0x00, C2	: 0xcf, C2(cmp)	: 0xcf, F2	: 0x00
Z3	: 0x00, Z4	: 0x00, S1(cmp)	: 0x00	

Transmitted SDH overhead:

F1	: 0x00, J0	: 0x01, K1	: 0x00, K2	: 0x00
S1	: 0x00, C2	: 0xcf, F2	: 0x00, Z3	: 0x00
Z4	: 0x00			

Received path trace: R2 so-0/0/0

52 32 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 R2 so-0/0/0.....

Transmitted path trace: R1 so-0/0/0

52 31 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 R1 so-0/0/0.....

```

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
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  147744000  95     0      low  none
3 network-control      5    7776000   5     0      low  none

Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43) (Generation 19)
Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
PPP parameters:
  PPP loopback clear timer: 3 sec
Protocol inet, MTU: 4470, Generation: 48, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3,
  Generation: 48
Protocol iso, MTU: 4470, Generation: 49, Route table: 0
Flags: Protocol-Down
Protocol mpls, MTU: 4458, Maximum labels: 3, Generation: 50, Route table: 0
Flags: Protocol-Down, Is-Primary
MS-ES-FE                      3

```

show interfaces brief (SONET Mode, Frame Relay)

```

user@host> show interfaces so-0/0/0 brief
Physical interface: so-0/0/0, Enabled, Physical link is Up
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives DTE
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI: Input: 29 (00:00:02 ago), Output: 28 (00:00:01 ago)
SONET alarms   : None
SONET defects  : None

Logical interface so-0/0/0.0
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
inet  10.0.12.1      --> 10.0.12.2
iso
mpls
DLCI 16
Flags: Down, DCE-Unconfigured
Total down time: 00:04:12 sec, Last down: 00:04:12 ago

```

show interfaces (SONET Mode, Frame Relay)

```

user@host> show interfaces so-0/0/0
Physical interface: so-0/0/0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 66
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives DTE
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds

```

```

LMI: Input: 23 (00:00:05 ago), Output: 22 (00:00:03 ago)
DTE statistics:
  Enquiries sent                : 19
  Full enquiries sent           : 3
  Enquiry responses received    : 20
  Full enquiry responses received : 3
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   : 1
CoS queues      : 4 supported, 4 maximum usable queues
Last flapped    : 2006-03-06 11:53:20 PST (3d 03:09 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 56 bps (0 pps)
SONET alarms    : None
SONET defects   : None

Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 4470
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.0.12.2, Local: 10.0.12.1
  Protocol iso, MTU: 4470
    Flags: None
  Protocol mpls, MTU: 4450, Maximum labels: 3
  DLCI 16
    Flags: Down, DCE-Unconfigured
    Total down time: 00:03:11 sec, Last down: 00:03:11 ago
      Input packets : 0
      Output packets: 0
  DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (SONET Mode, Frame Relay)

```

user@host> show interfaces so-0/0/0 detail
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 66, Generation: 11
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 33 (last seen 00:00:09 ago)
    Output: 32 (last sent 00:00:01 ago)
  DTE statistics:
    Enquiries sent                : 27
    Full enquiries sent           : 5
    Enquiry responses received    : 28

```

```

    Full enquiry responses received      : 5
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        : 1
CoS queues      : 4 supported, 4 maximum usable queues
Last flapped   : 2006-03-06 11:53:20 PST (3d 03:10 ago)
Statistics last cleared: Never
Traffic statistics:
    Input  bytes :          495368          0 bps
    Output bytes :         2765014          56 bps
    Input  packets:          41165          0 pps
    Output packets:         133530          0 pps
Egress queues: 4 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort          18              18              0

    1 expedited-fo         0              0              0

    2 assured-forw         0              0              0

    3 network-cont        133506          133506          0

SONET alarms   : None
SONET defects  : None
Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43) (Generation 28)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
    Input bytes :          0
    Output bytes:          0
    Input packets:         0
    Output packets:        0
  Local statistics:
    Input bytes :          0
    Output bytes:          0
    Input packets:         0
    Output packets:        0
  Transit statistics:
    Input bytes :          0          0 bps
    Output bytes:          0          0 bps
    Input packets:         0          0 pps
    Output packets:        0          0 pps
Protocol inet, MTU: 4470, Generation: 49, Route table: 0
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.0.12.2, Local: 10.0.12.1, Broadcast: Unspecified,
    Generation: 61
Protocol iso, MTU: 4470, Generation: 50, Route table: 0
  Flags: None
Protocol mpls, MTU: 4450, Maximum labels: 3, Generation: 51, Route table: 0
DLCI 16
  Flags: Down, DCE-Unconfigured
  Total down time: 00:04:54 sec, Last down: 00:04:54 ago
  Traffic statistics:

```

```

        Input bytes : 0
        Output bytes : 0
        Input packets: 0
        Output packets: 0
    DLCI statistics:
        Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (SONET Mode, Frame Relay)

```

user@host> show interfaces so-0/0/0 extensive
Physical interface: so-0/0/0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 66, Generation: 11
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
    Input : 39 (last seen 00:00:02 ago)
    Output: 36 (last sent 00:00:07 ago)
DTE statistics:
    Enquiries sent : 30
    Full enquiries sent : 6
    Enquiry responses received : 33
    Full enquiry responses received : 6
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 : 1
CoS queues : 4 supported, 4 maximum usable queues
Last flapped : 2006-03-06 11:53:20 PST (3d 03:11 ago)
Statistics last cleared: Never
Traffic statistics:
    Input bytes : 495452 56 bps
    Output bytes : 2765074 0 bps
    Input packets: 41171 0 pps
    Output packets: 133534 0 pps
Label-switched interface (LSI) traffic statistics:
    Input bytes : 0 0 bps
    Input packets: 0 0 pps
Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0,
    HS link FIFO underflows: 0, MTU errors: 0
Egress queues: 4 supported, 4 in use
Queue counters: Queued packets Transmitted packets Dropped packets

    0 best-effort 18 18 0

```



```

1 expedited-fo          0          0          0
2 assured-forw          0          0          0
3 network-cont          133510      133510      0

SONET alarms   : None
SONET defects  : None
SONET PHY:
Seconds      Count  State
  PLL Lock      0      0 OK
  PHY Light     60      1 OK
SONET section:
BIP-B1         0      0
SEF            108     158 OK
LOS            108      2 OK
LOF            108      2 OK
ES-S           108
SES-S           108
SEFS-S          108
SONET line:
BIP-B2         0      0
REI-L          0      0
RDI-L          1      1 OK
AIS-L         107      1 OK
BERR-SF        0      0 OK
BERR-SD        44      2 OK
ES-L           108
SES-L           108
UAS-L          97
ES-LFE         1
SES-LFE         1
UAS-LFE         0
SONET path:
BIP-B3         0      0
REI-P          0      0
LOP-P          1      1 OK
AIS-P         107      1 OK
RDI-P          1      1 OK
UNEQ-P         0      0 OK
PLM-P          1      1 OK
ES-P           108
SES-P           108
UAS-P          97
ES-PFE         1
SES-PFE         1
UAS-PFE         0
Received SONET overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
Z4      : 0x00
Received path trace: R2 so-0/0/0
52 32 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00 R2 so-0/0/0.....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a .....
Transmitted path trace: R1 so-0/0/0
52 31 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00 R1 so-0/0/0.....

```

```

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
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      147744000  95        0        low    none
3 network-control         5       7776000    5         0        low    none

Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43) (Generation 28)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 4470, Generation: 49, Route table: 0
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.0.12.2, Local: 10.0.12.1, Broadcast: Unspecified,
    Generation: 61
Protocol iso, MTU: 4470, Generation: 50, Route table: 0
  Flags: None
Protocol mpls, MTU: 4450, Maximum labels: 3, Generation: 51, Route table: 0
DLCI 16
  Flags: Down, DCE-Unconfigured
  Total down time: 00:05:42 sec, Last down: 00:05:42 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
  Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (OC768-over-4xOC192 Mode)

```

user@host> show interfaces so-7/0/0 extensive
Physical interface: so-7/0/0, Enabled, Physical link is Up
  Interface index: 163, SNMP ifIndex: 23, Generation: 186
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode, Speed:
  OC768,
  Loopback: Local, FCS: 16, Payload scrambler: Enabled
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000

```

```

Link flags      : No-Keepalives
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 8 supported, 8 maximum usable queues
Last flapped   : 2006-01-13 10:43:39 PST (01:05:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          76992          200 bps
  Output bytes  :          83707          216 bps
  Input packets :          1343           0 pps
  Output packets:          1343           0 pps
Input errors:
  Errors: 0, Drops: 3885, Framing errors: 68154624, Runts: 0, Giants: 0, Bucket
drops: 0,
  Policed discards: 0, L3 incompletes: 95040248, L2 channel errors: 0, L2
mismatch timeouts: 0,
  HS link CRC errors: 0, HS link FIFO overflows: 30742070
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO
underflows: 0,
  MTU errors: 0
Egress queues: 8 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort      2              2              0
  1 expedited-fo     0              0              0
  2 assured-forw     0              0              0
  3 network-cont    1341          1341              0

SONET alarms      : None
SONET defects     : None
Link : 0
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          2      1 OK
  LOS          0      0 OK
  LOF          3      2 OK
  ES-S         2
  SES-S        2
  SEFS-S       2
SONET line:
  BIP-B2       0      0
  REI-L        0      0
  RDI-L        1      1 OK
  AIS-L        2      1 OK
  BERR-SF      0      0 OK
  BERR-SD      0      0 OK
  ES-L         3
  SES-L        3
  UAS-L        0
  ES-LFE       1
  SES-LFE      1
  UAS-LFE      0
SONET path:

```

```

BIP-B3                0          0
REI-P                 0          0
LOP-P                 0          0 OK
AIS-P                 2          1 OK
RDI-P                 0          0 OK
UNEQ-P                0          0 OK
PLM-P                 0          0 OK
ES-P                  3
SES-P                  3
UAS-P                  0
ES-PFE                 0
SES-PFE                 0
UAS-PFE                 0
Payload pointer:
  Current pointer      : 522
  Pointer increment count : 0
  Pointer decrement count : 0
  New pointer NDF count  : 0
Received SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: fold so-7/0/0
  66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00  fold so-7/0/0...
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a .....
Transmitted path trace: fold so-7/0/0
  66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00  fold so-7/0/0...
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Link : 1
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          2      1 OK
  LOS          0      0 OK
  LOF          3      2 OK
  ES-S         2
  SES-S        2
  SEFS-S       2
SONET line:
  BIP-B2       0      0
  REI-L        0      0
  RDI-L        0      0 OK
  AIS-L        2      1 OK
  BERR-SF      0      0 OK
  BERR-SD      0      0 OK
  ES-L         3
  SES-L        3
  UAS-L        0
  ES-LFE       0

```

```

    SES-LFE                0
    UAS-LFE                0
SONET path:
    BIP-B3                 0          0
    REI-P                  0          0
    LOP-P                  0          0 OK
    AIS-P                  2          1 OK
    RDI-P                  0          0 OK
    UNEQ-P                 0          0 OK
    PLM-P                  0          0 OK
    ES-P                   3
    SES-P                   3
    UAS-P                   0
    ES-PFE                  0
    SES-PFE                 0
    UAS-PFE                 0
Payload pointer:
    Current pointer         : 522
    Pointer increment count : 0
    Pointer decrement count : 0
    New pointer NDF count   : 0
Received SONEt overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONEt overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
Received path trace: fold so-7/0/0
    66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00    fold so-7/0/0...
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    .....
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    .....
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a    .....
Transmitted path trace: fold so-7/0/0
    66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00    fold so-7/0/0...
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    .....
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    .....
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    .....
...

```

show interfaces detail (IPv6 Tracking)

