

Channelized OC12/STM4 Interfaces



Published: 2013-02-14

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

This product includes the Envoy SNMP Engine, developed by Epilogue Technology, an Integrated Systems Company. Copyright © 1986-1997, Epilogue Technology Corporation. All rights reserved. This program and its documentation were developed at private expense, and no part of them is in the public domain.

This product includes memory allocation software developed by Mark Moraes, copyright © 1988, 1989, 1993, University of Toronto.

This product includes FreeBSD software developed by the University of California, Berkeley, and its contributors. All of the documentation and software included in the 4.4BSD and 4.4BSD-Lite Releases is copyrighted by the Regents of the University of California. Copyright © 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994. The Regents of the University of California. All rights reserved.

GateD software copyright © 1995, the Regents of the University. All rights reserved. Gate Daemon was originated and developed through release 3.0 by Cornell University and its collaborators. Gated is based on Kirton's EGP, UC Berkeley's routing daemon (routed), and DCN's HELLO routing protocol. Development of Gated has been supported in part by the National Science Foundation. Portions of the GateD software copyright © 1988, Regents of the University of California. All rights reserved. Portions of the GateD software copyright © 1991, D. L. S. Associates.

This product includes software developed by Maker Communications, Inc., copyright © 1996, 1997, Maker Communications, Inc.

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.

Products made or sold by Juniper Networks or components thereof might be covered by one or more of the following patents that are owned by or licensed to Juniper Networks: U.S. Patent Nos. 5,473,599, 5,905,725, 5,909,440, 6,192,051, 6,333,650, 6,359,479, 6,406,312, 6,429,706, 6,459,579, 6,493,347, 6,538,518, 6,538,899, 6,552,918, 6,567,902, 6,578,186, and 6,590,785.

Channelized OC12/STM4 Interfaces
Copyright © 2013, 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 | xi |
| | Documentation and Release Notes | xi |
| | Supported Platforms | xi |
| | Using the Examples in This Manual | xi |
| | Merging a Full Example | xii |
| | Merging a Snippet | xii |
| | Documentation Conventions | xiii |
| | Documentation Feedback | xv |
| | Requesting Technical Support | xv |
| | Self-Help Online Tools and Resources | xv |
| | Opening a Case with JTAC | xvi |
| Part 1 | Overview | |
| Chapter 1 | Channelized OC12/STM4 Interfaces | 3 |
| | Channelized OC12/STM4 IQ and IQE Interfaces Overview | 3 |
| Part 2 | Configuration | |
| Chapter 2 | Channelized OC12/STM4 Interfaces | 7 |
| | Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode) | 7 |
| | Channelization of OC12/STM4 IQE PIC (SDH Mode) | 8 |
| | Channelization of OC12/STM4 IQ PIC (SDH Mode) | 9 |
| | Channelization of OC12 PIC (SONET Mode) | 10 |
| | Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode) | 11 |
| | Configuring an OC12/STM4 Interface | 11 |
| | Configuring T3 Interfaces | 11 |
| | Example: Configuring T3 Interfaces | 12 |
| | Configuring OC3 Interfaces | 13 |
| | Example: Configuring OC3 Interfaces | 13 |
| | Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces | 13 |
| | Example: Configuring T1 Interfaces | 15 |
| | Configuring NxDS0 Interfaces | 15 |
| | Example: Configuring NxDS0 Interfaces | 16 |

| | |
|--|----|
| Configuring Fractional T1 Interfaces | 17 |
| Example: Configuring Fractional T1 Interfaces | 17 |
| Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode) | 18 |
| Configuring Channelized OC12/STM4 IQE PICs for SDH Mode | 18 |
| Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC | 19 |
| Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface | 19 |
| Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs | 19 |
| Example: Configuring SDH (VC-4) Interfaces | 20 |
| Configuring Channelized AU-4 Interfaces | 20 |
| Example: Configuring Channelized AU-4 Interfaces | 21 |
| Configuring E3 Interfaces | 21 |
| Example: Configuring E3 Interfaces | 22 |
| Configuring E1 or Channelized E1 Interfaces | 22 |
| Example: Configuring E1 or Channelized CE1 Interfaces | 23 |
| Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs | 23 |
| Example: Configuring NxDS0 Interfaces | 23 |
| Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode) | 23 |
| Configuring Channelized OC12/STM4 IQ PICs for SDH Mode | 24 |
| Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQ PIC | 25 |
| Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface | 25 |
| Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQ PICs | 25 |
| Example: Configuring SDH (VC-4) Interfaces | 26 |
| Configuring Channelized AU-4 Interfaces | 26 |
| Example: Configuring Channelized AU-4 Interfaces | 26 |
| Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces | 27 |
| Example: Configuring T3 or Channelized T3 Interfaces | 27 |
| Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces | 27 |
| Example: Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces | 28 |
| Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces | 28 |
| Example: Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces | 28 |
| Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs | 29 |
| Example: Configuring NxDS0 Interfaces | 29 |
| Configuring Channelized OC12 Interfaces | 29 |
| Example: Configuring Channelized OC12 Interfaces | 30 |
| Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces | 32 |
| Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel | 32 |
| Example: Configuring Channelized OC12 Interfaces with Partitioned Channels | 36 |

| | | |
|------------------|---|-----------|
| Chapter 3 | Network Interfaces Configuration Statements and Hierarchy | 39 |
| | [edit chassis] Hierarchy Level | 39 |
| | [edit interfaces] Hierarchy Level | 40 |
| | [edit logical-systems] Hierarchy Level | 56 |
| Chapter 4 | Statement Summary | 61 |
| | fast-aps-switch | 61 |
| | interface-type (Interfaces) | 62 |
| | no-partition | 64 |
| | no-termination-request | 65 |
| | oc-slice | 66 |
| | partition | 67 |
| | sonet-options | 68 |
| | timeslots | 70 |
| Part 3 | Administration | |
| Chapter 5 | Monitoring Commands | 75 |
| | show interfaces (Channelized OC12) | 76 |
| | show interfaces (Channelized OC12 IQ and IQE) | 80 |
| Chapter 6 | Command Summaries | 85 |
| | Channelized E1 Interface Operational Mode Commands | 85 |
| | Channelized OC Interface Operational Commands | 86 |
| | Channelized STM1 Interface Operational Mode Commands | 86 |
| | Channelized T1 and T3 Interface Operational Mode Commands | 87 |
| Part 4 | Troubleshooting | |
| Chapter 7 | Interface Diagnostics | 91 |
| | Interface Diagnostics | 91 |
| | Configuring Loopback Testing | 91 |
| | Interface Diagnostics | 93 |
| | Starting and Stopping a BERT Test | 97 |
| | Example: Configuring Bit Error Rate Testing | 97 |
| Chapter 8 | Investigate Channelized OC12 Interfaces | 99 |
| | Investigating Interface Steps and Commands | 99 |
| | Investigating Interface Steps and Commands Overview | 99 |
| | Monitoring Interfaces | 99 |
| | Performing a Loopback Test on an Interface | 100 |
| | Locating Interface Alarms | 102 |
| | Monitor Channelized OC12 Interfaces | 102 |
| | Checklist for Monitoring Channelized OC12 Interfaces | 102 |
| | Monitor Channelized OC12 Interfaces | 103 |
| | Display the Status of Channelized OC12 Interfaces | 104 |
| | Display the Status of a Specific Channelized OC12 Interface | 104 |
| | Display Extensive Status Information for a Specific Channelized OC12 Interface | 105 |

| | |
|---|-----|
| Monitor Statistics for a Channelized OC12 Interface | 108 |
| Monitor Channelized OC12 IQ Interfaces | 110 |
| Display the Status of a Channelized OC12 IQ Interface | 110 |
| Display the Status of the Controller Channelized OC12 IQ Interface | 115 |
| Display the Status of a Specific Channel of a Channelized OC12 IQ Interface | 117 |
| Display Extensive Status Information for a Channelized OC12 IQ Interface | 120 |
| Monitor Statistics for a Channelized OC12 IQ Interface | 123 |
| Use Loopback Testing for Channelized OC12 Interfaces | 125 |
| Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces | 125 |
| Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface | 127 |
| Create a Loopback | 127 |
| Create a Physical Loopback | 128 |
| Configure a Local Loopback | 128 |
| Verify That the Interface Is Up | 129 |
| Clear Interface Statistics | 132 |
| Force the Link Layer to Stay Up | 132 |
| Configure Encapsulation to Cisco-HDLC | 133 |
| Configure No-Keepalives | 133 |
| Verify the Status of the Logical Interface | 134 |
| Ping the Channelized Interface | 135 |
| Check for Interface Error Statistics | 136 |
| Diagnose a Suspected Circuit Problem | 139 |
| Loop the Entire T3 Interface Toward the Network | 139 |
| Create a Loop to the Router from Various Points in the Network | 140 |
| Locate Channelized OC12 Alarms and Errors | 140 |
| Checklist for Channelized OC12 Alarms and Errors | 140 |
| Display Channelized OC12 Alarms and Errors | 141 |
| Display Channelized OC12 IQ Alarms and Errors | 145 |

