JUNIPER NETWORKS

Junos® OS

Channelized STM1 Interfaces Feature Guide for Routing Devices

Release
14.1

Published: 2014-05-15

Copyright © 2014, Juniper Networks, Inc.

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, and JunosE are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Junos® OS Channelized STM1 Interfaces Feature Guide for Routing Devices
14.1
Copyright © 2014, Juniper Networks, Inc.
All rights reserved.

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

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at http://www.juniper.net/support/eula.html. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

Table of Contents

About the Documentation vii
Documentation and Release Notes vii
Supported Platforms vii
Using the Examples in This Manual vii
Merging a Full Example viii
Merging a Snippet viii
Documentation Conventions ix
Documentation Feedback xi
Requesting Technical Support xi
Self-Help Online Tools and Resources xi
Opening a Case with JTAC xii

Part 1 Overview

Chapter 1 Channelized STM1 Interfaces 3

Channelized STM1 Interfaces Overview 3

Part 2 Configuration

Chapter 2 Channelized STM1 Interfaces 7

Configuring Channelized STM1 IQ and IQE Interfaces 7
Configuring an STM1 IQ or STM1 IQE Interface 7
Configuring E1 IQ and IQE Interfaces 7
Example: Configuring E1 IQ and IQE Interfaces 8
Configuring Fractional E1 IQ and IQE Interfaces 8
Example: Configuring Fractional E1 Interfaces 9
Configuring an NxDS0 IQ Interface 9
Example: Configuring an NxDS0 IQ Interface 10
Example: Configuring Channelized STM1 IQ and IQE Interfaces 11
Configuring Channelized STM1 Interfaces 12
Configuring Channelized STM1 Interface Properties 12
Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces 14
Configuring Link PIC Failover on Channelized STM1 Interfaces 21
Example: Configuring Channelized STM1 Interfaces 21

Chapter 3 Network Interfaces Configuration Statements and Hierarchy 23

[edit chassis] Hierarchy Level 23
[edit interfaces] Hierarchy Level 24
[edit logical-systems] Hierarchy Level 40

Copyright © 2014, Juniper Networks, Inc.

Chapter 4 Statement Summary . . . 47
advertise-interval . . . 48
aps . . . 49
authentication-key . . . 50
bert-error-rate . . . 51
bert-period . . . 53
bytes . . . 55
e1-options . . . 56
fast-aps-switch . . . 57
fcs . . . 58
force . . . 59
framing (E1, E3, and T1 Interfaces) . . . 60
hold-time (APS) . . . 61
idle-cycle-flag . . . 62
interface-type (Interfaces) . . . 63
lockout . . . 64
loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) . . . 65
neighbor (Automatic Protection Switching for SONET/SDH) . . . 66
no-partition . . . 67
no-termination-request . . . 68
paired-group . . . 68
partition . . . 69
protect-circuit . . . 70
request . . . 70
revert-time (Interfaces) . . . 71
sonet-options . . . 72
start-end-flag . . . 74
switching-mode . . . 75
timeslots . . . 76
vtmapping . . . 77
working-circuit . . . 77

Part 3 Administration

Chapter 5 Monitoring Commands . . . 81
show interfaces (Channelized STM1) . . . 82

Part 4 Troubleshooting

Chapter 6 Interface Diagnostics . . . 99
Interface Diagnostics . . . 99
Configuring Loopback Testing . . . 99
Interface Diagnostics . . . 101
Starting and Stopping a BERT Test . . . 105
Example: Configuring Bit Error Rate Testing . . . 105

Part 5 Index

Index . . . 109

Copyright © 2014, Juniper Networks, Inc.

List of Tables

About the Documentation vii

Table 1: Notice Icons ix
Table 2: Text and Syntax Conventions x

Part 2 Configuration

Chapter 2 Channelized STM1 Interfaces 7

Table 3: Channelized STM1-to-E1 Channel Mapping 14
Table 4: Channelized STM1-to-T1 Channel Mapping 17

Part 3 Administration

Chapter 5 Monitoring Commands 81

Table 5: Channelized STM1 show interfaces Output Fields 82

Part 4 Troubleshooting

Chapter 6 Interface Diagnostics 99

Table 6: Loopback Modes by Interface Type 100
Table 7: BERT Capabilities by Interface Type 104

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

About the Documentation

- Documentation and Release Notes on page vii
- Supported Platforms on page vii
- Using the Examples in This Manual on page vii
- Documentation Conventions on page ix
- Documentation Feedback on page xi
- Requesting Technical Support on page xi

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
- J Series

Using the Examples in This Manual

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

Copyright © 2014, Juniper Networks, Inc.

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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


Copyright © 2014, Juniper Networks, Inc.

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

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

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

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

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

Documentation Conventions

Table 1 on page ix 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 x defines the text and syntax conventions used in this guide.

Copyright © 2014, Juniper Networks, Inc.

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`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric** *metric***>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

Copyright © 2014, Juniper Networks, Inc.