```

user@host> show interfaces so-0/2/0 detail
Physical interface: so-0/2/0, Enabled, Physical link is Up
  Interface index: 130, SNMP ifIndex: 26, Generation: 131
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONEt mode,
Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 7 (last seen 00:00:01 ago)
    Output: 6 (last sent 00:00:08 ago)
  LCP state: Opened
  NCP state: inet: Not-configured, inet6: Opened, iso: Not- configured, mp1s:
Not-configured
  CHAP state: Closed

```

```

PAP state: Closed
CoS queues      : 4 supported, 4 maximum usable queues
Last flapped    : 2007-11-29 08:45:47 PST (1d 03:44 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          7407782          40 bps
  Output bytes  :          7307322          48 bps
  Input packets :          107570           0 pps
  Output packets:          108893           0 pps
IPv6 transit statistics:
  Input bytes   :          57328
  Output bytes  :          57400
  Input packets :          1024
  Output packets:          1025
Egress queues: 4 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      1191             1191                 0
  1 expedited-fo      0              0                     0
  2 assured-forw      0              0                     0
  3 network-cont     107700           107700                0
SONET alarms   : None
SONET defects  : None

Logical interface so-0/2/0.0 (Index 70) (SNMP ifIndex 47) (Generation 231)
Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
Protocol inet6, MTU: 4470, Generation: 433, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 2001:db8::2:1/32, Local: 2001:db8::2:2,
  Broadcast: Unspecified, Generation: 683
Addresses, Flags: Is-Preferred
  Destination: 2001:db8::1:2, Local: 2001:db8::1:3,
  Broadcast: Unspecified, Generation: 684

```

show interfaces (Shared Interface)

```

user@rsd1> show interfaces so-7/2/0
Physical interface: so-7/2/0, Enabled, Physical link is Down
Interface index: 128, SNMP ifIndex: 109
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC192, Loopback: None, FCS: 16, Payload scrambler: Enabled
Device flags   : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
Shared-interface : Owner
Link flags     : No-Keepalives DTE
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI: Input: 0 (never), Output: 0 (never)
DTE statistics:
  Enquiries sent           : 0
  Full enquiries sent       : 0
  Enquiry responses received : 0
  Full enquiry responses received : 0
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
CoS queues      : 8 supported, 8 maximum usable queues
Last flapped    : 2008-08-11 10:51:51 PDT (1w1d 04:47 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
SONET alarms    : LOL, PLL
SONET defects   : LOL, PLL, LOF, SEF, AIS-L, AIS-P

Logical interface so-7/2/0.0 (Index 67) (SNMP ifIndex 117)
  Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: FR-NLPID
  Shared interface:
    Shared with: psd5
    Tunnel token: Rx: 2.517, Tx: 1.517
  Input packets : 0
  Output packets: 0
  DLCI 700
    Flags: Active
    Total down time: 00:01:09 sec, Last down: 284:58:21 ago
    Input packets : 0
    Output packets: 0
  DLCI statistics:
    Active DLCI  :1 Inactive DLCI :0
```

show interfaces (T1, E1, or DS)

Syntax	<code>show interfaces <i>interface-type</i></code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index <i>snmp-index</i>></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is <code>t1-<i>fpc/pic/port</i></code>, whereas the E1 interface type is <code>e1-<i>fpc/pic/port</i></code>, and DS interface type is <code>ds-<i>fpc/pic/port</i>:<channel></code>.</p> <p><code>brief detail extensive terse</code>—(Optional) Display the specified level of output.</p> <p><code>descriptions</code>—(Optional) Display interface description strings.</p> <p><code>media</code>—(Optional) Display media-specific information about network interfaces.</p> <p><code>snmp-index <i>snmp-index</i></code>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><code>statistics</code>—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• Understanding Interfaces on ACX Series Universal Access Routers
List of Sample Output	show interfaces (T1, IMA Link) on page 784 show interfaces (T1, PPP) on page 785 show interfaces detail (T1, PPP) on page 785 show interfaces extensive (T1 CRC Errors) on page 786 show interfaces extensive (T1, PPP) on page 786 show interfaces (E1, Frame Relay) on page 788 show interfaces detail (E1, Frame Relay) on page 789 show interfaces extensive (E1, Frame Relay) on page 790 show interfaces (E1, IMA Link) on page 792 show interfaces extensive (T1, TDM-CCC-SATOP) on page 793 show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 794
Output Fields	Table 47 on page 544 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 59: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics or (Input packets , Output packets). Flags can be one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 59: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	<p>Information related to the circuit emulation statistics.</p> <ul style="list-style-type: none"> • CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). • CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). • CE Rx Forwarded—Number of forwarded bytes. • CE Strayed—Number of stray packets. • CE Lost—Number of lost packets. • CE Malformed—Number of malformed packets • CE Misinserted—Number of misinserted packets. • CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). • CE Dropped—Number of dropped packets during resynchronization • CE Overrun Events—Number of overrun events. • CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1, IMA Link)

```

user@host> show interfaces t1-1/0/0
IMA Link alarms   : None
IMA Link defects  : LIF, LODS
IMA Link state:
  Line           : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end  : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0           0  OK
LODS                 0           0  OK
Err-ICP              0           0  OK
IV                   0           0  OK
Rx-FC                0           0  OK
Tx-FC                0           0  OK
FE-Defects           0           0
FE-Rx-FC             0           0
FE-Tx-FC             0           0
Rx-ICP               0           0
Rx-Stuff             0           0
Tx-ICP               11          11
Tx-Stuff             0           0
Rx-SES               0           0
Rx-UAS               0           0
Rx-UUS               1           1
Tx-UUS               0           0
FE-Rx-SES            0           0
FE-Rx-UAS            0           0
FE-Rx-UUS            0           0
FE-Tx-UUS            0           0

```

show interfaces (T1, PPP)

```

user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1 alarms    : None
  DS1 defects   : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T1, PPP)

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 798 0 bps
    Input packets: 0 0 pps
    Output packets: 42 0 pps
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort    0 0 0
    1 expedited-fo  0 0 0

```

```

2 assured-forw          0          0          0
3 network-cont          40         40          0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 14, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 18

```

show interfaces extensive (T1 CRC Errors)

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
Interface index: 179, SNMP ifIndex: 79, Generation: 180
:
:
DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
DS1  defects  : AIS, LOF, CRC Major, CRC Minor
T1 media:
      Seconds      Count  State
SEF          1          1  OK
BEE          1          1  OK
AIS        1128          1 Defect Active
LOF        1128          1 Defect Active
LOS          0          0  OK
YELLOW       0          0  OK
CRC Major   154          1 Defect Active
CRC Minor   154          1 Defect Active
BPV          0          0
EXZ          0          0
LCV          0          0
PCV          0          0
CS           0          0
CRC         154        15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
    Output: 0 (last sent: never)
LCP state: Down

```

```

NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes  :                0                0 bps
Output bytes :               817               72 bps
Input packets:                0                0 pps
Output packets:              43                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo              0                0                0
2 assured-forw              0                0                0
3 network-cont              42               42                0

DS1  alarms   : None
DS1  defects  : None
T1  media:      Seconds      Count  State
SEF              1           1  OK
BEE              0           0  OK
AIS              0           0  OK
LOF              1           1  OK
LOS              0           0  OK
YELLOW           1           1  OK
BPV              1           1
EXZ              1           1
LCV              1          65535
PCV              1          1023
CS               0           0
LES              1
ES               1
SES              1
SEFS             1
BES              0
UAS              0

HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS
Buildout       : 0 to 132 feet
Byte encoding: Nx64K, 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

```

```

Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %          bps          %          usec
0 best-effort             95      1459200    95           0          low     none
3 network-control         5       76800     5           0          low     none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags      : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags        : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 1
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues      : 8 supported
  Last flapped    : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1 alarms     : None
  DS1 defects    : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 1500
    Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:13 sec, Last down: 00:01:13 ago

```



```

      Input packets : 0
      Output packets: 0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 2
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 225 56 bps
    Input packets: 0 0 pps
    Output packets: 15 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

  DS1 alarms : None
  DS1 defects : None
  DS1 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 e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:

```

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:18 sec, Last down: 00:01:18 ago
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
Enquiries sent : 10
Full enquiries sent : 2
Enquiry responses received : 0
Full enquiry responses received : 0
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 timeout : 1
CoS queues : 8 supported

```

```

Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :                0                0 bps
  Output bytes  :               225                0 bps
  Input packets :                0                0 pps
  Output packets:               15                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets

  0 limited              0                0                0
  1 expedited-fo        0                0                0
  2 real-plus           0                0                0
  3 network-cont        15               15                0

DS1  alarms   : None
DS1  defects  : None
E1  media:
  Seconds      Count  State
  SEF          0       0 OK
  BEE          5       5 OK
  AIS          0       0 OK
  LOF         245      15 OK
  LOS         245       4 OK
  YELLOW       0      11 OK
  BPV          0       0
  EXZ          9       9
  LCV          0       0
  PCV          0       0
  CS           0       0
  FEBE         0       0
  LES          0
  ES           0
  SES          0
  SEFS         0
  BES          0
  UAS         271

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, 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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue  Bandwidth  Buffer  Priority  Limit
                       %      bps      %      usec
  0 limited           95    1945600  95      0      low    none

```

```

3 network-control 5 102400 5 0 low none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1, IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:

```

	Seconds	Count	State
LIF		0	
LODS		0	
Err-ICP		0	
IV		0	
Rx-FC		0	
Tx-FC		0	
FE-Defects		0	
FE-Rx-FC		0	
FE-Tx-FC		0	
Rx-ICP		0	
Rx-Stuff		0	
Tx-ICP		11	
Tx-Stuff		0	
Rx-SES	0		
Rx-UAS	0		
Rx-UUS	1		
Tx-UUS	0		

```

FE-Rx-SES          0
FE-Rx-UAS          0
FE-Rx-UUS          0
FE-Tx-UUS          0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host> show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort          0              0              0

    1 expedited-fo        0              0              0

    2 assured-forw        0              0              0

    3 network-cont        0              0              0

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
  DS1  alarms   : None
  DS1  defects  : None
  T1  media:      Seconds      Count  State
    SEF              0          0  OK
    BEE              0          0  OK
    AIS              0          0  OK
    LOF              0          0  OK
    LOS              0          0  OK
    YELLOW           0          0  OK
    CRC Major        0          0  OK
    CRC Minor        0          0  OK
    BPV              0          0
    EXZ              0          0
    LCV              0          0
    PCV              0          0
    CS               0          0
    CRC              0          0
    LES              0
    ES               0
    SES              0
    SEFS             0
    BES              0
    UAS              0
  SAToP configuration:
    Payload size: 192

```