Part 5

Index

| | |
|-----------------|-----|
| Index | 151 |
|-----------------|-----|

List of Figures

| | | |
|------------------|---|-----------|
| Part 2 | Configuration | |
| Chapter 2 | Channelized OC12/STM4 Interfaces | 7 |
| | Figure 1: Sample Channelization of OC12/STM4 IQ or IQE PIC (SONET Mode) . . . | 8 |
| | Figure 2: Sample Channelization of OC12/STM4 IQE PIC (SDH Mode) | 9 |
| | Figure 3: Sample Channelization of OC12/STM4 IQ PIC (SDH Mode) | 10 |
| | Figure 4: Sample Channelization of OC12 PIC (non IQ and IQE) | 10 |
| | Figure 5: T1 Interfaces on a Channelized OC12 PIC | 14 |
| | Figure 6: Sample Channelization of OC12 IQE PIC | 16 |
| Part 4 | Troubleshooting | |
| Chapter 8 | Investigate Channelized OC12 Interfaces | 99 |
| | Figure 7: Sample Configuration of Channelized OC12 IQ Interface | 113 |
| | Figure 8: Controller Interfaces at Different Levels of Channelization | 117 |
| | Figure 9: Specific Channels of a Channelized OC12 IQ Interface | 119 |

List of Tables

| | | |
|------------------|---|-----------|
| | About the Documentation | xi |
| | Table 1: Notice Icons | xiii |
| | Table 2: Text and Syntax Conventions | xiii |
| Part 2 | Configuration | |
| Chapter 2 | Channelized OC12/STM4 Interfaces | 7 |
| | Table 3: OC12-to-DS3 Numbering Scheme | 30 |
| Part 3 | Administration | |
| Chapter 6 | Command Summaries | 85 |
| | Table 4: Channelized E1 Interface Operational Mode Commands | 85 |
| | Table 5: Channelized OC Interface Operational Mode Commands | 86 |
| | Table 6: Channelized STM1 Interface Operational Mode Commands | 86 |
| | Table 7: Channelized T1 and T3 Interface Operational Mode Commands | 87 |
| Part 4 | Troubleshooting | |
| Chapter 7 | Interface Diagnostics | 91 |
| | Table 8: Loopback Modes by Interface Type | 92 |
| | Table 9: BERT Capabilities by Interface Type | 96 |
| Chapter 8 | Investigate Channelized OC12 Interfaces | 99 |
| | Table 10: Commands Used to Monitor Interfaces | 100 |
| | Table 11: Commands Used to Perform Loopback Testing on Interfaces | 101 |
| | Table 12: Checklist for Monitoring Channelized OC12 Interfaces | 102 |
| | Table 13: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces | 126 |
| | Table 14: Checklist for Channelized OC12 Alarms and Errors | 141 |
| | Table 15: T3 Interface Error Counter Definitions | 144 |

About the Documentation

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

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.

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons





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

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

Table 2: Text and Syntax Conventions

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

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

| Convention | Description | Examples |
|--------------------------------|--|---|
| <i>Italic text like this</i> | <ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies book names. Identifies RFC and Internet draft titles. | <ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i> |
| <i>Italic text like this</i> | Represents variables (options for which you substitute a value) in commands or configuration statements. | Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i> |
| Text like this | Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components. | <ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE. |
| < > (angle brackets) | Enclose optional keywords or variables. | stub <default-metric metric>; |
| (pipe symbol) | Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity. | broadcast multicast <i>(string1 string2 string3)</i> |
| # (pound sign) | Indicates a comment specified on the same line as the configuration statement to which it applies. | rsvp { # Required for dynamic MPLS only |
| [] (square brackets) | Enclose a variable for which you can substitute one or more values. | community name members [community-ids] |
| Indentation and braces ({ }) | Identify a level in the configuration hierarchy. | [edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } } |
| ;(semicolon) | Identifies a leaf statement at a configuration hierarchy level. | |
| J-Web GUI Conventions | | |
| Bold text like this | Represents J-Web graphical user interface (GUI) items you click or select. | <ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel. |
| > (bold right angle bracket) | Separates levels in a hierarchy of J-Web 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/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

- [Channelized OC12/STM4 Interfaces on page 3](#)

CHAPTER 1

Channelized OC12/STM4 Interfaces

- [Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3](#)

Channelized OC12/STM4 IQ and IQE Interfaces Overview

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

PART 2

Configuration

- [Channelized OC12/STM4 Interfaces on page 7](#)
- [Network Interfaces Configuration Statements and Hierarchy on page 39](#)
- [Statement Summary on page 61](#)

CHAPTER 2

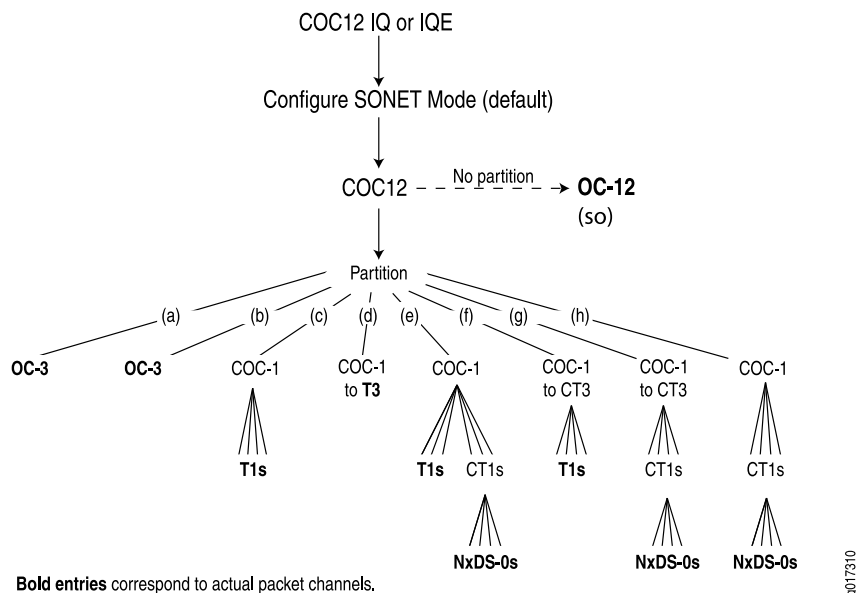
Channelized OC12/STM4 Interfaces

- Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode) on page 7
- Channelization of OC12/STM4 IQE PIC (SDH Mode) on page 8
- Channelization of OC12/STM4 IQ PIC (SDH Mode) on page 9
- Channelization of OC12 PIC (SONET Mode) on page 10
- Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode) on page 11
- Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode) on page 18
- Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode) on page 23
- Configuring Channelized OC12 Interfaces on page 29
- Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 32
- Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel on page 32
- Example: Configuring Channelized OC12 Interfaces with Partitioned Channels on page 36