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

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

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

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

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 JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

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

Self-Help Online Tools and Resources

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

- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/

Copyright © 2014, Juniper Networks, Inc.

- 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.

Copyright © 2014, Juniper Networks, Inc.

PART 1

Overview

- Channelized STM1 Interfaces on page 3

Copyright © 2014, Juniper Networks, Inc.

 Copyright © 2014, Juniper Networks, Inc.

CHAPTER 1

Channelized STM1 Interfaces

- Channelized STM1 Interfaces Overview on page 3

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*xDS0 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*xDS0).

Related Documentation

- Configuring Channelized STM1 Interfaces on page 12

Copyright © 2014, Juniper Networks, Inc.

 Copyright © 2014, Juniper Networks, Inc.

PART 2

Configuration

- Channelized STM1 Interfaces on page 7
- Network Interfaces Configuration Statements and Hierarchy on page 23
- Statement Summary on page 47

Copyright © 2014, Juniper Networks, Inc.

 Copyright © 2014, Juniper Networks, Inc.

CHAPTER 2

Channelized STM1 Interfaces

- Configuring Channelized STM1 IQ and IQE Interfaces on page 7
- Configuring Channelized STM1 Interfaces on page 12
- Configuring Link PIC Failover on Channelized STM1 Interfaces on page 21
- Example: Configuring Channelized STM1 Interfaces on page 21

Configuring Channelized STM1 IQ and IQE Interfaces

This section includes the following topics:

- Configuring an STM1 IQ or STM1 IQE Interface on page 7
- Configuring E1 IQ and IQE Interfaces on page 7
- Configuring Fractional E1 IQ and IQE Interfaces on page 8
- Configuring an NxDS0 IQ Interface on page 9
- Example: Configuring Channelized STM1 IQ and IQE Interfaces on page 11

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:

Copyright © 2014, Juniper Networks, Inc.

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 14.1*.

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:

Copyright © 2014, Juniper Networks, Inc.

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. *N*xDS0 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 14.1*.

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized STM1 interface are used. To configure an *N*xDS0 IQ interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

Copyright © 2014, Juniper Networks, Inc.

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 *N*xDS0 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 *N*xDS0 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]
```


Copyright © 2014, Juniper Networks, Inc.

```
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 14.1*.

Example: Configuring Channelized STM1 IQ and IQE Interfaces

Configure STM1, E1, fractional E1, and *N*xDS0 interfaces:

STM1 Interface

```
[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;
    }
  }
}
```

E1 Interface

```
[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;
    }
  }
}
...
```

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;
```

Copyright © 2014, Juniper Networks, Inc.

```
    }
  }
}
...
```

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 14.1*.

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 12
- Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 14

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 {
```


Copyright © 2014, Juniper Networks, Inc.

```
    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.

Copyright © 2014, Juniper Networks, Inc.

For information about Frame Relay DLCI limitations for channelized interfaces, see *Data-Link Connection Identifiers on Channelized Interfaces*. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

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 21.

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 Administration Library for Routing Devices*.

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 3 on page 14 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 3: 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
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

Copyright © 2014, Juniper Networks, Inc.

Table 3: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32

Copyright © 2014, Juniper Networks, Inc.

Table 3: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15

Copyright © 2014, Juniper Networks, Inc.

Table 3: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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 4 on page 17 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 4: 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
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

Copyright © 2014, Juniper Networks, Inc.

Table 4: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
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

Copyright © 2014, Juniper Networks, Inc.

Table 4: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
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

Copyright © 2014, Juniper Networks, Inc.

Table 4: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
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

Copyright © 2014, Juniper Networks, Inc.

Table 4: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
80	81	4	6	3	81
81	82	4	7	1	42
82	83	4	7	2	63
83	84	4	7	3	84

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*.

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*. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

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 {
```

Copyright © 2014, Juniper Networks, Inc.

```
    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;
    }
  }
}
```


Copyright © 2014, Juniper Networks, Inc.

CHAPTER 3

Network Interfaces Configuration Statements and Hierarchy

- [edit chassis] Hierarchy Level on page 23
- [edit interfaces] Hierarchy Level on page 24
- [edit logical-systems] Hierarchy Level on page 40

[edit chassis] Hierarchy Level

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

Copyright © 2014, Juniper Networks, Inc.

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

Related Documentation

- *Router Interfaces*

[edit interfaces] Hierarchy Level

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

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

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
```


Copyright © 2014, Juniper Networks, Inc.

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

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


Copyright © 2014, Juniper Networks, Inc.

```
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
  }
  description text;
  alias alias-name;
  dialer-options {
    pool pool-name <priority priority>;
  }
  disable;
  ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
  }
  e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
  }
  e3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
```

Copyright © 2014, Juniper Networks, Inc.

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


Copyright © 2014, Juniper Networks, Inc.

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

```
    tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
    lmi-type (ansi | itu | c-lmi);
    n391dte number;
    n392dce number;
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interfaceinterface-name;
        }
    }
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
```


Copyright © 2014, Juniper Networks, Inc.