```

Idle pattern: 0xFF
Octet aligned: Disabled
Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms : None
SONET defects : AIS-V, RDI-V
SONET vt:
  BIP-BIP2          0          0
  REI-V             0          0
  LOP-V             0          0 OK
  AIS-V             2          0 Defect Active
  RDI-V             2          0 Defect Active
  UNEQ-V            0          0 OK
  PLM-V             0          0 OK
  ES-V              0
  SES-V             0
  UAS-V             2
  ES-VFE            0
  SES-VFE           0
  UAS-VFE           0
Received SONET overhead:
V5 : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5 : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
  0 best-effort           95      1459200    95      0      low
none
  3 network-control       5       76800     5       0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
CE info      Packets      Bytes      Count
CE Tx        1005        192960
CE Rx        1004        192768
CE Rx Forwarded      0
CE Strayed           0
CE Lost              0
CE Malformed         0
CE Misinserted       0
CE AIS dropped        0
CE Dropped           1005      192960
CE Overrun Events      0
CE Underrun Events     0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host> show interfaces ds-1/0/0:1:1 extensive
```

```

Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
CESoPSN configuration:
  Packetization latency: 1000 us
  Idle pattern: 0xFF
  Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
  Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue

```

Limit	CoS transmit queue	Bandwidth		Buffer Priority	
		%	bps	%	usec
0 best-effort	95	1459200	95	0	low
none					
3 network-control	5	76800	5	0	low
none					

```

Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation 549)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
CE info

```

	Packets	Bytes	Count
CE Tx	0	0	
CE Rx	35712	6856704	
CE Rx Forwarded		0	
CE Strayed	0		
CE Lost	0		
CE Malformed	0		
CE Misinserted	0		
CE AIS dropped	0		
CE Dropped	0	0	
CE Overrun Events			0

```
CE Underrun Events          1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```


show interfaces (T3 or E3)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T3 or E3 interface.
Options	<p><i>interface-type</i>—On M Series and T Series routers, the T3 interface type is t3-fpc/pic/port, whereas the E3 interface type is e3-fpc/pic/port.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces (T3, PPP) on page 806</p> <p>show interfaces detail (T3, PPP) on page 807</p> <p>show interfaces extensive (T3, PPP) on page 808</p> <p>show interfaces (E3, Frame Relay) on page 809</p> <p>show interfaces detail (E3, Frame Relay) on page 810</p> <p>show interfaces extensive (E3, Frame Relay) on page 811</p>
Output Fields	<p>Table 60 on page 797 lists the output fields for the show interfaces (T3 or E3) command. Output fields are listed in the approximate order in which they appear.</p>

Table 60: T3 or E3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Mode	(T3 only) Whether C-bit parity mode or M13 mode is enabled.	All levels
Long buildout	(T3 only) Buildout setting: less than 255 feet (68 meters) or greater than 255 feet and shorter than 450 feet (137 meters).	All levels
Framing	(E3 only) Physical layer framing format used on the link. It can be G751 or Unframed . The default is G751 .	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics or Keepalive	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Local Management Interface (LMI) settings (ANSI or ITU). ANSI LMI settings is the default. The format is LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Resp-received—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response sent for the challenge received. • Chap-Chal-sent—Challenge sent. • Chap-Chal-received—Challenge received but response not yet sent. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (year-month-day hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS queues	Number of CoS queues configured.	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets received on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—(T3 only) Number of frames received that are smaller than the runt threshold. • Giants—(T3 only) Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
Active alarms Active defects	<p>E3 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • EXZ—Excessive zeros • FERF—Far-end receive failures • IDLE—Idle code detected • LCD—Loss of cell delineation • LCV—Line code violation • LOF—Loss of frame • LOS—Loss of signal • PLL—Phase-locked loop • YLW—Remote defect indication 	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS3 media or E3 media	<p>Counts of DS3 (T3) or E3 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mod—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling: Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. The subrate can be Disabled or display units in Kbps. • FEAC loopbac—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
DS3 (or E3) BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive

Logical Interface

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Logical interface	Name of the logical interface.	detail extensive none
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Encapsulation	Encapsulation on the logical interface.	detail extensive none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	<p>(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none

Table 60: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics (or Input packets, Output packets). Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces (T3, PPP)

```

user@host> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)

```

```

Active alarms : None
Active defects : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T3, PPP)

```

user@host> show interfaces t3-0/2/0 detail
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues : 4 supported, 4 in use
  Last flapped : 2005-12-05 08:43:06 PST (02:18:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 152 0 bps
    Input packets: 0 0 pps
    Output packets: 8 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	6	6	0

```

Active alarms : None
Active defects : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0

```

```

Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 24

```

show interfaces extensive (T3, PPP)

```

user@host> show interfaces t3-0/2/0 extensive
Physical interface: t3-0/2/0, Enabled, Physical link is Up
Interface index: 139, SNMP ifIndex: 35, Generation: 22
Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
Loopback: None, FCS: 16, Mode: C/Bit parity,
Long buildout: Shorter than 255 feet
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues   : 4 supported, 4 in use
Last flapped : 2005-12-05 08:43:06 PST (02:18:47 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes   :                0                0 bps
Output bytes  :               171               72 bps
Input packets:                0                0 pps
Output packets:               9                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 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, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets

0 best-effort                0                0                0
1 expedited-fo              0                0                0
2 assured-forw              0                0                0
3 network-cont              7                7                0

Active alarms : None
Active defects : None
DS3 media:      Seconds      Count  State
PLL Lock        0          0  OK
Reframing       0          0  OK
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                 1          4
PCV                 0          0
CCV                 0          0
FEBE                1          11
LES                 1
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
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-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 t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 24

```

show interfaces (E3, Frame Relay)

```

user@host> show interfaces e3-1/2/0
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 4 (00:00:06 ago)
  DTE statistics:
    Enquiries sent           : 4
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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  : 1
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:46:14 PST (02:27:17 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
Active alarms   : None
Active defects  : None

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Input packets : 0
Output packets: 0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:06 sec, Last down: 00:00:06 ago
    Input packets : 0
    Output packets: 0
  DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (E3, Frame Relay)

```

user@host> show interfaces e3-1/2/0 detail
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 5 (last sent 00:00:07 ago)
  DTE statistics:
    Enquiries sent           : 5
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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          : 1
    CoS queues      : 4 supported, 4 in use
    Last flapped    : 2005-12-05 08:46:14 PST (02:27:27 ago)
    Statistics last cleared: Never
    Traffic statistics:
    Input bytes  :                0                0 bps
    Output bytes :               806                0 bps
    Input packets:                0                0 pps
    Output packets:              44                0 pps
    Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort                0                0                0
    1 expedited-fo                0                0                0
    2 assured-forw                0                0                0
    3 network-cont              43               43                0

    Active alarms : None
    Active defects : None

    Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    Local statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    Transit statistics:
    Input bytes  :                0                0 bps
    Output bytes :                0                0 bps
    Input packets:                0                0 pps
    Output packets:               0                0 pps
    Protocol inet, MTU: 4470, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255,
    Generation: 38
    DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:16 sec, Last down: 00:00:16 ago
    Traffic statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 extensive
```

```

Physical interface: e3-1/2/0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 49, Generation: 36
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
Loopback: None, FCS: 16, Framing: G751
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 6 (last sent 00:00:02 ago)
DTE statistics:
  Enquiries sent           : 5
  Full enquiries sent      : 1
  Enquiry responses received : 0
  Full enquiry responses received : 0
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 : 1
CoS queues   : 4 supported, 4 in use
Last flapped : 2005-12-05 08:46:14 PST (02:27:30 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 821 56 bps
  Input packets: 0 0 pps
  Output packets: 45 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 21118, 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,
  Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     44         44         0

Active alarms : None
Active defects : None
E3 media:      Seconds      Count  State
  PLL Lock      0          0  OK
  Reframing     187         1  OK
  AIS           0          0  OK
  LOF           187         1  OK

```



```

LOS                187          1 OK
IDLE               0           0 OK
YELLOW            0           0 OK
BPV               0           0
EXZ               0           0
LCV               188       12303167
LES               188
SEFS              187
UAS               195

```

DSU configuration:

Compatibility mode: None, Scrambling: Disabled

E3 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced Error rate: 10e-0

Packet Forwarding Engine configuration:

Destination slot: 1, PLP byte: 1 (0x00)

CoS information:

CoS transmit queue	%	Bandwidth bps	%	Buffer usec	Priority	Limit
0 best-effort	95	32649600	95	0	low	none
3 network-control	5	1718400	5	0	low	none

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID

Traffic statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

Local statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

Transit statistics:

```

Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps

```

Protocol inet, MTU: 4470, Generation: 24, Route table: 0

Flags: None

Addresses, Flags: Dest-route-down Is-Preferred Is-Primary

Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 38

DLCI 100

Flags: Down, DCE-Unconfigured

Total down time: 00:00:19 sec, Last down: 00:00:19 ago

Traffic statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

DLCI statistics:

Active DLCI :0 Inactive DLCI :1

show interfaces (Channelized STM1)

Syntax	<pre>show interfaces e1-fpc/pic/port:elchannel <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized STM1 interface.
Options	<p>e1-fpc/pic/port:elchannel—Display standard status information about the specified channelized STM1 interface.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized STM1, SDH) on page 825
Output Fields	Table 44 on page 499 lists the output fields for the show interfaces (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 61: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be G704 , G704-NO-CRC4 , or Unframed . The default is G704 .	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> intervalseconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
ANSI LMI settings or ITU LMI settings	<p>(Frame Relay) Local Management Interface settings. The format is (ANSI or ITU) LMI settings: <i>value, value...xx</i> seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1- 255) n392dce—DCE error threshold (1-10) n392dte—DTE error threshold (1-10) n393dce—DCE monitored event count (1-10) n393dte—DTE monitored event count (1-10) t391dte—DTE polling timer (5-30 seconds) t392dce—DCE polling verification timer (5-30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Statistics about the link management.</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: <i>nn</i> (last seen <i>hh:mm:ss</i> ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> Unknown messages received—Number of received packets that do not fall into any category. Asynchronous updates received—Number of link status peer changes received. Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgment was received. Conf-ack-sent—Acknowledgment was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Not-configured—LCP is not configured on the interface. Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgment was received. Conf-ack-sent—Acknowledgment was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Not-configured—NCP is not configured on the interface. Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> Chap-Chal-received—Challenge was received but response not yet sent. Chap-Chal-sent—Challenge was sent. Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) Chap-Resp-sent—Response was sent for the challenge received. Closed—CHAP authentication is incomplete. Failure—CHAP authentication failed. Not-configured—CHAP is not configured on the interface. Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. 	extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none
SDH alarms SDH defects	<p>SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path.</p> <p>NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the show interface cstm1 extensive command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.</p>	All levels

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
E1 media	<p>Active alarms and defects, plus counts of specific E1 errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS-S—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Interface transmit queues	<p>Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used. It is always HDB3. 	extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
SDH PHY	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop • PHY Light—Loss of optical signal 	extensive
SDH regenerator section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • RS-BIP8—24-bit BIP for multiplex section overhead (B2 bytes) • OOF—Out of frame • LOS—Loss of signal • LOF—Loss of frame • RS-ES—Errored seconds (near-end regenerator section) • RS-SES—Severely errored seconds (near-end regenerator section) • RS-SEFS—Severely errored framing seconds (regenerator section) 	extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH multiplex section	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • MS-BIP24—8-bit BIP for high-order path overhead (B3 byte) • MS-FEBE—Far-end block error (multiplex section) • MS-FERF—Far-end remote fail (multiplex section) • MS-AIS—alarm indication signal (multiplex section) • BERR-SF—Bit error rate fault (signal failure) • BERR-SD—Bit error rate defect (signal degradation) • MS-ES—Errored seconds (near-end multiplex section) • MS-SES—Severely errored seconds (near-end multiplex section) • MS-UAS—Unavailable seconds (near-end multiplex section) • MS-ES-FE—Errored seconds (far-end multiplex section) • MS-SES-FE—Severely errored seconds (far-end multiplex section) • MS-UAS-FE—Unavailable seconds (far-end multiplex section) 	extensive
SDH path	<p>Active alarms and defects, plus counts of specific SDH errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • HP-BIP8—8-bit BIP for regenerator section overhead (B1 byte) • HP-FEBE—Far-end block error (high-order path) • HP-LOP—Loss of pointer (high-order path) • HP-AIS—High-order-path alarm indication signal • HP-FERF—Far-end remote fail (high-order path) • HP-UNEQ—Unequipped (high-order path) • HP-PLM—Payload label mismatch (high-order path) • HP-ES—Errored seconds (near-end high-order path) • HP-SES—Severely errored seconds (near-end high-order path) • HP-UAS—Unavailable seconds (near-end high-order path) • HP-ES-FE—Errored seconds (far-end high-order path) • HP-SES-FE—Severely errored seconds (far-end high-order path) • HP-UAS-FE—Unavailable seconds (far-end high-order path) 	extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SDH tu	<p>Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>Subfields are:</p> <ul style="list-style-type: none"> • TU-BIP-2—Bit interleaved parity for SONET line overhead • TU-FEBE—(near-end TU) • TU-LOP—Loss of pointer (near-end TU) • TU-AIS—Alarm indication signal (near-end TU) • TU-FERF—(near-end TU) • TU-UNEQ—Unequipped (near-end TU) • TU-PLM—Payload label mismatch (near-end TU) • TU-ES—Errored seconds (near-end TU) • TU-SES—Severely errored seconds (near-end TU) • TU-UAS—Unavailable seconds (near-end TU) • TU-ES-FE—Errored seconds (far-end TU) • TU-SES-FE—Severely errored seconds (far-end TU) • TU-UAS-FE—Unavailable seconds (far-end TU) 	extensive
Received SDH overhead	Values of the received and transmitted SONET overhead:	extensive
Transmitted SDH overhead	<ul style="list-style-type: none"> • C2—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • F1—Section user channel byte. This byte is set aside for the purposes of users. • K1 and K2—These bytes are allocated for APS signaling for the protection of the multiplex section. • J0—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • S1—Synchronization status. The S1 byte is located in the first STS-1 of an STS-<i>N</i> signal. • Z3 and Z4—Allocated for future use. 	
Received path trace	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	extensive
Transmitted path trace		
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Flags	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none

Table 61: Channelized STM1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics . Flags is one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```

user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  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 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :           592           48 bps
  Output bytes  :           644           48 bps
  Input packets :           46           0 pps
  Output packets:           46           0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1 alarms   : None
DS1 defects  : None
SDH alarms   : None
SDH defects  : None
E1 media:
  Seconds      Count  State
SEF            0        0 OK
BEE            0        0 OK
AIS           124        1 OK
LOF           124        1 OK
LOS            0        0 OK
YELLOW         0        0 OK
BPV            0         0
EXZ            0         0
LCV            0         0
PCV            0         0
CS             0         0
FEBE           0         0
LES           124
ES            125
SES           124
SEFS          124
BES            0
UAS            37
Interface transmit queues:
      B/W  WRR  Packets      Bytes      Drops      Errors
Queue0   95  95         0         0         0         0
Queue1    5   5       529       6348         0         0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SDH PHY:
  Seconds      Count  State
PLL Lock       0        0 OK
PHY Light      0        0 OK
SDH regenerator section:
  RS-BIP8       0        0
  OOF           125        1 OK
  LOS           125        1 OK
  LOF           125        1 OK
  RS-ES         125
  RS-SES        125
  RS-SEFS       125
SDH multiplex section:
  MS-BIP24      0        0
  MS-FEBE       0        0

```

```

MS-FERF          0          0 OK
MS-AIS           125        1 OK
BERR-SF          0          0 OK
BERR-SD          0          0 OK
MS-ES            125
MS-SES           125
MS-UAS           115
MS-ES-FE         0
MS-SES-FE        0
MS-UAS-FE        0
SDH path:
HP-BIP8          0          0
HP-FEBE          0          0
HP-LOP           0          0 OK
HP-AIS           125        1 OK
HP-FERF          0          0 OK
HP-UNEQ          0          0 OK
HP-PLM           125        1 OK
HP-ES            125
HP-SES           125
HP-UAS           115
HP-ES-FE         0
HP-SES-FE        0
HP-UAS-FE        0
SDH tu:
TU-BIP2          0          0
TU-FEBE          124        1
TU-LOP           0          0 OK
TU-AIS           124        1 OK
TU-FERF          124        1 OK
TU-UNEQ          0          0 OK
TU-PLM           124        1 OK
TU-ES            125
TU-SES           125
TU-UAS           115
TU-ES-FE         0
TU-SES-FE        0
TU-UAS-FE        0
Received SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
V5(cmp) : 0x02
Transmitted SDH overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
Z4      : 0x00, V5      : 0x02
Received path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Transmitted path trace:
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      usec
  0 best-effort            95      1945600  95      0      low  none
  3 network-control        5       102400   5      0      low  none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 575, Route table: 0

```

```
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 975
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 T1 IQ)

Syntax	show interfaces (<i>ct1-fpc/pic/port</i> <i>type-fpc/pic/port<:channel><:channel></i>) <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced in Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.
Options	<p><i>type-fpc/pic/port:channel</i>—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none"> • <i>type-fpc/pic/port</i>—For the physical channelized T1 IQ interface, <i>type</i> is ct1. • <i>type-fpc/pic/port:channel</i>—For the clear channel, <i>type</i> is t1. At the first level of channelization, <i>type</i> can be ct1 or t1. • <i>type-fpc/pic/port:channel:channel</i>—At the second level of channelization, <i>type</i> can be ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (CT1) on page 837 show interfaces extensive (T1) on page 838 show interfaces extensive (DS0) on page 839
Output Fields	Table 45 on page 514 lists the output fields for the show interfaces (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	<p>(Frame Relay) Statistics about messages sent between the DTE and the DCE:</p> <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	<p>(PPP) Network Control Protocol state.</p> <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error event • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Line encoding	Line encoding used: B8ZS or AMI .	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used: B8ZS or AMI. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle Flag—Idle cycle flags. • Start end Flag—Start and end flag. 	extensive

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSO or DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 62: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (CT1)

```

user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 32, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
DS1 alarms     : None
DS1 defects    : None
T1 media:
      Seconds    Count  State
      SEF        0        0  OK
      BEE        0        0  OK
      AIS        0        0  OK
      LOF        0        0  OK
      LOS        0        0  OK
      YELLOW     0        0  OK
      BPV        0        0
      EXZ        0        0
      LCV        0        0
      PCV        0        0
      CS         0        0
      LES        0
      ES         0
      SES        0
      SEFS       0
      BES        0

```

```

UAS                                0
Line encoding: B8ZS
Buildout       : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (T1)

```

user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 33, Generation: 61
  Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
  Parent: ct1-0/2/0 Interface index 148
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 timeout : 0
Nonmatching DCE-end DLCIs:
  2
Hold-times   : Up 0 ms, Down 0 ms
CoS queues   : 4 supported
Last flapped : 2005-09-07 15:43:47 PDT (00:00:06 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes  : 0          0 bps
  Output bytes : 14         0 bps
  Input packets: 0          0 pps
  Output packets: 1         0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     1          1          0
DS1 alarms   : None

```

```

DS1  defects  : None
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : All active
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
  flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

```

show interfaces extensive (DS0)

```

user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
  Interface index: 157, SNMP ifIndex: 52, Generation: 46
  Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
  Speed: 640kbps, Loopback: None, FCS:16,
  Parent: ct1-0/1/0 Interface index 143
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 8 (last seen 00:00:12 ago)
  Output: 8 (last sent 00:00:07 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 : 2005-08-18 15:23:46 PDT (00:03:17 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
Traffic statistics:
  Input bytes  : 840 0 bps
  Output bytes : 912 0 bps
  Input packets: 25 0 pps
  Output packets: 26 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,

```

```

    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:
    Queued packets    Transmitted packets  Dropped packets
    0 best-effort      0                      0                0
    1 expedited-fo     0                      0                0
    2 assured-forw     0                      0                0
    3 network-cont     26                     26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots       : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
  Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
      Generation: 39
  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 (T1, E1, or DS)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is t1-<i>fpc/pic/port</i>, whereas the E1 interface type is e1-<i>fpc/pic/port</i>, and DS interface type is ds-<i>fpc/pic/port:channel</i>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • <i>Understanding Interfaces on ACX Series Universal Access Routers</i>
List of Sample Output	show interfaces (T1, IMA Link) on page 853 show interfaces (T1, PPP) on page 854 show interfaces detail (T1, PPP) on page 854 show interfaces extensive (T1 CRC Errors) on page 855 show interfaces extensive (T1, PPP) on page 855 show interfaces (E1, Frame Relay) on page 857 show interfaces detail (E1, Frame Relay) on page 858 show interfaces extensive (E1, Frame Relay) on page 859 show interfaces (E1, IMA Link) on page 861 show interfaces extensive (T1, TDM-CCC-SATOP) on page 862 show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 863
Output Fields	Table 47 on page 544 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 63: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags , Total down time , Last down , and Traffic statistics or (Input packets , Output packets). Flags can be one or more of the following: <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 63: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	<p>Information related to the circuit emulation statistics.</p> <ul style="list-style-type: none"> • CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). • CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). • CE Rx Forwarded—Number of forwarded bytes. • CE Strayed—Number of stray packets. • CE Lost—Number of lost packets. • CE Malformed—Number of malformed packets • CE Misinserted—Number of misinserted packets. • CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). • CE Dropped—Number of dropped packets during resynchronization • CE Overrun Events—Number of overrun events. • CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1, IMA Link)

```

user@host> show interfaces t1-1/0/0
IMA Link alarms   : None
IMA Link defects  : LIF, LODS
IMA Link state:
  Line           : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end  : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0           0 OK
LODS                  0           0 OK
Err-ICP               0           0 OK
IV                    0           0 OK
Rx-FC                  0           0 OK
Tx-FC                  0           0 OK
FE-Defects            0           0
FE-Rx-FC              0           0
FE-Tx-FC              0           0
Rx-ICP                 0           0
Rx-Stuff              0           0
Tx-ICP                 0          11
Tx-Stuff              0           0
Rx-SES                 0           0
Rx-UAS                 0           0
Rx-UUS                 1           0
Tx-UUS                 0           0
FE-Rx-SES              0           0
FE-Rx-UAS              0           0
FE-Rx-UUS              0           0
FE-Tx-UUS              0           0

```

show interfaces (T1, PPP)

```

user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues    : 4 supported, 4 in use
  Last flapped  : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate    : 0 bps (0 pps)
  Output rate   : 72 bps (0 pps)
  DS1 alarms   : None
  DS1 defects   : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T1, PPP)

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues    : 4 supported, 4 in use
  Last flapped  : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 798 0 bps
    Input packets: 0 0 pps
    Output packets: 42 0 pps
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort    0 0 0
    1 expedited-fo   0 0 0

```