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

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

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

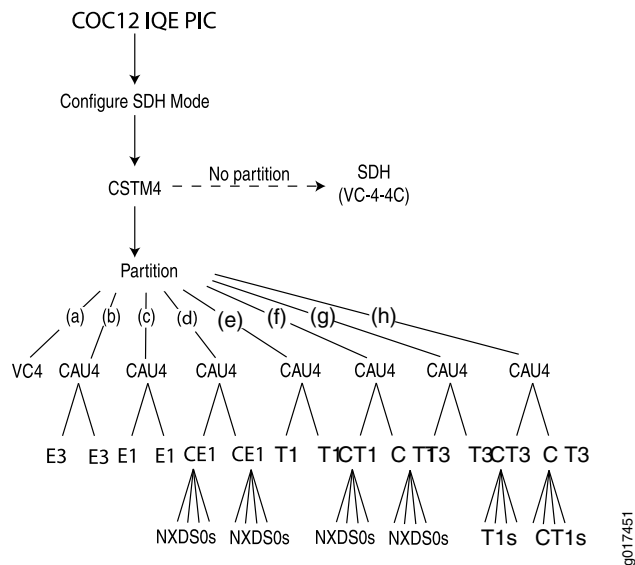


In the example in [Figure 1 on page 8](#), a Channelized OC12/STM4 IQ or IQE PIC operating in SONET mode is partitioned into the following OC slices:

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

Channelization of OC12/STM4 IQE PIC (SDH Mode)

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

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

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

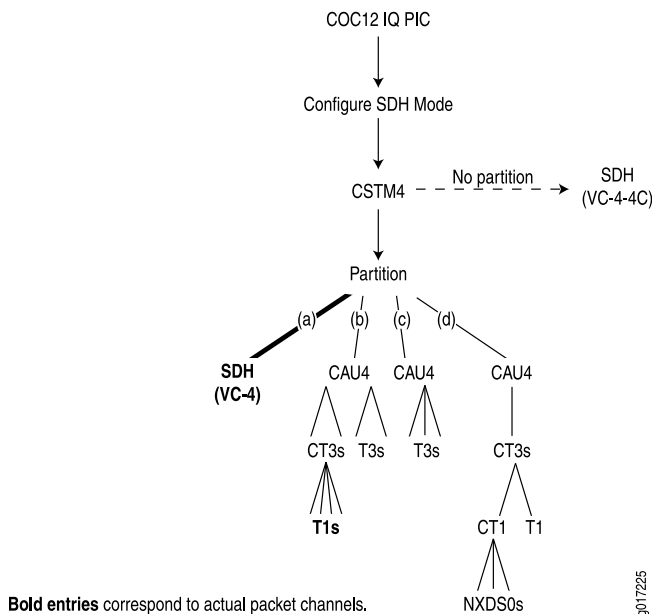
- An SDH VC-4 interface.
- A channelized AU-4 partitioned into E3 interfaces.
- A channelized AU-4 interface partitioned into E1 interfaces.
- A channelized AU-4 interface partitioned into CE1 interfaces partitioned into NxDS0 interfaces.
- A channelized AU-4 interface partitioned into T1 interfaces.
- A channelized AU-4 interface partitioned into CT1 interfaces.
- A channelized AU-4 interface partitioned into T3 interfaces partitioned into T1 interfaces.
- A channelized AU-4 interface partitioned into CT3 interfaces partitioned into CT1 interfaces.

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

Channelization of OC12/STM4 IQ PIC (SDH Mode)

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

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



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

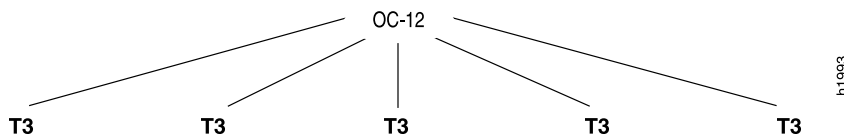
- An SDH VC-4 interface.
- A channelized AU-4 partitioned into channelized T3 interfaces and T3 interfaces.
- Another channelized AU-4 interface converted into T3 interfaces.
- Another channelized AU-4 interface converted into a channelized T3 interface, which is partitioned further into a channelized T1 and a T1 interface. The channelized T1 interface is further partitioned into NxDS0 interfaces.

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

Channelization of OC12 PIC (SONET Mode)

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

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



[Figure 4 on page 10](#) shows five T3 channels configured on the Channelized OC12 PIC. You can configure seven additional T3 channels. For more information about configuring Channelized OC12 PICs, see [“Configuring Channelized OC12 Interfaces” on page 29](#).

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

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

- [Configuring an OC12/STM4 Interface on page 11](#)
- [Configuring T3 Interfaces on page 11](#)
- [Configuring OC3 Interfaces on page 13](#)
- [Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces on page 13](#)
- [Configuring NxDS0 Interfaces on page 15](#)
- [Configuring Fractional T1 Interfaces on page 17](#)

Configuring an OC12/STM4 Interface

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

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

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



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



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

Configuring T3 Interfaces

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

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

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

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

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

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

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



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

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

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



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

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

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

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

Example: Configuring T3 Interfaces

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

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

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

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

Configuring OC3 Interfaces

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

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

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



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

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

- 1–3
- 4–6
- 7–9
- 10–12

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

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

Example: Configuring OC3 Interfaces

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

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

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

Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces

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

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

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

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

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

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

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

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

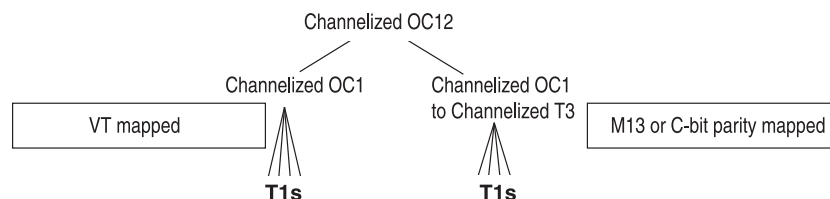
```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type (Interfaces) t1;
```



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

Figure 5 on page 14 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

Figure 5: T1 Interfaces on a Channelized OC12 PIC



Bold entries correspond to actual packet channels.

9003013

Example: Configuring T1 Interfaces

Configure the following T1 interfaces:

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

VT-Mapped Configuration

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

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

M13 or C-bit Parity-Mapped Configuration

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

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

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

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

Configuring NxDSO Interfaces

To configure NxDSO interfaces on a Channelized OC12 IQE PIC, perform the following tasks:

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

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

2. If your network equipment uses VT mapping, partition the channelized OC1 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-fpc/pic/port]** hierarchy level, specifying the **ct1** interface type:

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



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

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

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



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

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

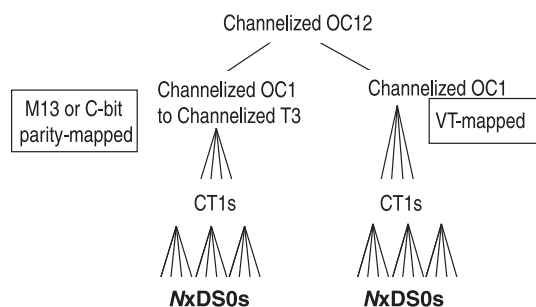
```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type (Interfaces) ct1;
```

5. Configure channelized NxDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the `[edit interfaces ct1-fpc/pic/port]` hierarchy level, specifying the **ds** interface type:

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

Figure 6 on page 16 shows VT-mapped and M13 or C-bit parity-mapped configurations of NxDS0 IQ interfaces.