```
no-partition {
  interface-type type;
}
no-vpivci-swapping;
otn-options {
  fec (efec | gfec | none);
  (laser-enable | no-laser-enable);
  (line-loopback | no-line-loopback);
  pass-thru;
  rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
  transmit-payload-type number;
  trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
    | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
    opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
    otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
  tti;
}
optics-options {
  wavelength nm;
  alarm alarm-name {
    (syslog | link-down);
  }
  warning warning-name {
    (syslog | link-down);
  }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  no-termination-request;
  pap {
    access-profile name;
    local-name name;
    local-password password;
    compression;
  }
}
psn-vcipsn-vci-identifier;
psn-vpipsn-vpi-identifier;
receive-bucket {
  overflow (discard | tag);
  rate percentage;
  threshold bytes;
```

Copyright © 2014, Juniper Networks, Inc.

```
}
redundancy-options {
  priority sp-fpc/pic/port;
  secondary sp-fpc/pic/port;
  hot-standby;
}
satop-options {
  payload-size n;
}
schedulers number;
serial-options {
  clock-rate rate;
  clocking-mode (dce | internal | loop);
  control-polarity (negative | positive);
  cts-polarity (negative | positive);
  dcd-polarity (negative | positive);
  dce-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
  }
  dsr-polarity (negative | positive);
  dte-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
  }
  dtr-circuit (balanced | unbalanced);
  dtr-polarity (negative | positive);
  encoding (nrz | nrzi);
  indication-polarity (negative | positive);
  line-protocol protocol;
  loopback mode;
  rts-polarity (negative | positive);
  tm-polarity (negative | positive);
  transmit-clock invert;
}
services-options {
  inactivity-timeout seconds;
  open-timeout seconds;
  session-limit {
    maximum number;
    rate new-sessions-per-second;
    }
```


Copyright © 2014, Juniper Networks, Inc.

```
        syslog {
        host hostname {
          facility-override facility-name;
          log-prefix prefix-number;
          services priority-level;
        }
      }
    }
    shdsl-options {
      annex (annex-a | annex-b);
      line-rate line-rate;
      loopback (local | remote);
      snr-margin {
        current margin;
        snext margin;
      }
    }
    sonet-options {
      aggregate asx;
      aps {
        advertise-interval milliseconds;
        annex-b;
        authentication-key key;
        fast-aps-switch;
        force;
        hold-time milliseconds;
        lockout;
        neighbor address;
        paired-group group-name;
        preserve-interface;
        protect-circuit group-name;
        request;
        revert-time seconds;
        switching-mode (bidirectional | unidirectional);
        working-circuit group-name;
      }
      bytes {
        c2 value;
        e1-quiet value;
        f1 value;
        f2 value;
        s1 value;
        z3 value;
        z4 value;
      }
      fcs (16 | 32);
      loopback (local | remote);
      mpls {
        pop-all-labels {
          required-depth number;
        }
      }
      path-trace trace-string;
      (payload-scrambler | no-payload-scrambler);
      rfc-2615;
      trigger {
```

Copyright © 2014, Juniper Networks, Inc.

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


Copyright © 2014, Juniper Networks, Inc.

```
    overflow discard;
    rate percentage;
    threshold bytes;
  }
  (traps | no-traps);
  unidirectional;
  vlan-tagging;
  vlan-vci-tagging;
  unit logical-unit-number {
    accept-source-mac {
      mac-address mac-address {
        policer {
          input cos-policer-name;
          output cos-policer-name;
        }
      }
    }
    accounting-profile name;
    advisory-options {
      downstream-rate rate;
      upstream-rate rate;
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
      interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
      rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
          minimum port-number;
          maximum port-number;
        }
      }
    }
    compression-device interface-name;
    copy-tos-to-outer-ip-header;
    demux-destination family;
    demux-source family;
    demux-options {
      underlying-interface interface-name;
    }
    description text;
    alias alias-name;
    interface {
      l2tp-interface-id name;
      (dedicated | shared);
    }
    dialer-options {
      activation-delay seconds;
```

```
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
      caller (caller-id | accept-all);
      initial-route-check seconds;
      load-interval seconds;
      load-threshold percent;
      pool pool-name;
      redial-delay time;
      watch-list {
        [ routes ];
      }
    }
  }
  disable;
  disable-mlppp-inner-ppp-pfc;
  dlci dlci-identifier;
  drop-timeout milliseconds;
  dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
  }
  encapsulation type;
  epd-threshold cells plp1 cells;
  fragment-threshold bytes;
  inner-vlan-id-range start start-id end end-id;
  input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  interleave-fragments;
  inverse-arp;
  layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
  }
  link-layer-overhead percent;
  minimum-links number;
  mrru bytes;
  multicast-dlci dlci-identifier;
  multicast-vci vpi-identifier.vci-identifier;
  multilink-max-classes number;
  multipoint;
  oam-liveness {
    down-count cells;
    up-count cells;
  }
  oam-period (seconds | disable);
```


Copyright © 2014, Juniper Networks, Inc.