```

2 assured-forw          0          0          0
3 network-cont          40         40          0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 14, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 18

```

show interfaces extensive (T1 CRC Errors)

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
Interface index: 179, SNMP ifIndex: 79, Generation: 180
:
:
DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
DS1  defects  : AIS, LOF, CRC Major, CRC Minor
T1 media:
      Seconds      Count  State
SEF          1          1  OK
BEE          1          1  OK
AIS        1128          1 Defect Active
LOF        1128          1 Defect Active
LOS          0          0  OK
YELLOW       0          0  OK
CRC Major   154          1 Defect Active
CRC Minor   154          1 Defect Active
BPV          0          0
EXZ          0          0
LCV          0          0
PCV          0          0
CS           0          0
CRC         154        15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
    Output: 0 (last sent: never)
LCP state: Down

```

```

NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes  :                0                0 bps
Output bytes :               817               72 bps
Input packets:                0                0 pps
Output packets:              43                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo              0                0                0
2 assured-forw              0                0                0
3 network-cont              42                42                0

DS1  alarms   : None
DS1  defects  : None
T1  media:      Seconds      Count  State
SEF              1           1  OK
BEE              0           0  OK
AIS              0           0  OK
LOF              1           1  OK
LOS              0           0  OK
YELLOW           1           1  OK
BPV              1           1
EXZ              1           1
LCV              1          65535
PCV              1          1023
CS               0           0
LES              1
ES               1
SES              1
SEFS             1
BES              0
UAS              0

HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS
Buildout       : 0 to 132 feet
Byte encoding: Nx64K, 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

```

```

Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %          bps          %          usec
0 best-effort             95          1459200     95           0           low      none
3 network-control         5           76800       5            0           low      none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags      : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags        : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                : 10
    Full enquiries sent            : 1
    Enquiry responses received     : 0
    Full enquiry responses received : 0
  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    : 1
  CoS queues      : 8 supported
  Last flapped    : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  DS1 alarms      : None
  DS1 defects     : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 1500
    Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:13 sec, Last down: 00:01:13 ago

```

```

      Input packets : 0
      Output packets: 0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times    : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 2
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 225 56 bps
    Input packets: 0 0 pps
    Output packets: 15 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

  DS1 alarms : None
  DS1 defects : None
  DS1 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 e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:

```

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:18 sec, Last down: 00:01:18 ago
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
Enquiries sent : 10
Full enquiries sent : 2
Enquiry responses received : 0
Full enquiry responses received : 0
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 timeout : 1
CoS queues : 8 supported

```

```

Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :                0                0 bps
  Output bytes  :               225                0 bps
  Input packets :                0                0 pps
  Output packets:               15                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets

  0 limited              0              0              0
  1 expedited-fo        0              0              0
  2 real-plus            0              0              0
  3 network-cont        15             15              0

DS1  alarms   : None
DS1  defects  : None
E1  media:
  Seconds      Count  State
SEF            0       0  OK
BEE            5       5  OK
AIS            0       0  OK
LOF           245      15  OK
LOS           245       4  OK
YELLOW         0      11  OK
BPV            0       0
EXZ            9       9
LCV            0       0
PCV            0       0
CS             0       0
FEBE           0       0
LES            0
ES             0
SES            0
SEFS           0
BES            0
UAS           271

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, 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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue  Bandwidth  Buffer  Priority  Limit
                      %      bps      %      usec
  0 limited           95    1945600  95      0      low    none

```



```

3 network-control 5 102400 5 0 low none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1, IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:

```

	Seconds	Count	State
LIF		0	
LODS		0	
Err-ICP		0	
IV		0	
Rx-FC		0	
Tx-FC		0	
FE-Defects		0	
FE-Rx-FC		0	
FE-Tx-FC		0	
Rx-ICP		0	
Rx-Stuff		0	
Tx-ICP		11	
Tx-Stuff		0	
Rx-SES	0		
Rx-UAS	0		
Rx-UUS	1		
Tx-UUS	0		

```

FE-Rx-SES          0
FE-Rx-UAS          0
FE-Rx-UUS          0
FE-Tx-UUS          0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host> show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
  DS1 alarms        : None
  DS1 defects       : None
  T1 media:

```

	Seconds	Count	State
SEF	0	0	OK
BEE	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	0	0	OK
CRC Major	0	0	OK
CRC Minor	0	0	OK
BPV	0	0	
EXZ	0	0	
LCV	0	0	
PCV	0	0	
CS	0	0	
CRC	0	0	
LES	0		
ES	0		
SES	0		
SEFS	0		
BES	0		
UAS	0		

```

  SAToP configuration:
    Payload size: 192

```

```

Idle pattern: 0xFF
Octet aligned: Disabled
Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms : None
SONET defects : AIS-V, RDI-V
SONET vt:
  BIP-BIP2          0          0
  REI-V             0          0
  LOP-V             0          0 OK
  AIS-V             2          0 Defect Active
  RDI-V             2          0 Defect Active
  UNEQ-V            0          0 OK
  PLM-V             0          0 OK
  ES-V              0
  SES-V             0
  UAS-V             2
  ES-VFE            0
  SES-VFE           0
  UAS-VFE           0
Received SONET overhead:
V5 : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5 : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
  0 best-effort           95      1459200    95      0      low
none
  3 network-control       5       76800     5       0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
CE info      Packets      Bytes      Count
CE Tx        1005        192960
CE Rx        1004        192768
CE Rx Forwarded      0
CE Strayed          0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          1005      192960
CE Overrun Events    0
CE Underrun Events   0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host> show interfaces ds-1/0/0:1:1 extensive
```

```

Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
CESoPSN configuration:
  Packetization latency: 1000 us
  Idle pattern: 0xFF
  Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
  Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue

```

Limit	CoS transmit queue	Bandwidth		Buffer Priority	
		%	bps	%	usec
	0 best-effort	95	1459200	95	0
none					low
	3 network-control	5	76800	5	0
none					low

```

Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation 549)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
CE info

```

	Packets	Bytes	Count
CE Tx	0	0	
CE Rx	35712	6856704	
CE Rx Forwarded		0	
CE Strayed	0		
CE Lost	0		
CE Malformed	0		
CE Misinserted	0		
CE AIS dropped	0		
CE Dropped	0	0	
CE Overrun Events			0

```
CE Underrun Events                1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```

show interfaces (Channelized DS3-to-DS0)

Syntax	<pre>show interfaces ds-fpc/pic/port:t1channel:ds0channel <brief detail extensive> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.
Options	<p>ds-fpc/pic/port:t1channel:ds0channel—Display standard information about the specified channelized DS3-to-DS0 interface.</p> <p>brief detail extensive—(Optional) Display the specified level of output interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (Channelized DS3-to-DS0) on page 874
Output Fields	Table 41 on page 440 lists the output fields for the show interfaces (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 64: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link’s status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value, value...xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last seen hh:mm:ss ago). 	detail extensive none
LCP state	<p>(PPP) Link Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Not-configured—LCP is not configured on the interface. Opened—LCP negotiation is successful. 	detail extensive none
NCP state	<p>(PPP) Network Control Protocol state.</p> <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Not-configured—NCP is not configured on the interface. Opened—NCP negotiation is successful. 	detail extensive none

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CHAP state	<p>(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction.</p> <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication). • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: <i>year-month-day hour:minute:second timezone hh:mm:ss ago</i> . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. 	extensive
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. 	extensive

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 alarms	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm.	detail extensive none
DS1 defects	Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	
T1 media	Counts of T1 media-specific errors. <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • SEF—Severely errored framing • BEE—Bit error event • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • LES—Line error seconds • ES—Errored seconds • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • BES—Bit error seconds • UAS—Unavailable seconds 	extensive

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS3 media	<p>Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496.</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Remote defect indication • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CCV—C-bit coding violation • LES—Line error seconds • PES—P-bit errored seconds • PSES—P-bit errored seconds (section) • CES—C-bit errored seconds • CSES—C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled 	extensive
Interface transmit queues	<p>Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC.</p> <ul style="list-style-type: none"> • B/W—Queue bandwidth as a percentage of the total interface bandwidth. • WRR—Weighted round-robin (in percent). • Packets—Number of packets transmitted. • Bytes—Number of bytes transmitted. • Drops—Number of packets dropped. • Errors—Number of packet errors. 	extensive

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mpls .	detail extensive none

Table 64: Channelized DS3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	detail extensive none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```

user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  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 : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :           6814           16 bps
    Output bytes  :          28840           72 bps
    Input packets :           568           0 pps
    Output packets:           893           0 pps
  Input errors:

```

Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
 L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
 HS link CRC errors: 0

Output errors:

Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0

DS1 alarms : None

DS3 alarms : None

DS1 defects : None

DS3 defects : None

T1 media:	Seconds	Count	State
SEF	0	0	OK
BEE	5	1	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	17	1	OK
BPV	0	0	
EXZ	0	0	
LCV	5	27765	
PCV	0	0	
CS	0	0	
LES	0		
ES	0		
SES	5		
SEFS	10		
BES	0		
UAS	0		

DS3 media:	Seconds	Count	State
PLL Lock	0	0	OK
Reframing	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
IDLE	0	0	OK
YELLOW	0	0	OK
BPV	1	65535	
EXZ	1	65535	
LCV	2	131070	
PCV	1	1825	
CCV	0	0	
LES	1		
PES	1		
PSES	1		
CES	0		
CSES	0		
SEFS	0		
UAS	0		

Interface transmit queues:

	B/W	WRR	Packets	Bytes	Drops	Errors
Queue0	95	95	0	0	0	0
Queue1	5	5	893	28840	0	0

HDLC configuration:

Giant threshold: 1514, Runt threshold: 3

Timeslots : 1-10

Byte encoding: Nx64K, Data inversion: Disabled

DS3 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Algorithm: 2^15 - 1, Induced error rate: 10e-0

DS1 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)

```
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x01)
CoS information:    CoS transmit queue      Bandwidth      Buffer
Priority  Limit
           %      bps  %      usec
  0 best-effort      95    608000  95      0    low  none
  3 network-control  5     32000   5      0    low  none
Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
(Generation 943)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 949, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 1849
```


show interfaces (Channelized DS3-to-DS1)

Syntax	<code>show interfaces t1-fpc/pic/port:t1channel</code> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i> > <statistics>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.
Options	<p>t1-fpc/pic/port:t1channel—Display standard information about the specified channelized DS3-to-DS1 interface.</p> <p>brief detail extensive terse—(Optional) Display brief, detail, extensive, or terse information about the interface.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	show interfaces extensive (channelized DS3-to-DS1) on page 877
Output Fields	See the output field table for the show interfaces (Channelized DS3-to-DS0) command .

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```

user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  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 : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mp1s:

```

```

Not-configured
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          944          16 bps
  Output bytes :        1162          16 bps
  Input packets:          66           0 pps
  Output packets:         82           0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1  alarms : None
DS3  alarms : None
DS1  defects : None
DS3  defects : None
T1 media:
  Seconds      Count  State
SEF           0         0 OK
BEE          11         5 OK
AIS          28         1 OK
LOF          27         1 OK
LOS           0         0 OK
YELLOW       23         1 OK
BPV           0         0
EXZ           0         0
LCV          11       20574
PCV           0         0
CS            0         0
LES          28
ES           28
SES          39
SEFS         50
BES           0
UAS           0
DS3 media:
  Seconds      Count  State
PLL Lock      0         0 OK
Reframing     0         0 OK
AIS           0         0 OK
LOF           1         1 OK
LOS           1         1 OK
IDLE          0         0 OK
YELLOW        0         0 OK
BPV           2       131070
EXZ           3       49910
LCV           5       180980
PCV           2        327
CCV          12       264558
LES           3
PES           3
PSES          2
CES          13
CSES         13
SEFS          1
UAS          35
Interface transmit queues:
  B/W  WRR  Packets  Bytes  Drops  Errors
Queue0  95  95      0      0      0      0
Queue1   5   5      82    1162    0      0