Figure 6: Sample Channelization of OC12 IQE PIC



Bold entries correspond to actual packet channels.

g003014

Example: Configuring NxDS0 Interfaces

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

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


VT-Mapped Configuration

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

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

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

M13 or C-bit Parity-Mapped Configuration

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

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

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

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

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

Configuring Fractional T1 Interfaces

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

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

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

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

Example: Configuring Fractional T1 Interfaces

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

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

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

Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode)

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

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- E3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)
- Channelized E1 or E1 interfaces from a channelized AU-4 interface (63 interfaces, any combination)
- NxDS0 interfaces from a channelized E1 interface

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

- [Configuring Channelized OC12/STM4 IQE PICs for SDH Mode on page 18](#)
- [Configuring an Unpartitioned SDH \(VC-4-4C\) Interface on a Channelized OC12/STM4 IQE PIC on page 19](#)
- [Configuring SDH \(VC-4\) Interfaces on Channelized OC12/STM4 IQE PICs on page 19](#)
- [Configuring Channelized AU-4 Interfaces on page 20](#)
- [Configuring E3 Interfaces on page 21](#)
- [Configuring E1 or Channelized E1 Interfaces on page 22](#)
- [Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs on page 23](#)

Configuring Channelized OC12/STM4 IQE PICs for SDH Mode

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

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

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

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

You can also use the above configuration example to configure all 4 ports of a 4-port Channelized OC12 IQE PIC for SDH mode. To configure individual ports to operate in SDH

mode, include the **framing sdh** statement at the **[edit chassis fpc fpc/pic/port]** hierarchy level. The following example configures port 2 for SDH mode:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

- 1–3
- 4–6
- 7–9
- 10–12

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

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

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

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

Configuring Channelized AU-4 Interfaces

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

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

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

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



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

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

- 1–3
- 4–6

- 7–9
- 10–12

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

Example: Configuring Channelized AU-4 Interfaces

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

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

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

Configuring E3 Interfaces

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

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

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



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



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

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

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

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

Example: Configuring E3 Interfaces

Configure E3 interfaces, using partition 1:

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

Configuring E1 or Channelized E1 Interfaces

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

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

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



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

Example: Configuring E1 or Channelized CE1 Interfaces

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

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

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

Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs

Configure channelized NxDS0 interfaces on the channelized E1 interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-fpc/pic/port:channel]** hierarchy level, specifying the **ds** interface type:

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

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

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

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

Example: Configuring NxDS0 Interfaces

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

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

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

Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode)

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

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- Channelized T3 or T3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)
- Channelized T1 or T1 interfaces from a channelized T3 interface (28 interfaces, any combination)
- NxDS0 interfaces from a channelized T1 interface



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

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

- [Configuring Channelized OC12/STM4 IQ PICs for SDH Mode on page 24](#)
- [Configuring an Unpartitioned SDH \(VC-4-4C\) Interface on a Channelized OC12/STM4 IQ PIC on page 25](#)
- [Configuring SDH \(VC-4\) Interfaces on Channelized OC12/STM4 IQ PICs on page 25](#)
- [Configuring Channelized AU-4 Interfaces on page 26](#)
- [Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces on page 27](#)
- [Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces on page 27](#)
- [Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces on page 28](#)
- [Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs on page 29](#)

Configuring Channelized OC12/STM4 IQ PICs for SDH Mode

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

- 1–3
- 4–6
- 7–9
- 10–12

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

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

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

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

Configuring Channelized AU-4 Interfaces

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

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

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

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



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

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

- 1–3
- 4–6
- 7–9
- 10–12

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

Example: Configuring Channelized AU-4 Interfaces

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

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

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

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

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

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

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

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



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

Example: Configuring T3 or Channelized T3 Interfaces

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

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

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

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

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

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



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

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

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

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

Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces

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

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

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



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

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

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

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

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

Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs

Configure channelized NxDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-fpc/pic/port:channel]** hierarchy level, specifying the **ds** interface type:

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

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

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

1,9-18,21

Example: Configuring NxDS0 Interfaces

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

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

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

Configuring Channelized OC12 Interfaces

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

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

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

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

Table 3: OC12-to-DS3 Numbering Scheme

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

Example: Configuring Channelized OC12 Interfaces

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

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

The channels can also have logical interfaces.

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

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

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

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

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

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

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

For information about interchassis and intrachassis LSQ failover, see the Junos Services Interfaces Configuration Release 12.3.

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

Configuring a SONET/SDH Interface

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

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

Configuring Multiple Interface Types

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

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

- g. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into NxDS0 interfaces
- h. A channelized OC1 partitioned into channelized T1s, which are partitioned into NxDS0 interfaces

Configuring the Interface Partitions

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

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

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

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

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

```

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

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

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

(g)  coc1-1/1/0:7 {

```

```

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

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

```

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

Example: Configuring Channelized OC12 Interfaces with Partitioned Channels

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

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

The channels can also have logical interfaces.

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

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


CHAPTER 3

Network Interfaces Configuration Statements and Hierarchy

- [\[edit chassis\] Hierarchy Level on page 39](#)
- [\[edit interfaces\] Hierarchy Level on page 40](#)
- [\[edit logical-systems\] Hierarchy Level on page 56](#)

[\[edit chassis\] Hierarchy Level](#)

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
    }
    sonet {
      device-count number;
    }
  }
  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);
      cel {
        el link-number {
          channel-group group-number;
          timeslots time-slot-range;
        }
      }
      channelization;
      ct1 {
        t1 link-number {
          channel-group group-number;
          timeslots time-slot-range;
        }
      }
    }
  }
}
```

```

    }
  }
  ct3 {
    port port-number {
      tl 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{
  egress-policer-overhead bytes;
  ingress-policer-overhead bytes;
}
}
}
}

```

[edit interfaces] Hierarchy Level

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



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

```

interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    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);
}
aggregated-sonet-options {
    link-speed speed | mixed;
    minimum-links number;
}
atm-options {
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
        high-plp-max-threshold percent;
        low-plp-max-threshold percent;
        queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
}
pic-type (atm1 | atm2);
plp-to-clp;
promiscuous-mode {
    vpi vpi-identifier;
}
scheduler-maps map-name {
    forwarding-class class-name {
        epd-threshold cells plp1 cells;
        linear-red-profile profile-name;
        priority (high | low);
        transmit-weight (cells number | percent number);
    }
    vc-cos-mode (alternate | strict);
}
use-null-cw;
vpi vpi-identifier {
    maximum-vcs maximum-vcs;
}

```

```

    oam-liveness {
        down-count cells;
        up-count cells;
    }
    oam-period (seconds | disable);
    shaping {
        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
        burst length);
        queue-length number;
    }
}
}
clocking clock-source;
data-input (system | interface interface-name);
dce;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
description text;
dialer-options {

```

```

    pool pool-name <priority priority>;
}
disable;
ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
}
e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
e3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
    (unframed | no-unframed);
}
encapsulation type;
es-options {
    backup-interface es-fpc/pic/port;
}
fastether-options {
    802.3ad aex;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    ingress-rate-limit rate;
    (loopback | no-loopback);
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
}

```

```

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

```

```

ima-group-options {
    differential-delay number;
    frame-length (32 | 64 | 128 | 256);
    frame-synchronization {
        alpha number;
        beta number;
        gamma number;
    }
    minimum-links number;
    symmetry (symmetrical-config-and-operation |
        symmetrical-config-asymmetrical-operation);
    test-procedure {
        ima-test-start;
        ima-test-stop;
        interface name;
        pattern number;
        period number;
    }
    transmit-clock (common | independent);
    version (1.0 | 1.1);
}
ima-link-options group-id group-id;
interface-set interface-set-name {
    interface ethernet-interface-name {
        (unit unit-number | vlan-tags-outer vlan-tag);
    }
    interface interface-name {
        (unit unit-number);
    }
}
isdn-options {
    bchannel-allocation (ascending | descending);
    calling-number number;
    pool pool-name <priority priority>;
    spid1 spid-string;
    spid2 spid-string;
    static-tei-val value;
    switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
    t310 seconds;
    tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
    lmi-type (ansi | itu | c-lmi);
    n391dte number;
    n392dce number;
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}

```

```

}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interface interface-name;
    }
}
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
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;
}
redundancy-options {
    priority sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
    hot-standby;
}
satop-options {
    payload-size n;
}
schedulers number;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {

```