```
output-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
    pap;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
  dynamic-profile profile-name;
  lcp-max-conf-req number;
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-max-conf-req number;
  ncp-restart-timer milliseconds;
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
```

```
    key number;
    routing-instance {
      destination routing-instance-name;
    }
    source source-address;
    ttl number;
  }
  vci vpi-identifier.vci-identifier;
  vci-range start start-vci end end-vci;
  vpi vpi-identifier;
  vlan-id number;
  vlan-id-list [vlan-id vlan-id–vlan-id];
  vlan-id-range number-number;
  vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
  vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id];
  family family {
    accounting {
      destination-class-usage;
      source-class-usage {
        direction;
      }
    }
    access-concentrator name;
    address address {
      destination address;
    }
    bundle ml-fpc/pic/port | ls-fpc/pic/port);
    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 ];
      }
    }
    ipsec-sa sa-name;
    keep-address-and-control;
    max-sessions number;
    max-sessions-vsa-ignore;
    mtu bytes;
    multicast-only;
    negotiate-address;
    no-redirects;
    policer {
      arp policer-template-name;
      disable-arp-policer
      input policer-template-name;
      output policer-template-name;
    }
    primary;
```


Copyright © 2014, Juniper Networks, Inc.

```
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
  fail-filter filter-name;
  mode loose;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-names <service-filter filter-name>;
  }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
  maximum-seconds>;
targeted-broadcast {
  forward-and-send-to-re;
  forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
  profile-name | preferred-source-address address>;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
```

Copyright © 2014, Juniper Networks, Inc.

```
            (vrrp-group | vrrp-inet6-group) group-number {
              (accept-data | no-accept-data);
              advertise–interval seconds;
              authentication-type authentication;
              authentication-key key;
              fast-interval milliseconds;
              (preempt | no-preempt) {
                hold-time seconds;
              }
              priority-number number;
              track {
                priority-cost seconds;
                priority-hold-time interface-name {
                  bandwidth-threshold bits-per-second {
                    priority;
                  }
                  interface priority;
                }
                route ip-address/mask routing-instance instance-name priority-cost cost;
              }
              virtual-address [ addresses ];
            }
          }
        }
      }
    }
  }
```

Related Documentation

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

[edit logical-systems] Hierarchy Level

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

```
logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
          policer {
            input cos-policer-name;
            output cos-policer-name;
          }
        }
      }
      allow-any-vci;
      atm-scheduler-map (map-name | default);
      bandwidth rate;
      backup-options {
```


Copyright © 2014, Juniper Networks, Inc.

```
    interface interface-name;
}
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        port {
            minimum port-number;
            maximum port-number;
        }
        queues [ queue-numbers ];
    }
}
compression-device interface-name;
description text;
interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    initial-route-check seconds;
    load-threshold number;
    pool pool;
    remote-name remote-callers;
    watch-list {
        [ routes ];
    }
}
disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
```

Copyright © 2014, Juniper Networks, Inc.

```
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
        }
    }
    dynamic-profile profile-name;
    pap {
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
        burst length);
    queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
```


Copyright © 2014, Juniper Networks, Inc.

```
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      direction;
    }
  }
  bundle interface-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list {
      [ filter-names ];
    }
    output filter-name;
    output-list {
      [ filter-names ];
    }
  }
  ipsec-sa sa-name;
  keep-address-and-control;
  mtu bytes;
  multicast-only;
  no-redirects;
  policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
  }
  primary;
  proxy inet-address address;
  receive-options-packets;
  receive-ttl-exceeded;
  remote (inet-address address | mac-address address);
  rpf-check <fail-filter filter-name> {
    <mode loose>;
  }
  sampling {
    direction;
```

```
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
  profile-name;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise–interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
      hold-time seconds;
    }
    priority-number number;
    track {
      priority-cost seconds;
      priority-hold-time interface-name {
        interface priority;
        bandwidth-threshold bits-per-second {
          priority;
        }
      }
```


Copyright © 2014, Juniper Networks, Inc.