```

```

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00) CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %             bps      %       usec
  0 best-effort           95           608000  95         0      low  none
  3 network-control       5            32000   5         0      low  none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Bandwidth: 0
Protocol inet, MTU: 1500, Generation: 576, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
  Generation: 977

```

show interfaces (Channelized T3 IQ)

Syntax	<code>show interfaces (ct3-<i>fpc/pic/port</i> <i>type-fpc/pic/port</i><:<i>channel</i>><:<i>channel</i>>) <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.
Options	<p><i>type-fpc/pic/port:channel</i>—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none">• <i>type-fpc/pic/port</i>—For the physical channelized T3 IQ interface, <i>type</i> is ct3.• <i>type-fpc/pic/port:channel</i>—For the clear channel, <i>type</i> is t3. At the first level of channelization, <i>type</i> can be ct1 or t1.• <i>type-fpc/pic/port:channel:channel</i>—At the second level of channelization, <i>type</i> is ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (Channelized T3 IQ) (Physical) on page 881</p> <p>show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 881</p> <p>show interfaces extensive (DSO on Channelized T3 IQ) on page 881</p>
Output Fields	See the output field table for the show interfaces (Channelized T1 IQ) command.

Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DSO on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces (T1, E1, or DS)

Syntax	<code>show interfaces <i>interface-type</i></code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index <i>snmp-index</i>></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is t1-<i>fpc/pic/port</i>, whereas the E1 interface type is e1-<i>fpc/pic/port</i>, and DS interface type is ds-<i>fpc/pic/port</i>:<channel>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• Understanding Interfaces on ACX Series Universal Access Routers
List of Sample Output	show interfaces (T1, IMA Link) on page 894 show interfaces (T1, PPP) on page 895 show interfaces detail (T1, PPP) on page 895 show interfaces extensive (T1 CRC Errors) on page 896 show interfaces extensive (T1, PPP) on page 896 show interfaces (E1, Frame Relay) on page 898 show interfaces detail (E1, Frame Relay) on page 899 show interfaces extensive (E1, Frame Relay) on page 900 show interfaces (E1, IMA Link) on page 902 show interfaces extensive (T1, TDM-CCC-SATOP) on page 903 show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 904
Output Fields	Table 47 on page 544 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 65: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. • up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	<p>(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics or (Input packets, Output packets). Flags can be one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 65: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	<p>Information related to the circuit emulation statistics.</p> <ul style="list-style-type: none"> CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). CE Rx Forwarded—Number of forwarded bytes. CE Strayed—Number of stray packets. CE Lost—Number of lost packets. CE Malformed—Number of malformed packets CE Misinserted—Number of misinserted packets. CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). CE Dropped—Number of dropped packets during resynchronization CE Overrun Events—Number of overrun events. CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1, IMA Link)

```

user@host> show interfaces t1-1/0/0
IMA Link alarms   : None
IMA Link defects  : LIF, LODS
IMA Link state:
  Line           : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end  : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0           0  OK
LODS                 0           0  OK
Err-ICP              0           0  OK
IV                   0           0  OK
Rx-FC                0           0  OK
Tx-FC                0           0  OK
FE-Defects           0           0
FE-Rx-FC             0           0
FE-Tx-FC             0           0
Rx-ICP               0           0
Rx-Stuff             0           0
Tx-ICP               11          11
Tx-Stuff             0           0
Rx-SES               0           0
Rx-UAS               0           0
Rx-UUS               1           1
Tx-UUS               0           0
FE-Rx-SES            0           0
FE-Rx-UAS            0           0
FE-Rx-UUS            0           0
FE-Tx-UUS            0           0

```

show interfaces (T1, PPP)

```

user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues    : 4 supported, 4 in use
  Last flapped  : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate    : 0 bps (0 pps)
  Output rate   : 72 bps (0 pps)
  DS1 alarms   : None
  DS1 defects   : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T1, PPP)

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues    : 4 supported, 4 in use
  Last flapped  : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 798 0 bps
    Input packets: 0 0 pps
    Output packets: 42 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0

```

2 assured-forw          0          0          0
3 network-cont          40         40          0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 14, Route table: 0
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 18

```

show interfaces extensive (T1 CRC Errors)

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
Interface index: 179, SNMP ifIndex: 79, Generation: 180
:
:
DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
DS1  defects  : AIS, LOF, CRC Major, CRC Minor
T1 media:
      Seconds      Count  State
SEF          1         1  OK
BEE          1         1  OK
AIS        1128         1 Defect Active
LOF        1128         1 Defect Active
LOS          0         0  OK
YELLOW       0         0  OK
CRC Major   154         1 Defect Active
CRC Minor   154         1 Defect Active
BPV          0         0
EXZ          0         0
LCV          0         0
PCV          0         0
CS           0         0
CRC         154       15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
    Output: 0 (last sent: never)
LCP state: Down

```

```

NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes  :                0                0 bps
Output bytes :               817               72 bps
Input packets:                0                0 pps
Output packets:              43                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo                0                0                0
2 assured-forw                0                0                0
3 network-cont              42                42                0

DS1  alarms   : None
DS1  defects  : None
T1  media:      Seconds      Count  State
SEF                1          1  OK
BEE                0          0  OK
AIS                0          0  OK
LOF                1          1  OK
LOS                0          0  OK
YELLOW            1          1  OK
BPV                1          1
EXZ                1          1
LCV                1       65535
PCV                1       1023
CS                 0          0
LES                1
ES                 1
SES                1
SEFS               1
BES                0
UAS                0

HDLC configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots      : All active
Line encoding: B8ZS
Buildout       : 0 to 132 feet
Byte encoding: Nx64K, 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

```

```

Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %          bps          %          usec
0 best-effort             95      1459200    95           0          low     none
3 network-control         5       76800     5           0          low     none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 1
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate : 0 bps (0 pps)
  Output rate : 0 bps (0 pps)
  DS1 alarms : None
  DS1 defects : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:13 sec, Last down: 00:01:13 ago

```

```

    Input packets : 0
    Output packets: 0
    DLCI statistics:
      Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 10
    Full enquiries sent      : 2
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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 : 1
  CoS queues : 8 supported
  Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 225 56 bps
    Input packets: 0 0 pps
    Output packets: 15 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

  DS1 alarms : None
  DS1 defects : None
  DS1 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 e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:

```

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:18 sec, Last down: 00:01:18 ago
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
Enquiries sent : 10
Full enquiries sent : 2
Enquiry responses received : 0
Full enquiry responses received : 0
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 timeout : 1
CoS queues : 8 supported

```



```

Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :                0                0 bps
  Output bytes  :               225                0 bps
  Input packets :                0                0 pps
  Output packets:               15                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:
  Queued packets  Transmitted packets  Dropped packets

  0 limited              0                0                0
  1 expedited-fo         0                0                0
  2 real-plus            0                0                0
  3 network-cont         15               15                0

DS1  alarms   : None
DS1  defects  : None
E1  media:
  Seconds      Count  State
SEF            0       0  OK
BEE            5       5  OK
AIS            0       0  OK
LOF           245      15  OK
LOS           245       4  OK
YELLOW         0      11  OK
BPV            0       0
EXZ            9       9
LCV            0       0
PCV            0       0
CS             0       0
FEBE           0       0
LES            0
ES             0
SES            0
SEFS           0
BES            0
UAS           271

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, 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, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue  Bandwidth  Buffer  Priority  Limit
                       %      bps      %      usec
  0 limited           95    1945600  95      0      low    none

```

```

3 network-control 5 102400 5 0 low none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0 0 bps
  Output bytes : 0 0 bps
  Input packets: 0 0 pps
  Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1, IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:

```

	Seconds	Count	State
LIF		0	
LODS		0	
Err-ICP		0	
IV		0	
Rx-FC		0	
Tx-FC		0	
FE-Defects		0	
FE-Rx-FC		0	
FE-Tx-FC		0	
Rx-ICP		0	
Rx-Stuff		0	
Tx-ICP		11	
Tx-Stuff		0	
Rx-SES	0		
Rx-UAS	0		
Rx-UUS	1		
Tx-UUS	0		

```

FE-Rx-SES          0
FE-Rx-UAS          0
FE-Rx-UUS          0
FE-Tx-UUS          0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host> show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
  DS1  alarms       : None
  DS1  defects      : None
  T1  media:

```

	Seconds	Count	State
SEF	0	0	OK
BEE	0	0	OK
AIS	0	0	OK
LOF	0	0	OK
LOS	0	0	OK
YELLOW	0	0	OK
CRC Major	0	0	OK
CRC Minor	0	0	OK
BPV	0	0	
EXZ	0	0	
LCV	0	0	
PCV	0	0	
CS	0	0	
CRC	0	0	
LES	0		
ES	0		
SES	0		
SEFS	0		
BES	0		
UAS	0		

```

  SAToP configuration:
    Payload size: 192

```

```

Idle pattern: 0xFF
Octet aligned: Disabled
Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms : None
SONET defects : AIS-V, RDI-V
SONET vt:
  BIP-BIP2          0          0
  REI-V             0          0
  LOP-V             0          0 OK
  AIS-V             2          0 Defect Active
  RDI-V             2          0 Defect Active
  UNEQ-V            0          0 OK
  PLM-V             0          0 OK
  ES-V              0
  SES-V             0
  UAS-V             2
  ES-VFE            0
  SES-VFE           0
  UAS-VFE           0
Received SONET overhead:
V5 : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5 : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
    0 best-effort         95      1459200    95      0      low
none
    3 network-control     5       76800     5       0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
CE info      Packets      Bytes      Count
CE Tx        1005        192960
CE Rx        1004        192768
CE Rx Forwarded      0
CE Strayed          0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          1005      192960
CE Overrun Events    0
CE Underrun Events   0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host> show interfaces ds-1/0/0:1:1 extensive
```

```

Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control
CESoPSN configuration:
  Packetization latency: 1000 us
  Idle pattern: 0xFF
  Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
  Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DSO BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue

```

Limit	CoS transmit queue	Bandwidth		Buffer Priority	
		%	bps	%	usec
0 best-effort	95	1459200	95	0	low
3 network-control	5	76800	5	0	low

```

Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation 549)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
CE info
  Packets      Bytes      Count
CE Tx          0          0
CE Rx        35712      6856704
CE Rx Forwarded          0
CE Strayed           0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          0          0
CE Overrun Events          0

```

```
CE Underrun Events          1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```

show interfaces (Channelized T1 IQ)