```

control-signal (assert | de-assert | normal);
cts (ignore | normal | require);
dcd (ignore | normal | require);
dsr (ignore | normal | require);
dtr signal-handling-option;
ignore-all;
indication (ignore | normal | require);
rts (assert | de-assert | normal);
tm (ignore | normal | require);
}
dsr-polarity (negative | positive);
dte-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
line-protocol protocol;
loopback mode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
        rate new-sessions-per-second;
    }
    syslog {
        host hostname {
            facility-override facility-name;
            log-prefix prefix-number;
            services priority-level;
        }
    }
}
shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
        current margin;
        snext margin;
    }
}

```



```

sonet-options {
  aggregate asx;
  aps {
    advertise-interval milliseconds;
    annex-b;
    authentication-key key;
    fast-aps-switch;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    hold-time up milliseconds down milliseconds;
  }
  vtmapping (itu-t | klm);
  (z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed (10m | 100m | 1g);
    link-mode (full-duplex | half-duplex);
  }
}
t1-options {
  bert-algorithm algorithm;
}

```

```

    bert-error-rate rate;
    bert-period seconds;
    buildout value;
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
        value>;
    fcs (16 | 32);
    (feac-loop-respond | no-feac-loop-respond);
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
}
}

```

```

accounting-profile name;
advisory-options {
    downstream-rate rate;
    upstream-rate rate;
}
allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
        caller (caller-id | accept-all);
        initial-route-check seconds;
        load-interval seconds;
        load-threshold percent;
        pool pool-name;
        redial-delay time;
        watch-list {
            [ routes ];
        }
    }
}
disable;

```

```
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    down-count cells;
    up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
}
```

```

compression {
  acfc;
  pfc;
  pap;
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
dynamic-profile profile-name;
lcp-max-conf-req number;
lcp-restart-timer milliseconds;
loopback-clear-timer seconds;
ncp-max-conf-req number;
ncp-restart-timer milliseconds;
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
  burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id];
family family {
  accounting {
    destination-class-usage;
  }
}

```

```
    source-class-usage {
        direction;
    }
}
access-concentrator name;
address address {
    destination address;
}
bundle ml-fpc/pic/port | ls-fpc/pic/port;
duplicate-protection;
dynamic-profile profile-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [ filter-names ];
        output filter-name;
    }
    output-list {
        [ filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
max-sessions-vs-a-ignore;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name;
    mode loose;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-names <service-filter filter-name>;
    }
}
```

```

service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
    profile-name | preferred-source-address address>;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
    multipoint-destination address {
        epd-threshold cells plp1 cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                rate burst length);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    (vrrp-group | vrrp-inet6-group) group-number {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-type authentication;
        authentication-key key;
        fast-interval milliseconds;
        (preempt | no-preempt) {
            hold-time seconds;
        }
        priority-number number;
        track {
            priority-cost seconds;
            priority-hold-time interface-name {
                bandwidth-threshold bits-per-second {
                    priority;
                }
                interface priority;
            }
            route ip-address/mask routing-instance instance-name priority-cost cost;
        }
    }
}

```

```
        virtual-address [ addresses ];
    }
}
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[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 Configuration Guide.

```
logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
          policer {
            input cos-policer-name;
            output cos-policer-name;
          }
        }
      }
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    bandwidth rate;
    backup-options {
      interface interface-name;
    }
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
      rtp {
        f-max-period number;
        port {
          minimum port-number;
          maximum port-number;
        }
        queues [ queue-numbers ];
      }
    }
    compression-device interface-name;
    description text;
    interface {
      l2tp-interface-id name;
      (dedicated | shared);
    }
  }
}
```



```

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

```

```
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
}
dynamic-profile profile-name;
pap {
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
  burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;
```

```

    source-class-usage {
        direction;
    }
}
bundle interface-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [ filter-names ];
    }
    output filter-name;
    output-list {
        [ filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
    <mode loose>;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
    profile-name;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
}

```

```

multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
multipoint-destination address {
  epd-threshold cells plp1 cells;
  inverse-arp;
  oam-liveness {
    up-count cells;
    down-count cells;
  }
  oam-period (seconds | disable);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
      rate burst length);
    queue-length number;
  }
  vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
  (accept-data | no-accept-data);
  advertise-interval seconds;
  authentication-type authentication;
  authentication-key key;
  fast-interval milliseconds;
  (preempt | no-preempt) {
    hold-time seconds;
  }
  priority-number number;
  track {
    priority-cost seconds;
    priority-hold-time interface-name {
      interface priority;
      bandwidth-threshold bits-per-second {
        priority;
      }
    }
  }
  route ip-address/mask routing-instance instance-name priority-cost cost;
}
}
virtual-address [ addresses ];
}
}
}
}
}

```

Related Documentation

- [Junos OS Hierarchy and RFC Reference](#)
- [Junos® OS Ethernet Interfaces](#)
- [Junos® OS Network Interfaces](#)

CHAPTER 4

Statement Summary

fast-aps-switch

| | |
|----------------------------|---|
| Syntax | fast-aps-switch; |
| Hierarchy Level | [edit interfaces <i>interface-name</i> sonet-options aps] |
| Release Information | Statement introduced in Junos OS Release 12.1. |
| Description | (M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits. |



NOTE:

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

| | |
|---------------------------------|---|
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none">• Reducing APS Switchover Time in Layer 2 Circuits |

interface-type (Interfaces)

| | |
|----------------------------|---|
| Syntax | <code>interface-type (bc coc1 ct1 ct3 dc ds so t1 t3);</code> |
| Hierarchy Level | <code>[edit interfaces <i>interface-range</i> name no-partition],</code> <code>[edit interfaces <i>interface-range</i> name partition <i>partition-number</i>],</code> <code>[edit interfaces <i>interface-range</i> name partition <i>partition-number</i> oc-slice <i>oc-slice-range</i>],</code> <code>[edit interfaces <i>interface-range</i> name partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code> |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For IQ and IQE interfaces only, configure the sublevel interface type. |
| Options | <p>bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code> hierarchy level to create a bearer (B) channel <code>bc-pim/0/port:channel</code> interface for each time you want to function as an ISDN PRI B-channel.</p> <p>coc1—Channelized OC1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc1-fpc/pic/port]</code> hierarchy level.</p> <p>ct1—Channelized T1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type ct3-fpc/pic/port<:channel>]</code> hierarchy level.</p> <p>ct3—Channelized T3 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc1-fpc/pic/port:channel no-partition]</code> hierarchy level.</p> <p>dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code> hierarchy level to create a (D) channel <code>dc-pim/0/port</code> to control the B-channels.</p> <p>ds—DS0 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type (ce1-fpc/pic/port ct1-fpc/pic/port<:channel>)]</code> hierarchy level.</p> <p>so—SONET/SDH interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc12-fpc/pic/port]</code> hierarchy level.</p> <p>t1—T1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port)]</code> hierarchy level.</p> <p>t3—T3 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port:channel no-partition)]</code> hierarchy level.</p> |

| | |
|------------------------------|---|
| Required Privilege | interface—To view this statement in the configuration. |
| Level | interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none">• Channelized E1 IQ and IQE Interfaces Overview• Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3• Configuring Channelized T3 IQ Interfaces |

no-partition

| | |
|---------------------------------|--|
| Syntax | no-partition interface-type (e1 (cau4 so) (ct3 t3) so t3); |
| Hierarchy Level | [edit interfaces ce1- <i>fpc/pic/port</i>], [edit interfaces coc1- <i>fpc/pic/port:channel</i>], [edit interfaces coc12- <i>fpc/pic/port</i>], [edit interfaces cstm1- <i>fpc/pic/port</i>], [edit interfaces ct3- <i>fpc/pic/port</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | <p>For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.</p> <p>For Channelized OC12 PIC only, convert the channelized OC1 IQ interface into a channelized T3 interface or a T3 interface. You perform this configuration task for C-bit parity and M13-mapped configurations.</p> <p>For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.</p> <p>For Channelized STM1 PIC only, convert the channelized STM1 IQ interface into a channelized Administrative Unit 4 (AU-4) interface or a SONET/SDH STM1 interface.</p> <p>For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.</p> |
| Default | If you do not include either this statement or the partition statement, the Channelized IQ PIC is not partitioned, and no data channels are configured. |
| Options | <p>The option used must correspond to the physical interface type:</p> <p>e1—E1 interface type.</p> <p>coc12 so—Channelized OC12 interface type, in SONET mode.</p> <p>cau4—Channelized AU-4 interface type.</p> <p>cstm1—SONET/SDH STM1 interface type, in SDH mode.</p> <p>ct3—Channelized T3 interface type.</p> <p>t3—T3 interface type.</p> |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p> |
| Related Documentation | <ul style="list-style-type: none">Channelized E1 IQ and IQE Interfaces OverviewChannelized OC12/STM4 IQ and IQE Interfaces Overview on page 3Configuring an OC12/STM4 Interface on page 11 |