```
                route ip-address/mask routing-instance instance-name priority-cost cost;
            }
          }
          virtual-address [ addresses ];
        }
      }
    }
  }
}
```

Related Documentation

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

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

CHAPTER 4

Statement Summary

- advertise-interval on page 48
- aps on page 49
- authentication-key on page 50
- bert-error-rate on page 51
- bert-period on page 53
- bytes on page 55
- e1-options on page 56
- fast-aps-switch on page 57
- fcs on page 58
- force on page 59
- framing (E1, E3, and T1 Interfaces) on page 60
- hold-time (APS) on page 61
- idle-cycle-flag on page 62
- interface-type (Interfaces) on page 63
- lockout on page 64
- loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 65
- neighbor (Automatic Protection Switching for SONET/SDH) on page 66
- no-partition on page 67
- no-termination-request on page 68
- paired-group on page 68
- partition on page 69
- protect-circuit on page 70
- request on page 70
- revert-time (Interfaces) on page 71
- sonet-options on page 72
- start-end-flag on page 74
- switching-mode on page 75
- timeslots on page 76

Copyright © 2014, Juniper Networks, Inc.

- vtmapping on page 77
- working-circuit on page 77

advertise-interval

Syntax advertise-interval *milliseconds*;

Hierarchy Level [edit interfaces *interface-name* 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 ***milliseconds***—Interval between advertisement packets.

Range: 1 through 65,534 milliseconds

Default: 1000 milliseconds

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

Related Documentation

- *Configuring APS Timers*

Copyright © 2014, Juniper Networks, Inc.

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

Related Documentation

- *Automatic Protection Switching and Multiplex Section Protection Overview*

Copyright © 2014, Juniper Networks, Inc.

authentication-key

Syntax authentication-key *key*;

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

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

- *Configuring Basic Automatic Protect Switching*
- For information about the **authentication-key** statement at the **[edit interfaces *interface-name* unit *unit-number* family inet address *address* (vrrp-group | vrrp-inet6-group) *group-number*]** or **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number*]** hierarchy level, see the *Junos OS High Availability Library for Routing Devices*.

Copyright © 2014, Juniper Networks, Inc.

bert-error-rate

Syntax bert-error-rate *rate*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*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 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.

When configuring **t3-options bert-error-rate** on J Series routers, only 0 and 3 through 7 are valid values. If you enter 1 or 2, Junos OS will return the error message **configuration check-out failed**.

Options ***rate***—Bit error rate.

Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)

Default: 0

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

Related Documentation

- *bert-algorithm*
- bert-period on page 53
- *ds0-options*
- e1-options on page 56
- *e3-options*
- *t1-options*
- *t3-options*

Copyright © 2014, Juniper Networks, Inc.

- Interface Diagnostics on page 101
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *Examples: Configuring T3 Interfaces*

Copyright © 2014, Juniper Networks, Inc.

bert-period

Syntax bert-period *seconds*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*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 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).

E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-period** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***seconds***—Test duration. Range and default values vary by interface type.

Range:

- 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

Default:

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

Related Documentation

- Interface Diagnostics on page 101
- *Configuring E1 BERT Properties*

Copyright © 2014, Juniper Networks, Inc.

- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *bert-algorithm*
- bert-error-rate on page 51

Copyright © 2014, Juniper Networks, Inc.

bytes

Syntax

```
bytes {
  c2 value;
  e1-quiet value;
  f1 value;
  f2 value;
  s1 value;
  z3 value;
  z4 value;
}
```

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Set values in some SONET/SDH header bytes.

Options

c2 *value*—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.

Range: 0 through 255

Default: 0xCF

e1-quiet *value*—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.

Range: 0 through 255

Default: 0x7F

f1 *value*, **f2 *value***, **z3 *value***, **z4 *value***—SONET/SDH overhead bytes.

Range: 0 through 255

Default: 0x00

s1 *value*—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.

Range: 0 through 255

Default: 0xCC

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

Related Documentation

- *Configuring SONET/SDH Header Byte Values*
- *no-concatenate*

Copyright © 2014, Juniper Networks, Inc.

e1-options

Syntax

```
e1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```

Hierarchy Level [edit interfaces *interface-name*]

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 E1-specific physical interface properties.

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

- *Channelized E1 IQ and IQE Interfaces Overview*
- Channelized STM1 Interfaces Overview on page 3
- *E1 Interfaces Overview*
- *T1 Interfaces Overview*

Copyright © 2014, Juniper Networks, Inc.

fast-aps-switch

Syntax fast-aps-switch;

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

Release Information Statement introduced in Junos OS Release 12.1.

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

NOTE:

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

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

Related Documentation

- *Reducing APS Switchover Time in Layer 2 Circuits*

Copyright © 2014, Juniper Networks, Inc.

fcs

Syntax fcs (16 | 32);

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* sonet-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 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.

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 *N*xDS3 to *N*xVC3 to AU3 to STM.

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-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options
16—Use a 16-bit frame checksum on the interface.

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.

Default: 16

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

Related Documentation
- *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*

Copyright © 2014, Juniper Networks, Inc.

force

Syntax force (protect | working);

Hierarchy Level [edit interfaces *interface-name* 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

- *Configuring Switching Between the Working and Protect Circuits*
- request on page 70

Copyright © 2014, Juniper Networks, Inc.

framing (E1, E3, and T1 Interfaces)

Syntax framing (g704 | g704-no-crc4 | g.751 | g.832 | unframed | sf | esf);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces at-*fpc/pic/port* e3-options],
[edit interfaces e1-*fpc/pic/port* e1-options],
[edit interfaces t1-*fpc/pic/port* 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 **esf** for T1 interfaces; **g704** for E1 interfaces. There is no default value for E3 over ATM interfaces.

Options

esf—Extended superframe (ESF) mode for T1 interfaces.

g704—G.704 framing format for E1 interfaces.

g704-no-crc4—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.

g.751—G.751 framing format for E3 over ATM interfaces.

g.832—G.832 framing format for E3 over ATM interfaces.

sf—Superframe (SF) mode for T1 interfaces.

unframed—Unframed mode for E1 interfaces.