Syntax	<pre>show interfaces (ct1-fpc/pic/port type-fpc/pic/port<:channel><:channel>) <brief detail extensive terse> <descriptions> <media> <snmp-index snmp-index> <statistics></pre>
Release Information	Command introduced in Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.
Options	<p>type-fpc/pic/port:channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:</p> <ul style="list-style-type: none"> type-fpc/pic/port—For the physical channelized T1 IQ interface, type is ct1. type-fpc/pic/port:channel—For the clear channel, type is t1. At the first level of channelization, type can be ct1 or t1. type-fpc/pic/port:channel:channel—At the second level of channelization, type can be ds. <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index snmp-index—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces extensive (CT1) on page 915</p> <p>show interfaces extensive (T1) on page 916</p> <p>show interfaces extensive (DS0) on page 917</p>
Output Fields	Table 45 on page 514 lists the output fields for the show interfaces (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used on the link. It can be ESF or SF . The default is ESF .	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. None indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics	<p>Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI packet statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not-configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not-configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Closed—CHAP authentication is incomplete. • Failure—CHAP authentication failed. • Not-configured—CHAP is not configured on the interface. • Success—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes, Output bytes—Number of bytes received and transmitted on the interface. • Input packets, Output packets—Number of packets received and transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Giants—Number of frames received that are larger than the giant threshold. • Runts—Number of frames received that are smaller than the runt threshold. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Counter increments when the software could not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeds the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • LOS—Loss of signal. • LOF—Loss of frame. • AIS—Alarm indication signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media	<p>Counts of T1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The T1 media-specific error types can be:</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • BEE—Bit error event • BES—Bit error seconds • BPV—Bipolar violation • CS—Carrier state • ES—Errored seconds • EXZ—Excessive zeros • FEBE—Far-end block error • LCV—Line code violation • LES—Line error seconds • LOF—Loss of frame • LOS—Loss of signal • PCV—Pulse code violation • SEF—Severely errored framing • SEFS—Severely errored framing seconds (section) • SES—Severely errored seconds • UAS—Unavailable seconds • YELLOW—Errors at the remote site receiver 	extensive
Line encoding	Line encoding used: B8ZS or AMI .	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Configured time slots for the interface. • Line encoding—Line encoding used: B8ZS or AMI. • Byte encoding—Byte encoding used: Nx64K or Nx56K. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle Flag—Idle cycle flags. • Start end Flag—Start and end flag. 	extensive

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSO or DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the logical interface; values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , or mpls .	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none

Table 66: Channelized T1 IQ and T3 IQ show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics. Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • Dce-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces extensive (CT1)

```

user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 32, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps 16384
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
CoS queues     : 4 supported
Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
DS1 alarms     : None
DS1 defects    : None
T1 media:
      Seconds    Count  State
SEF          0      0  OK
BEE          0      0  OK
AIS          0      0  OK
LOF          0      0  OK
LOS          0      0  OK
YELLOW       0      0  OK
BPV          0      0
EXZ          0      0
LCV          0      0
PCV          0      0
CS           0      0
LES          0
ES           0
SES          0
SEFS         0
BES          0

```

```

UAS                                0
Line encoding: B8ZS
Buildout       : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)

```

show interfaces extensive (T1)

```

user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 33, Generation: 61
  Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
  Parent: ct1-0/2/0 Interface index 148
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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 timeout : 0
Nonmatching DCE-end DLCIs:
  2
Hold-times   : Up 0 ms, Down 0 ms
CoS queues   : 4 supported
Last flapped : 2005-09-07 15:43:47 PDT (00:00:06 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes  : 0          0 bps
  Output bytes : 14         0 bps
  Input packets: 0          0 pps
  Output packets: 1         0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets
  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     1          1          0
DS1 alarms   : None

```



```

DS1  defects  : None
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : All active
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
  flags, Start end flag: shared
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)

```

show interfaces extensive (DS0)

```

user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
  Interface index: 157, SNMP ifIndex: 52, Generation: 46
  Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
  Speed: 640kbps, Loopback: None, FCS:16,
  Parent: ct1-0/1/0 Interface index 143
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  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
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 8 (last seen 00:00:12 ago)
  Output: 8 (last sent 00:00:07 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 : 2005-08-18 15:23:46 PDT (00:03:17 ago)
Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
Traffic statistics:
  Input bytes  : 840 0 bps
  Output bytes : 912 0 bps
  Input packets: 25 0 pps
  Output packets: 26 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, L3 incompletes: 0,

```

```

    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets
    0 best-effort      0                0                0
    1 expedited-fo     0                0                0
    2 assured-forw     0                0                0
    3 network-cont     26               26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots       : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DSO BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
  Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
      Generation: 39
  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 (T3 or E3)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T3 or E3 interface.
Options	<p><i>interface-type</i>—On M Series and T Series routers, the T3 interface type is t3-fpc/pic/port, whereas the E3 interface type is e3-fpc/pic/port.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces (T3, PPP) on page 928</p> <p>show interfaces detail (T3, PPP) on page 929</p> <p>show interfaces extensive (T3, PPP) on page 930</p> <p>show interfaces (E3, Frame Relay) on page 931</p> <p>show interfaces detail (E3, Frame Relay) on page 932</p> <p>show interfaces extensive (E3, Frame Relay) on page 933</p>
Output Fields	<p>Table 60 on page 797 lists the output fields for the show interfaces (T3 or E3) command. Output fields are listed in the approximate order in which they appear.</p>

Table 67: T3 or E3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Mode	(T3 only) Whether C-bit parity mode or M13 mode is enabled.	All levels
Long buildout	(T3 only) Buildout setting: less than 255 feet (68 meters) or greater than 255 feet and shorter than 450 feet (137 meters).	All levels
Framing	(E3 only) Physical layer framing format used on the link. It can be G751 or Unframed . The default is G751 .	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. down-count number—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3. up-count number—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1. 	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Keepalive statistics or Keepalive	<p>(PPP and HDLC) Information about keepalive packets.</p> <ul style="list-style-type: none"> Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. Output—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none
LMI settings	<p>(Frame Relay) Local Management Interface (LMI) settings (ANSI or ITU). ANSI LMI settings is the default. The format is LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> n391dte—DTE full status polling interval (1–255) n392dce—DCE error threshold (1–10) n392dte—DTE error threshold (1–10) n393dce—DCE monitored event count (1–10) n393dte—DTE monitored event count (1–10) t391dte—DTE polling timer (5–30 seconds) t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) LMI statistics:</p> <ul style="list-style-type: none"> Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> Enquiries received—Number of enquiries received by the DCE from the DTE. Full enquiries received—Number of full enquiries received by the DCE from the DTE. Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> Unknown messages received—Number of received packets that do not fall into any category. Asynchronous updates received—Number of link status peer changes received. Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. Keepalive responses timedout—Number of keepalive responses that timed out when no LMI packet was reported for n392dte or n393dce intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—LCP negotiation is incomplete (not yet completed or has failed). Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> Conf-ack-received—Acknowledgement was received. Conf-ack-sent—Acknowledgement was sent. Conf-req-sent—Request was sent. Down—NCP negotiation is incomplete (not yet completed or has failed). Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> Chap-Resp-received—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.) Chap-Resp-sent—Response sent for the challenge received. Chap-Chal-sent—Challenge sent. Chap-Chal-received—Challenge received but response not yet sent. Down—CHAP authentication is incomplete (not yet completed or has failed). Not-configured—CHAP is not configured on the interface. Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (year-month-day hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS queues	Number of CoS queues configured.	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets received on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Runts—(T3 only) Number of frames received that are smaller than the runt threshold. • Giants—(T3 only) Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
Active alarms Active defects	<p>E3 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • EXZ—Excessive zeros • FERF—Far-end receive failures • IDLE—Idle code detected • LCD—Loss of cell delineation • LCV—Line code violation • LOF—Loss of frame • LOS—Loss of signal • PLL—Phase-locked loop • YLW—Remote defect indication 	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DS3 media or E3 media	<p>Counts of DS3 (T3) or E3 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mod—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling: Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. The subrate can be Disabled or display units in Kbps. • FEAC loopbac—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
DS3 (or E3) BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive
CoS information	<p>Information about the CoS queue for the physical interface.</p> <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive

Logical Interface

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Logical interface	Name of the logical interface.	detail extensive none
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Encapsulation	Encapsulation on the logical interface.	detail extensive none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	<p>(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	(Multilink) Interface name for the multilink bundle.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	detail extensive none

Table 67: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics (or Input packets, Output packets). Flags is one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Sample Output

show interfaces (T3, PPP)

```

user@host> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)

```

```

Active alarms : None
Active defects : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255

```

show interfaces detail (T3, PPP)

```

user@host> show interfaces t3-0/2/0 detail
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  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 : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues : 4 supported, 4 in use
  Last flapped : 2005-12-05 08:43:06 PST (02:18:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 0 0 bps
    Output bytes : 152 0 bps
    Input packets: 0 0 pps
    Output packets: 8 0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	6	6	0

```

Active alarms : None
Active defects : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0

```

```

Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 24

```

show interfaces extensive (T3, PPP)

```

user@host> show interfaces t3-0/2/0 extensive
Physical interface: t3-0/2/0, Enabled, Physical link is Up
Interface index: 139, SNMP ifIndex: 35, Generation: 22
Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
Loopback: None, FCS: 16, Mode: C/Bit parity,
Long buildout: Shorter than 255 feet
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
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 : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues   : 4 supported, 4 in use
Last flapped : 2005-12-05 08:43:06 PST (02:18:47 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes   :                0                0 bps
Output bytes  :               171               72 bps
Input packets :                0                0 pps
Output packets:                9                0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 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, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort                0                0                0
1 expedited-fo              0                0                0
2 assured-forw              0                0                0
3 network-cont              7                7                0

Active alarms  : None
Active defects : None
DS3 media:      Seconds      Count  State
PLL Lock        0          0  OK
Reframing       0          0  OK
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                 1          4
PCV                 0          0
CCV                 0          0
FEBE                1          11
LES                 1
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
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-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 t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    Generation: 24

```

show interfaces (E3, Frame Relay)

```

user@host> show interfaces e3-1/2/0
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 4 (00:00:06 ago)
  DTE statistics:
    Enquiries sent           : 4
    Full enquiries sent      : 0
    Enquiry responses received : 0
    Full enquiry responses received : 0
  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  : 1
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:46:14 PST (02:27:17 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
Active alarms   : None
Active defects  : None

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Input packets : 0
Output packets: 0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:06 sec, Last down: 00:00:06 ago
    Input packets : 0
    Output packets: 0
  DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (E3, Frame Relay)

```

user@host> show interfaces e3-1/2/0 detail
Physical interface: e3-1/2/0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 49, Generation: 36
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
Loopback: None, FCS: 16, Framing: G751
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 5 (last sent 00:00:07 ago)
DTE statistics:
  Enquiries sent           : 5
  Full enquiries sent      : 0
  Enquiry responses received : 0
  Full enquiry responses received : 0
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          : 1
    CoS queues      : 4 supported, 4 in use
    Last flapped    : 2005-12-05 08:46:14 PST (02:27:27 ago)
    Statistics last cleared: Never
    Traffic statistics:
    Input bytes  :                0                0 bps
    Output bytes :               806                0 bps
    Input packets:                0                0 pps
    Output packets:              44                0 pps
    Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0 best-effort                0                0                0
    1 expedited-fo                0                0                0
    2 assured-forw                0                0                0
    3 network-cont              43               43                0

    Active alarms : None
    Active defects : None

    Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    Local statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    Transit statistics:
    Input bytes  :                0                0 bps
    Output bytes :                0                0 bps
    Input packets:                0                0 pps
    Output packets:               0                0 pps
    Protocol inet, MTU: 4470, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255,
    Generation: 38
    DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:16 sec, Last down: 00:00:16 ago
    Traffic statistics:
    Input bytes  :                0
    Output bytes :                0
    Input packets:                0
    Output packets:               0
    DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 extensive
```