- Configuring Channelized STM1 IQ and IQE Interfaces
- Configuring T3 IQ Interfaces
- [partition on page 67](#)
- no-partition

no-termination-request

| | |
|---------------------------------|---|
| Syntax | no-termination-request; |
| Hierarchy Level | [edit interfaces <i>interface-name</i> ppp-options], [edit interfaces lsq- <i>fpc/pic/port</i> lsq-failure-options] |
| Release Information | Statement introduced in Junos OS Release 7.4. Support at the [edit interfaces <i>interface-name</i> ppp-options] hierarchy level added in Junos OS Release 8.3. |
| Description | For LSQ PICs or link PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the PIC fails. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none"> • Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces • Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 32 • Configuring Link PIC Failover on Channelized STM1 Interfaces • Junos Services Interfaces Configuration Release 12.3 |

oc-slice

| | |
|---------------------------------|---|
| Syntax | <code>oc-slice <i>oc-slice-range</i>;</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> partition <i>partition-number</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For channelized OC12 IQ interfaces only, configure the range of SONET/SDH slices. |
| Default | If you do not include either this statement or the no-partition statement, the Channelized OC12 IQ PICs not partitioned, and no data channels are configured. |
| Options | <p><i>oc-slice-range</i>—Range of SONET/SDH slices. OC3 interfaces must occupy three consecutive OC slices per interface, in the form 1–3, 4–6, 7–9, or 10–12. The T3, T1, and DS0 interface types each occupy one OC slice per interface.</p> <p>Range: For OC3 interfaces, 1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12</p> <p>The remaining statement is explained separately.</p> |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none">• Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3 |

partition

| | |
|---------------------------------|--|
| Syntax | <code>partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type <i>type</i> timeslots <i>time-slot-range</i>;</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | 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 | <p><i>partition-number</i>—Sublevel interface partition index.</p> <p>Range:</p> <ul style="list-style-type: none"> • 1 through 4 for an OC3 interface on a channelized OC12 IQ interface. • 1 through 12 for a T3 interface on a channelized OC12 IQ interface. • 1 through 4 for a T3 interface on a channelized T3 IQ interface. • 1 through 28 for a T1 IQ interface on a channelized OC12 IQ or channelized T3 IQ interface. • 1 through 10 for an E1 interface on a channelized E1 IQ interface. • 1 through 30 on a channelized E1 interface. • 1 through 23 on a channelized T1 interface. • 1 through 24 for NxDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces. • 0 through 31 (with 0 reserved for framing) for NxDS0 interfaces on channelized E1 IQ interfaces. <p>The remaining statements are explained separately.</p> |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p> |
| Related Documentation | <ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview • Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3 • Configuring Channelized T3 IQ Interfaces • no-partition on page 64 |

sonet-options

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

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure SONET/SDH-specific interface properties.

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

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



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

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

The statements are explained separately.

| | |
|---------------------------------|--|
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none"> • Configuring SONET/SDH Parameters on ATM Interfaces • Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 3 • Channelized STM1 Interfaces Overview • SONET/SDH Physical Interface Properties Overview • no-concatenate |

timeslots

| | |
|---|--|
| Syntax | <code>timeslots <i>time-slot-range</i>;</code> |
| Hierarchy Level | <code>[edit interfaces e1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i>],</code> <code>[edit interfaces <i>interface-name</i> t1-options]</code> |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For E1 and T1 interfaces, allocate the specific time slots by number. |
| <div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>timeslots</code> statement must be included at the <code>[edit interfaces e1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces t1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> </div> | |
| Options | <p><i>time-slot-range</i>—Actual time slot numbers allocated:</p> <p>Range: Ranges vary by interface type and configuration option as follows:</p> <ul style="list-style-type: none"> • 1 through 24 for T1 interfaces (0 is reserved) • 1 through 31 for 4-port E1 PICs (0 is reserved) • 1 through 31 for NxDS0 interfaces (0 is reserved) • 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved) • 2 through 32 for the setting under e1-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 NxDS0) |
| <div>  <p>NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.</p> </div> | |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p> |
| Related Documentation | <ul style="list-style-type: none"> • Configuring Fractional E1 IQ and IQE Interfaces • Configuring Fractional T1 IQ and IQE Interfaces |

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

PART 3

Administration

- [Monitoring Commands on page 75](#)
- [Command Summaries on page 85](#)

CHAPTER 5

Monitoring Commands

show interfaces (Channelized OC12)

| | |
|---------------------------------|--|
| Syntax | <code>show interfaces t3-fpc/pic/port:t3channel</code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index <i>snmp-index</i>></code> <code><statistics></code> |
| Release Information | Command introduced before Junos OS Release 7.4. |
| Description | Display status information about the specified channelized OC12 interface. |
| Options | <p><code>t3-fpc/pic/port:t3channel</code>—Display standard information about the specified channelized OC12 interface.</p> <p><code>brief detail extensive terse</code>—(Optional) Display the specified level of output.</p> <p><code>descriptions</code>—(Optional) Display interface description strings.</p> <p><code>media</code>—(Optional) Display media-specific information about network interfaces.</p> <p><code>snmp-index <i>snmp-index</i></code>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><code>statistics</code>—(Optional) Display static interface statistics.</p> |
| Required Privilege Level | view |
| List of Sample Output | show interfaces extensive (Channelized OC12) on page 77 |
| Output Fields | See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command. |

Sample Output

```

show interfaces
extensive (Channelized
OC12)
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 32, SNMP ifIndex: 21, Generation: 2719
  Link-level type: Frame-Relay, PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: T3, Loopback: None, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 43186
    Full enquiries sent      : 8515
    Enquiry responses received : 43185
    Full enquiry responses received : 8515
  DCE statistics:
    Enquiries received       : 0
    Full enquiries received  : 0
    Enquiry responses sent   : 0
    Full enquiry responses sent : 0
  Common statistics:
    Unknown messages received : 0
    Asynchronous updates received : 0
    Out-of-sequence packets received : 0
    Keepalive responses timeout : 0
  Nonmatching DCE-end DLCIs:
    2
  Hold-times      : Up 0 ms, Down 0 ms
  Last flapped    : 2002-05-23 16:59:03 PDT (18:23:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   : 1700          0 bps
    Output bytes  : 1714          0 bps
    Input packets : 123           0 pps
    Output packets: 124           0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 1100817, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3 alarms : None
  SONET alarms : None
  DS3 defects : None
  SONET defects : None
  DS3 media:
    Seconds      Count  State
    AIS          0      0 OK
    LOF          18      1 OK
    LOS          0      0 OK
    IDLE         0      0 OK
    YELLOW       0      0 OK
    BPV          0      0
    EXZ          0      0
    LCV          0      0
    PCV         36    122399
    CCV         72    91948
    LES         0
    PES         18