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

Related Documentation

- *Configuring E1 Framing*
- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Configuring T1 Framing*

Copyright © 2014, Juniper Networks, Inc.

hold-time (APS)

Syntax hold-time *milliseconds*;

Hierarchy Level [edit interfaces *interface-name* 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 ***milliseconds***—Hold-time value.
Range: 1 through 65,534 milliseconds
Default: 3000 milliseconds (3 times the advertisement interval)

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

Related Documentation
- *Configuring APS Timers*
- advertise-interval on page 48

Copyright © 2014, Juniper Networks, Inc.

idle-cycle-flag

Syntax idle-cycle-flag *value*;

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* serial-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 Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.

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

Options ***value***—Value to transmit in the idle cycles:

- **flags**—Transmit the value 0x7E.
- **ones**—Transmit the value 0xFF (all ones).

Default: Flags

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

Related Documentation

- *Configuring the E1 Idle Cycle Flag*
- *Configuring the E3 Idle Cycle Flag*
- *Configuring the T1 Idle Cycle Flag*
- *Configuring the T3 Idle Cycle Flag*

Copyright © 2014, Juniper Networks, Inc.

interface-type (Interfaces)

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

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

Release Information Statement introduced before Junos OS Release 7.4.

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

Options

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

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

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

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

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

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

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

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

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

Copyright © 2014, Juniper Networks, Inc.

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

Related Documentation
- *Channelized E1 IQ and IQE Interfaces Overview*
- *Channelized OC12/STM4 IQ and IQE Interfaces Overview*
- *Configuring Channelized T3 IQ Interfaces*

lockout

Syntax
lockout;

Hierarchy Level
[edit interfaces *interface-name* 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
- *Configuring Switching Between the Working and Protect Circuits*

Copyright © 2014, Juniper Networks, Inc.

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax loopback (local | payload | remote);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* dsl-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* shdsl-options},
[edit interfaces *interface-name* sonet-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 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. *N*xDS0 IQ interfaces do not support local loopback.

Copyright © 2014, Juniper Networks, Inc.

payload—For channelized T3, T1, and *N*xDS0 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. *N*xDS0 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*
- *Configuring SHDSL Operating Mode on an ATM Physical Interface*
- *Configuring T1 Loopback Capability*
- *Configuring T3 Loopback Capability*
- *feac-loop-respond*

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*

Copyright © 2014, Juniper Networks, Inc.

no-partition

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

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

Release Information Statement introduced before Junos OS Release 7.4.

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

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

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

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

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

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

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

e1—E1 interface type.

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

cau4—Channelized AU-4 interface type.

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

ct3—Channelized T3 interface type.

t3—T3 interface type.

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

Related Documentation

- *Channelized E1 IQ and IQE Interfaces Overview*
- *Channelized OC12/STM4 IQ and IQE Interfaces Overview*
- *Configuring an OC12/STM4 Interface*

Copyright © 2014, Juniper Networks, Inc.

- Configuring Channelized STM1 IQ and IQE Interfaces on page 7
- *Configuring T3 IQ Interfaces*
- partition on page 69
- *no-partition*

no-termination-request

Syntax no-termination-request;

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

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

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

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

Related Documentation
- *Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces*
- *Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces*
- Configuring Link PIC Failover on Channelized STM1 Interfaces on page 21
- *Junos OS Services Interfaces Library for Routing Devices*

paired-group

Syntax paired-group *group-name*;

Hierarchy Level [edit interfaces *interface-name* 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 interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring APS Load Sharing*
- working-circuit on page 77

Copyright © 2014, Juniper Networks, Inc.

partition

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

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

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

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

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

Range:

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

The remaining statements are explained separately.

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

Related Documentation

- *Channelized E1 IQ and IQE Interfaces Overview*
- *Channelized OC12/STM4 IQ and IQE Interfaces Overview*
- *Configuring Channelized T3 IQ Interfaces*
- no-partition on page 67

Copyright © 2014, Juniper Networks, Inc.

protect-circuit

Syntax protect-circuit *group-name*;

Hierarchy Level [edit interfaces *interface-name* 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 ***group-name***—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
- *Configuring Basic Automatic Protect Switching*
- working-circuit on page 77

request

Syntax request (protect | working);

Hierarchy Level [edit interfaces *interface-name* 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 **protect**—Request that the circuit become the protect circuit.

working—Request that the circuit 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
- *Configuring Switching Between the Working and Protect Circuits*
- force on page 59

Copyright © 2014, Juniper Networks, Inc.

revert-time (Interfaces)

Syntax revert-time *seconds*;

Hierarchy Level [edit interfaces *interface-name* 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 ***seconds***—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

- *Configuring Revertive Mode*

Copyright © 2014, Juniper Networks, Inc.

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.

Copyright © 2014, Juniper Networks, Inc.