```

Physical interface: e3-1/2/0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 49, Generation: 36
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
Loopback: None, FCS: 16, Framing: G751
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 6 (last sent 00:00:02 ago)
DTE statistics:
  Enquiries sent           : 5
  Full enquiries sent      : 1
  Enquiry responses received : 0
  Full enquiry responses received : 0
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 : 1
CoS queues   : 4 supported, 4 in use
Last flapped : 2005-12-05 08:46:14 PST (02:27:30 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 821 56 bps
  Input packets: 0 0 pps
  Output packets: 45 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 21118, 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,
  Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort      0          0          0
  1 expedited-fo     0          0          0
  2 assured-forw     0          0          0
  3 network-cont     44         44         0

Active alarms : None
Active defects : None
E3 media:      Seconds      Count  State
  PLL Lock      0          0  OK
  Reframing     187         1  OK
  AIS           0          0  OK
  LOF           187         1  OK

```

```

LOS                187          1 OK
IDLE                0           0 OK
YELLOW             0           0 OK
BPV                0           0
EXZ                0           0
LCV                188       12303167
LES                188
SEFS               187
UAS                195

```

DSU configuration:

Compatibility mode: None, Scrambling: Disabled

E3 BERT configuration:

BERT time period: 10 seconds, Elapsed: 0 seconds

Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced Error rate: 10e-0

Packet Forwarding Engine configuration:

Destination slot: 1, PLP byte: 1 (0x00)

CoS information:

CoS transmit queue	%	Bandwidth bps	%	Buffer usec	Priority	Limit
0 best-effort	95	32649600	95	0	low	none
3 network-control	5	1718400	5	0	low	none

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID

Traffic statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

Local statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

Transit statistics:

```

Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps

```

Protocol inet, MTU: 4470, Generation: 24, Route table: 0

Flags: None

Addresses, Flags: Dest-route-down Is-Preferred Is-Primary

Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 38

DLCI 100

Flags: Down, DCE-Unconfigured

Total down time: 00:00:19 sec, Last down: 00:00:19 ago

Traffic statistics:

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

DLCI statistics:

Active DLCI :0 Inactive DLCI :1

show interfaces controller (Channelized E1 IQ)

Syntax	<code>show interfaces controller ce1-fpc/pic/port</code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display the interface names of the physical channelized E1 IQ interface and the channels configured on each interface.
Options	<code>ce1-fpc/pic/port</code> —Basic Rate Interface (BRI) interface name.
Required Privilege Level	view
List of Sample Output	show interfaces controller (Channelized E1 IQ with Logical E1) on page 936 show interfaces controller (Channelized E1 IQ with Logical DSO) on page 936
Output Fields	Table 68 on page 936 lists the output fields for the <code>show interfaces controller</code> (Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 68: Channelized E1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized E1 IQ with Logical E1)

```

user@host> show interfaces controller ce1-1/2/6

Controller                               Admin Link
ce1-1/2/6                                up    up
e1-1/2/6                                  up    up

```

show interfaces controller (Channelized E1 IQ with Logical DSO)

```

user@host> show interfaces controller ce1-1/2/3

Controller                               Admin Link
ce1-1/2/3                                up    up

ds-1/2/3:1                               up    up

ds-1/2/3:2                               up    up

```

show interfaces controller (Channelized OC12 IQ and IQE)

Syntax `show interfaces controller coc12-fpc/pic/port`

Release Information Command introduced before Junos OS Release 7.4.

Description Display a list of channels configured on a channelized OC12 IQ or IQE interface.

Options *coc12-fpc/pic/slot*—Channelized OC12 IQ or IQE interface name.

Required Privilege Level [view](#)

List of Sample Output [show interfaces controller \(Channelized OC12 IQ\) on page 937](#)

Output Fields Table 69 on page 937 lists the output fields for the **show interfaces controller** (Channelized OC12 IQ and IQE) command. Output fields are listed in the approximate order in which they appear.

Table 69: Channelized OC12 IQ and IQE show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized OC12 IQ)

```

user@host> show interfaces controller
Controller
coc12-4/2/0
    so-4/2/0:1
    t3-4/2/0:2
    ct3-4/2/0:3
        t1-4/2/0:3:1
        t1-4/2/0:3:2
    ...
    t1-4/2/0:3:28
    ct3-4/2/0:4
        ct1-4/2/0:4:1
            ds-4/2/0:4:1:1
            ds-4/2/0:4:1:2
        ...
        ds-4/2/0:4:1:24
    ct1-4/2/0:4:2
        ds-4/2/0:4:2:1
        ds-4/2/0:4:2:2

```

...			
ds-4/2/0:4:2:6	up	up	
t1-4/2/0:4:3	up	up	
t1-4/2/0:4:4	up	up	
...			
t1-4/2/0:4:28	up	up	
t3-4/2/0:5	up	up	
coc1-4/2/0:6	up	up	
t1-4/2/0:6:1	up	up	
t1-4/2/0:6:2	up	up	
...			
t1-4/2/0:6:28	up	up	
coc1-4/2/0:7	up	up	
ct1-4/2/0:7:1	up	up	
ds-4/2/0:7:1:1	up	up	
ds-4/2/0:7:1:2	up	up	
...			
ds-4/2/0:7:1:24	up	up	
ct1-4/2/0:7:2	up	up	
ds-4/2/0:7:2:1	up	up	
ds-4/2/0:7:2:2	up	up	
...			
ds-4/2/0:7:2:6	up	up	
t1-4/2/0:7:3	up	up	
t1-4/2/0:7:4	up	up	
...			
t1-4/2/0:7:28	up	up	
so-4/2/0:8	up	up	

show interfaces controller (Channelized OC3 IQ and IQE)

Syntax	<code>show interfaces controller coc3-<i>fpc/pic/slot</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display a list of channels configured on a channelized OC3 IQ and IQE interface.
Options	<code>coc3-<i>fpc/pic/slot</i></code> —channelized OC3 IQ or IQE interface name.
Required Privilege Level	view

List of Sample Output [show interfaces controller \(Channelized OC3 IQ\) on page 939](#)

Output Fields [Table 70 on page 939](#) lists the output fields for the **show interfaces controller** (Channelized OC3 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 70: Channelized OC3 IQ and IQE show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized OC3 IQ)

```

user@host> show interfaces controller coc3-4/2/0
Controller
coc3-4/2/0
  coc1-4/2/0:1
    ct1-4/2/0:1:1
      ds-4/2/0:1:1:1
ct3-0/2/0
ct3-0/2/1
ct3-0/2/2
ct3-0/2/3

```

Admin	Link
up	up
up	up
up	up
up	up
up	up
up	up
up	up

show interfaces controller (Channelized STM1 IQ)

Syntax	<code>show interfaces controller cstm1-fpc/pic/port</code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display the interface names of the physical channelized STM1 IQ interface and the channels configured on each interface.
Options	<code>cstm1-fpc/pic/slot</code> —Channelized STM1 IQ interface name.
Required Privilege Level	view
List of Sample Output	show interfaces controller (Physical Channelized STM1 IQ with Logical E1) on page 940
Output Fields	Table 71 on page 940 lists the output fields for the <code>show interfaces controller</code> (Channelized STM1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 71: Channelized STM1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Physical Channelized STM1 IQ with Logical E1)

```

user@host> show interfaces controller cstm1-0/0/0
Controller
cstm1-0/0/0
cau4-0/0/0
  e1-0/0/0:1
  e1-0/0/0:2
  e1-0/0/0:3
  e1-0/0/0:4
  e1-0/0/0:5
  e1-0/0/0:6
  e1-0/0/0:7
  e1-0/0/0:8
  e1-0/0/0:9
  e1-0/0/0:10
  ce1-0/0/0:11
    ds-0/0/0:11:1
    ds-0/0/0:11:2
    ds-0/0/0:11:3
    ds-0/0/0:11:4

```

	Admin	Link
cstm1-0/0/0	up	up
cau4-0/0/0	up	up
e1-0/0/0:1	up	up
e1-0/0/0:2	up	up
e1-0/0/0:3	up	up
e1-0/0/0:4	up	up
e1-0/0/0:5	up	up
e1-0/0/0:6	up	up
e1-0/0/0:7	up	up
e1-0/0/0:8	up	up
e1-0/0/0:9	up	up
e1-0/0/0:10	up	up
ce1-0/0/0:11	up	up
ds-0/0/0:11:1	up	up
ds-0/0/0:11:2	up	up
ds-0/0/0:11:3	up	up
ds-0/0/0:11:4	up	up

show interfaces controller (Channelized T1 IQ)

Syntax	<code>show interfaces controller ct1-fpc/pic/slot</code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display the interface names of the specified physical channelized T1 IQ interface and the channels configured on it.
Options	<code>ct1-fpc/pic/slot</code> —Channelized T1 IQ interface name.
Required Privilege Level	view
List of Sample Output	show interfaces controller (T1 IQ) (Clear-Channel T1) on page 942 show interfaces controller (T1 IQ) (Channelized DS) on page 942
Output Fields	Table 72 on page 942 lists the output fields for the show interfaces controller (Channelized T1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 72: Channelized T1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (T1 IQ) (Clear-Channel T1)

The following sample output displays the channelized T1 IQ interface when it is configured as a clear-channel T1 interface:

```
user@host> show interfaces controller ct1-0/2/0
```

Controller	Admin	Link
ct1-0/2/0	up	up
t1-0/2/0	up	up

show interfaces controller (T1 IQ) (Channelized DS)

The following sample output displays the channelized T1 IQ interfaces when it is configured down to the channelized DS level:

```
user@host> show interfaces controller ct1-0/2/1
```

Controller	Admin	Link
ct1-0/2/1	up	up
ds-0/2/1:1	up	up
ds-0/2/1:2	up	up

show interfaces controller (Channelized T3 IQ)

Syntax	<code>show interfaces controller ct3-<i>fpc/pic/slot</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	(M Series and T Series routers only) Display the interface names of the specified physical channelized T3 IQ interface and the channels configured on it.
Options	<code>ct3-<i>fpc/pic /slot</i></code> —Channelized T3 IQ interface name.
Required Privilege Level	view
List of Sample Output	show interfaces controller (T3 IQ) on page 944
Output Fields	Table 73 on page 944 lists the output fields for the <code>show interfaces controller</code> (Channelized T3 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 73: Channelized T3 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (T3 IQ)

```

user@host> show interfaces controller ct3-0/0/1
Controller
ct3-0/0/1
  t1-0/0/1:1
  ct1-0/0/1:2
    ds-0/0/1:2:1
    ds-0/0/1:2:2
    ds-0/0/1:2:3
  t1-0/0/1:3
  ...
  t1-0/0/1:10
  ct1-0/0/1:11
  ...
  ct1-0/0/1:28

```

	Admin	Link
ct3-0/0/1	up	up
t1-0/0/1:1	up	up
ct1-0/0/1:2	up	up
ds-0/0/1:2:1	up	up
ds-0/0/1:2:2	up	up
ds-0/0/1:2:3	up	up
t1-0/0/1:3		
...	up	down
t1-0/0/1:10	up	up
ct1-0/0/1:11	up	up
...		
ct1-0/0/1:28	up	up

PART 5

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