```

```

PSES                      18
CES                       18
CSES                      18
SEFS                      18
UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
      B/W  WRR      Packets      Bytes      Drops      Errors
Queue0   95   95          0          0          0          0
Queue1    5    5        529        6348          0          0
SONET PHY:
      Seconds      Count  State
  PLL Lock          0          0  OK
  PHY Light        20          1  OK
SONET section:
      Seconds      Count
  BIP-B1          0          0
  SEF            20          1  OK
  LOS            20          1  OK
  LOF            20          1  OK
  ES-S           20
  SES-S          20
  SEFS-S         20
SONET line:
      Seconds      Count
  BIP-B2          0          0
  REI-L           0          0
  RDI-L           0          0  OK
  AIS-L           0          0  OK
  BERR-SF        18          1  OK
  BERR-SD         2          1  OK
  ES-L           20
  SES-L          20
  UAS-L          10
  ES-LFE         0
  SES-LFE        0
  UAS-LFE        0
SONET path:
      Seconds      Count
  BIP-B3          0          0
  REI-P           0          0
  LOP-P          20          1  OK
  AIS-P           0          0  OK
  RDI-P           0          0  OK
  UNEQ-P          0          0  OK
  PLM-P          20          1  OK
  ES-P           20
  SES-P          20
  UAS-P          10
  ES-PFE         0
  SES-PFE        0
  UAS-PFE        0
Received SONET overhead:
F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00

```

```

V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 0d 0a  t3-0/3/0:0.....
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00  t3-0/3/0:0.....
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer Priority  Limit
                           %      bps      %      usec
  0 best-effort           95      42499200  95      0      low  none
  3 network-control       5       2236800   5      0      low  none
Logical interface t3-0/3/0:0.0 (Index 11) (SNMP ifIndex 268) (Generation 499)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 578, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 22.22.22.1, Local: 22.22.22.2, Broadcast: Unspecified,
Generation: 98
DLCI 100
  Flags: Active, Dce-configured
  Total down time: 0 sec, Last down: Never
  Traffic statistics:
    Input bytes : 0
    Output bytes : 0
    Input packets: 0
    Output packets: 0
  DLCI statistics:
    Active DLCI :2 Inactive DLCI : 0

```

show interfaces (Channelized OC12 IQ and IQE)

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

Release Information Command introduced before Junos OS Release 7.4.

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

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

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

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

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

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

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

descriptions—(Optional) Display interface description strings.

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

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

statistics—(Optional) Display static interface statistics.

| | |
|---------------------------------|---|
| Required Privilege Level | view |
| List of Sample Output | show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 81 show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 81 show interfaces extensive (Channelized OC12 IQ) (Physical) on page 82 show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 82 show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 82 show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 83 show interfaces extensive (DS0 on Channelized OC12 IQ) on page 83 show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 83 show interfaces extensive (T1 on Channelized OC12 IQ) on page 83 |
| Output Fields | See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command. |

Sample Output

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

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

show interfaces extensive (Channelized

```
user@host> show interfaces extensive coc1-4/2/0:7
Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
```

**OC1 on
Channelized OC12 IQ)**

```
Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,  
Speed: 51840kbps, Loopback: None,  
FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)  
Device flags   : Present Running  
Interface flags: Point-To-Point SNMP-Traps  
Link flags     : None  
...
```

**show interfaces
extensive (Channelized
OC12 IQ) (Physical)**

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

**show interfaces
extensive (Channelized
T1 from Channelized
OC12 IQ)**

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

**show interfaces
extensive (Channelized**

```
user@host> show interfaces ct3-0/2/0:1 extensive  
Physical interface: ct3-0/2/0:1:1, Enabled, Physical link is Up  
Interface index: 220, SNMP ifIndex: 140, Generation: 222
```

T3 on Channelized OC12 IQ)

```
Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
Mode: C/Bit parity, Parent: cau4-0/2/0:1 Interface index 219
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags : None
...
```

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

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

**show interfaces
extensive (DS0 on
Channelized OC12 IQ)**

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

**show interfaces
extensive
(SONET Interface on
Channelized OC12 IQ)**

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

**show interfaces
extensive (T1 on
Channelized OC12 IQ)**

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


CHAPTER 6

Command Summaries

- [Channelized E1 Interface Operational Mode Commands on page 85](#)
- [Channelized OC Interface Operational Commands on page 86](#)
- [Channelized STM1 Interface Operational Mode Commands on page 86](#)
- [Channelized T1 and T3 Interface Operational Mode Commands on page 87](#)

Channelized E1 Interface Operational Mode Commands

[Table 4 on page 85](#) summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized E1 interfaces. Commands are listed in alphabetical order.

Table 4: Channelized E1 Interface Operational Mode Commands

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



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

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

Channelized OC Interface Operational Commands

Table 5 on page 86 summarizes the command-line interface (CLI) commands to monitor and troubleshoot channelized OC interfaces. Commands are listed in alphabetical order.

Table 5: Channelized OC Interface Operational Mode Commands

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



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

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

Channelized STM1 Interface Operational Mode Commands

Table 6 on page 86 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized STM1 interfaces. Commands are listed in alphabetical order.

Table 6: Channelized STM1 Interface Operational Mode Commands

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

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

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



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

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

Channelized T1 and T3 Interface Operational Mode Commands

Table 7 on page 87 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot channelized T1 and T3 interfaces. Commands are listed in alphabetical order.

Table 7: Channelized T1 and T3 Interface Operational Mode Commands

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



.....

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

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

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

.....

PART 4

Troubleshooting

- [Interface Diagnostics on page 91](#)
- [Investigate Channelized OC12 Interfaces on page 99](#)

CHAPTER 7

Interface Diagnostics

- [Interface Diagnostics on page 91](#)

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 91](#)
- [Interface Diagnostics on page 93](#)

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, NxDS0, serial, SONET/SDH, T1, and T3.

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

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

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

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

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

Table 8 on page 92 shows the loopback modes supported on the various interface types.

Table 8: Loopback Modes by Interface Type

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

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

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

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

loopback mode;

You can include this statement at the following hierarchy levels:

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

Interface Diagnostics

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

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

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

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

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

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

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

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

```
[edit interfaces t1-0/0/0 t1-options]
user@host# set bert-algorithm ?
Possible completions:
pseudo-2e11-o152    Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151    Pattern is 2^15 - 1 (per 0.152 standard)
pseudo-2e20-o151    Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153    Pattern is 2^20 - 1 (per 0.153 standard)
...
```

For specific hierarchy information, see the individual interface types.



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

| | |
|------------------|--|
| pseudo-2e11-o152 | Pattern is 2^11 - 1 (per 0.152 standard) |
| pseudo-2e15-o151 | Pattern is 2^15 - 1 (per 0.151 standard) |
| pseudo-2e20-o151 | Pattern is 2^20 - 1 (per 0.151 standard) |
| pseudo-2e23-o151 | Pattern is 2^23 (per 0.151 standard) |

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



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

| | |
|-------------------------------|--|
| all-ones-repeating | Repeating one bits |
| all-zeros-repeating | Repeating zero bits |
| alternating-double-ones-zeros | Alternating pairs of ones and zeros |
| alternating-ones-zeros | Alternating ones and zeros |
| pseudo-2e11-o152 | Pattern is $2^{11} - 1$ (per 0.152 standard) |
| pseudo-2e15-o151 | Pattern is $2^{15} - 1$ (per 0.151 standard) |
| pseudo-2e20-o151 | Pattern is $2^{20} - 1$ (per 0.151 standard) |
| pseudo-2e7 | Pattern is $2^7 - 1$ |
| pseudo-2e9-o153 | Pattern is $2^9 - 1$ (per 0.153 standard) |
| repeating-1-in-4 | 1 bit in 4 is set |
| repeating-1-in-8 | 1 bit in 8 is set |
| repeating-3-in-24 | 3 bits in 24 are set |

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



NOTE: The IQE PICs support only the following algorithms:

| | |
|-------------------------------|---|
| all-ones-repeating | Repeating one bits |
| all-zeros-repeating | Repeating zero bits |
| alternating-double-ones-zeros | Alternating pairs of ones and zeros |
| alternating-ones-zeros | Alternating ones and zeros |
| pseudo-2e9-o153 | Pattern is $2^9 - 1$ (per 0.153 (511 type) standard) |
| pseudo-2e11-o152 | Pattern is $2^{11} - 1$ (per 0.152 and 0.153 (2047 type) standards) |
| pseudo-2e15-o151 | Pattern is $2^{15} - 1$ (per 0.151 standard) |
| pseudo-2e20-o151 | Pattern is $2^{20} - 1$ (per 0.151 standard) |
| pseudo-2e20-o153 | Pattern is $2^{20} - 1$ (per 0.153 standard) |
| pseudo-2e23-o151 | Pattern is $2^{23} - 1$ (per 0.151 standard) |
| repeating-1-in-4 | 1 bit in 4 is set |
| repeating-1-in-8 | 1 bit in 8 is set |
| repeating-3-in-24 | 3 bits in 24 are set |

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



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

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

Table 9 on page 96 shows the BERT capabilities for various interface types.