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

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

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

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

The statements are explained separately.

Required Privilege Level

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

Related Documentation

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

Copyright © 2014, Juniper Networks, Inc.

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.

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.

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

- *Configuring E1 Start and End Flags*
- *Configuring the E3 Start and End Flags*
- *Configuring T1 Start and End Flags*
- *Configuring T3 Start and End Flags*

Copyright © 2014, Juniper Networks, Inc.

switching-mode

Syntax switching-mode (bidirectional | unidirectional);

Hierarchy Level [edit interfaces *interface-name* 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

- *Configuring Switching Mode*

Copyright © 2014, Juniper Networks, Inc.

timeslots

Syntax timeslots *time-slot-range*;

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

Release Information Statement introduced before Junos OS Release 7.4.

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

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

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

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

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

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

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

Related Documentation

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

Copyright © 2014, Juniper Networks, Inc.

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

vtmapping

Syntax vtmapping (itu-t | klm);

Hierarchy Level [edit interfaces *interface-name* sonet-options];
[edit chassis fpc *number* pic *number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For the Channelized STM1 IQ PIC or Channelized STM1 PIC, configure virtual tributary mapping.

For the Channelized STM1 PIC, you configure virtual tributary mapping at the **[edit chassis fpc *number* pic *number*]** hierarchy level.

Options **itu-t**—International Telephony Union standard.

klm—KLM standard.
Default: klm

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

Related Documentation
- Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 14
- *Configuring the Junos OS to Support Channelized STM1 Interface Virtual Tributary Mapping*

working-circuit

Syntax working-circuit *group-name*;

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the working router in an APS circuit pair.

Options ***group-name***—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
- *Configuring Basic Automatic Protect Switching*
- protect-circuit on page 70

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

PART 3

Administration

- Monitoring Commands on page 81

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

CHAPTER 5

Monitoring Commands

- show interfaces (Channelized STM1)

Copyright © 2014, Juniper Networks, Inc.

show interfaces (Channelized STM1)

Syntax show interfaces e1-*fpc/pic/port*:*e1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<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 STM1 interface.

Options **e1-*fpc/pic/port*:*e1channel***—Display standard status information about the specified channelized STM1 interface.

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

descriptions—(Optional) Display interface description strings.

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

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

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized STM1, SDH) on page 93

Output Fields Table 5 on page 82 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 5: 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 *Common Output Fields Description*.	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**

Copyright © 2014, Juniper Networks, Inc.

Table 5: 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 *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	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. • **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

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(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.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

ANSI LMI settingsor **ITU LMI settings**	(Frame Relay) Local Management Interface settings. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **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	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (***nn***) 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 (***nn***) 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
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **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	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **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

Copyright © 2014, Juniper Networks, Inc.

Table 5: 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: • **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. • **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. • **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. • **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

Copyright © 2014, Juniper Networks, Inc.

Table 5: 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	Number and rate of bytes and packets received and transmitted on the physical interface. • **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	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **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**

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **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**	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 *Bellcore Telcordia GR-499-CORE*. • **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**	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. 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.	All levels

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **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. Error types can be: • **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	Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC. • **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	Information about the HDLC configuration. • **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**

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **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	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **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. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **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. Subfields are: • **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**

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **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. Subfields are: • **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	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **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. Subfields are: • **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**

Copyright © 2014, Juniper Networks, Inc.

Table 5: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH tu	Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information. • **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. Subfields are: • **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 **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **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 of an STS-*N* signal. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted 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**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

Copyright © 2014, Juniper Networks, Inc.

Table 5: 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. • **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 *Common Output Fields Description*.	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 *Common Output Fields Description*.	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 *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none

Copyright © 2014, Juniper Networks, Inc.

Table 5: 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: • **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. • **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
```

Copyright © 2014, Juniper Networks, Inc.

```
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, O.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
```


Copyright © 2014, Juniper Networks, Inc.

```
  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: 19.19.19.3, Local: 19.19.19.4, Broadcast: Unspecified,
      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
```


Copyright © 2014, Juniper Networks, Inc.

PART 4

Troubleshooting

- Interface Diagnostics on page 99

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

CHAPTER 6

Interface Diagnostics

- Interface Diagnostics on page 99

Interface Diagnostics

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

- Configuring Loopback Testing on page 99
- Interface Diagnostics on page 101

Configuring Loopback Testing

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

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

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

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

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

Copyright © 2014, Juniper Networks, Inc.

- 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 6 on page 100 shows the loopback modes supported on the various interface types.

Table 6: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	*Configuring Ethernet Loopback Capability*
Circuit Emulation E1	Local and remote	*Configuring E1 Loopback Capability*
Circuit Emulation T1	Local and remote	*Configuring T1 Loopback Capability*
E1 and E3	Local and remote	*Configuring E1 Loopback Capability* and *Configuring E3 Loopback Capability*
*N*xDS0	Payload	*Configuring Channelized E1 IQ and IQE Interfaces*, *Configuring T1 and NxDS0 Interfaces*, *Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode)*, "Configuring an NxDS0 IQ Interface" on page 9, and *Configuring Channelized T3 IQ Interfaces*
Serial (V.35 and X.21)	Local and remote	*Configuring Serial Loopback Capability*
Serial (EIA-530)	DCE local, DCE remote, local, and remote	*Configuring Serial Loopback Capability*
SONET/SDH	Local and remote	*Configuring SONET/SDH Loopback Capability*

Copyright © 2014, Juniper Networks, Inc.

Table 6: Loopback Modes by Interface Type *(continued)*

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

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

loopback *mode*;

You can include this statement at the following hierarchy levels:

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

Interface Diagnostics

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

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

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

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

Copyright © 2014, Juniper Networks, Inc.

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

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

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

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

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

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

For specific hierarchy information, see the individual interface types.

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

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

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

Copyright © 2014, Juniper Networks, Inc.

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

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

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

NOTE: The IQE PICs support only the following algorithms:

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

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

Copyright © 2014, Juniper Networks, Inc.

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 7 on page 104 shows the BERT capabilities for various interface types.

Table 7: BERT Capabilities by Interface Type

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

Copyright © 2014, Juniper Networks, Inc.

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

Starting and Stopping a BERT Test

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

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

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

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

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

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

For example:

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

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

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

For more information about running and evaluating the results of the BERT procedure, see the 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.

Example: Configuring Bit Error Rate Testing

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

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

Copyright © 2014, Juniper Networks, Inc.

```
    }
}
```


Copyright © 2014, Juniper Networks, Inc.

PART 5

Index

- Index on page 109

Copyright © 2014, Juniper Networks, Inc.

Copyright © 2014, Juniper Networks, Inc.

Index

Symbols

#, comments in configuration statements....x
( ), in syntax descriptions....x
< >, in syntax descriptions....x
[ ], in configuration statements....x
{ }, in configuration statements....x
| (pipe), in syntax descriptions....x

A

advertise-interval statement....48
aps statement....49
authentication-key statement....50

B

BERT
    configuring interface diagnostics....101
bert-algorithm statement
    usage guidelines....101
bert-error-rate statement....51
    usage guidelines....101
bert-period statement....53
    usage guidelines....101
bit error rate test *See* BERT
braces, in configuration statements....x
brackets
    angle, in syntax descriptions....x
    square, in configuration statements....x
bytes statement....55

C

channelized E1 interfaces
    example configuration....12
    interface naming....12
channelized E1 IQ and IQE interfaces
    time slots....8
channelized STM1 interfaces
    example configuration....21
    status information, displaying....82
    time slots....9
channelized STM1 IQ interfaces
    example configuration....11
comments, in configuration statements....x
conventions
    text and syntax....ix
curly braces, in configuration statements....x
customer support....xi
    contacting JTAC....xi

D

documentation
    comments on....xi
ds0-options statement
    usage guidelines....12

E

E1 interfaces
    example configuration....12
E1 IQ interfaces
    example configuration....8
E1 IQE interfaces
    example configuration....8
e1-options statement....56
    usage guidelines....12

F

fast-aps-switch statement....57
fcs statement....58
font conventions....ix
force statement....59
fractional E1 IQ and IQE interfaces
    time slots....8
fractional E1 IQ interfaces
    example configuration....9
framing statement
    E1, E3, and T1 interfaces....60

H

hold-time statement
    APS....61

I

idle-cycle-flag statement....62
interface-type statement....63
    channelized T1 IQ interfaces
        usage guidelines....7
interfaces
    configuration statements....24

Copyright © 2014, Juniper Networks, Inc.

L

link PIC failover
channelized STM1 IQ and IQE PICs....21
lockout statement....64
logical systems
configuration statements....40
loopback statement
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3....65
loopback testing....99

M

manuals
comments on....xi

N

neighbor statement....66
no-partition statement....67
channelized T3 IQ interfaces
usage guidelines....7
no-termination-request statement....68
NxDS0 IQ interfaces
example configuration....10

P

paired-group statement....68
parentheses, in syntax descriptions....x
partition statement....69
channelized T1 IQ interfaces
usage guidelines....7
physical interfaces
time slots....9
fractional E1 IQ and IQE interfaces....8
protect-circuit statement....70

R

request statement....70
revert-time statement....71

S

show interfaces (Channelized STM1) command....82
sonet-options statement....72
start-end-flag statement....74
support, technical *See* technical support
switching-mode statement....75
syntax conventions....ix

T

technical support
contacting JTAC....xi
time slots
channelized E1 IQ and IQE interfaces....8
channelized NxDS0 IQ interfaces....9
fractional E1 IQ and IQE interfaces....8
timeslots statement....76
channelized E1 IQ and IQE interfaces
usage guidelines....8
channelized NxDS0 IQ interfaces
usage guidelines....9
fractional E1 IQ and IQE interfaces
usage guidelines....8

V

vtmapping statement....77
usage guidelines....14

W

working-circuit statement....77

Copyright © 2014, Juniper Networks, Inc.