Table 9: BERT Capabilities by Interface Type

| Interface | T1 BERT | T3 BERT | Comments |
|--|-----------------------|--------------------------------|---|
| 12-port T1/E1 Circuit Emulation | Yes (ports 0–11) | | <ul style="list-style-type: none"> Limited algorithms |
| 4-port Channelized OC3/STM1 Circuit Emulation | Yes (port 0–3) | | <ul style="list-style-type: none"> Limited algorithms |
| E1 or T1 | Yes (port 0–3) | Yes (port 0–3) | <ul style="list-style-type: none"> Single port at a time Limited algorithms |
| E3 or T3 | Yes (port 0–3) | Yes (port 0–3) | <ul style="list-style-type: none"> Single port at a time |
| Channelized OC12 | N/A | Yes (channel 0–11) | <ul style="list-style-type: none"> Single channel at a time Limited algorithms No bit count |
| Channelized STM1 | Yes (channel 0–62) | N/A | <ul style="list-style-type: none"> Multiple channels Only one algorithm No error insert No bit count |
| Channelized T3 and Multichannel T3 | Yes (channel 0–27) | Yes (port 0–3 on channel 0) | <ul style="list-style-type: none"> Multiple ports and channels Limited algorithms for T1 No error insert for T1 No bit count for T1 |

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

Starting and Stopping a BERT Test

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

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

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

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

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

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

For example:

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

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

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

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



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

Example: Configuring Bit Error Rate Testing

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

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

```
}  
}
```

CHAPTER 8

Investigate Channelized OC12 Interfaces

- [Investigating Interface Steps and Commands on page 99](#)
- [Monitor Channelized OC12 Interfaces on page 102](#)
- [Use Loopback Testing for Channelized OC12 Interfaces on page 125](#)
- [Locate Channelized OC12 Alarms and Errors on page 140](#)

Investigating Interface Steps and Commands

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

- [Investigating Interface Steps and Commands Overview on page 99](#)
- [Monitoring Interfaces on page 99](#)
- [Performing a Loopback Test on an Interface on page 100](#)
- [Locating Interface Alarms on page 102](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on [page 99](#) section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on [page 100](#) section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on [page 102](#) section explains some of the alarms and errors for the media.

Monitoring Interfaces

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

Solution To monitor interfaces, follow these steps:

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

The [Table 10 on page 100](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 10: Commands Used to Monitor Interfaces

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

Performing a Loopback Test on an Interface

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

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

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

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

The [Table 11 on page 101](#) lists and describes the operational and configuration mode commands you use to perform loopback testing on interfaces (the commands are shown in the order in which you perform them).

Table 11: Commands Used to Perform Loopback Testing on Interfaces

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

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

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

Locating Interface Alarms

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

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

Monitor Channelized OC12 Interfaces

- [Checklist for Monitoring Channelized OC12 Interfaces on page 102](#)
- [Monitor Channelized OC12 Interfaces on page 103](#)
- [Monitor Channelized OC12 IQ Interfaces on page 110](#)

Checklist for Monitoring Channelized OC12 Interfaces

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

Action [Table 12 on page 102](#) provides links and commands for monitoring Channelized OC12 interfaces.

Table 12: Checklist for Monitoring Channelized OC12 Interfaces

| Tasks | Command or Action |
|---|-------------------|
| “Monitor Channelized OC12 Interfaces” on page 103 | |

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

| Tasks | Command or Action |
|---|--|
| 1. Display the Status of Channelized OC12 Interfaces on page 104 | <code>show interfaces terse t3-interface-name*</code> |
| 2. Display the Status of a Specific Channelized OC12 Interface on page 104 | <code>show interfaces terse t3-fpc/pic/port:channel</code> |
| 3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 105 | <code>show interfaces t3-fpc/pic/port:channel extensive</code> |
| 4. Monitor Statistics for a Channelized OC12 Interface on page 108 | <code>monitor interfaces t3-fpc/pic/port:channel</code> |
| “Monitor Channelized OC12 IQ Interfaces” on page 110 | |
| 1. Display the Status of a Channelized OC12 IQ Interface on page 110 | <code>show interfaces terse coc*</code> <code>show interfaces controller</code> <code>show interfaces terse</code> |
| 2. Display the Status of the Controller Channelized OC12 IQ Interface on page 115 | <code>show interfaces interface-type-fpc/pic/port</code> <code>show interfaces interface-type-fpc/pic/port</code> <code>show interfaces interface-type-fpc/pic/port:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel:channel</code> |
| 3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 117 | <code>show interfaces interface-type-fpc/pic/port:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel</code> <code>show interfaces interface-type-fpc/pic/port:channel:channel:channel</code> |
| 4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 120 | <code>show interfaces interface-type-interface-name extensive</code> |
| 5. Monitor Statistics for a Channelized OC12 IQ Interface on page 123 | <code>monitor interfaces interface-type-fpc/pic/port:channel</code> |

Monitor Channelized OC12 Interfaces

Purpose

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

To monitor your Channelized OC12 interfaces, follow these steps:

1. [Display the Status of Channelized OC12 Interfaces on page 104](#)
2. [Display the Status of a Specific Channelized OC12 Interface on page 104](#)
3. [Display Extensive Status Information for a Specific Channelized OC12 Interface on page 105](#)
4. [Monitor Statistics for a Channelized OC12 Interface on page 108](#)

Display the Status of Channelized OC12 Interfaces

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

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

Sample Output 1 The following sample output is for a Channelized OC12 interface:

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

Meaning

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

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as a T3 or OC12 SONET link, or a Physical Interface Card (PIC) problem. For more information on monitoring SONET interfaces, see [“Checklist for Monitoring Channelized OC12 Interfaces” on page 102](#).

Display the Status of a Specific Channelized OC12 Interface

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

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

Sample Output

```

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

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

```

Meaning

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

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as an OC12 SONET link or PIC problem. For more information on monitoring SONET interfaces, see [“Checklist for Monitoring Channelized OC12 Interfaces” on page 102](#).

Display Extensive Status Information for a Specific Channelized OC12 Interface

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

Action `user@host> show interface t3-fpc/pic/port:channel extensive`

Sample Output

```

user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 4 supported
  Last flapped  : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :                0                0 bps
    Output bytes  :                0                0 bps
    Input packets :                0                0 pps
    Output packets:                0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3 alarms   : None
  SONET alarms  : None
  DS3 defects   : None
  SONET defects : None
  DS3 media:
    Seconds      Count  State
    AIS          0      0 OK
    LOF          0      0 OK
    LOS          0      0 OK
    IDLE         0      0 OK
    YELLOW       0      0 OK
    BPV          0      0
    EXZ          0      0
    LCV          0      0
    PCV          0      0
    CCV          0      0
    LES          0
    PES          0
    PSES         0
    CES          0
    CSES         0
    SEFS         0
    UAS          0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket  : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  Interface transmit queues:
    B/W  WRR      Packets      Bytes
  Queue0      0    0
    Transmitted:                0          0

```

```

        Drops:                                0            0
        Errors:                                0
Queue1      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue2      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue3      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
SONET PHY:      Seconds      Count      State
  PLL Lock      0            0 OK
  PHY Light      0            0 OK
SONET section:
  BIP-B1          1            22
  SEF              0            0 OK
  LOS              0            0 OK
  LOF              0            0 OK
  ES-S             1
  SES-S            0
  SEFS-S           0
SONET line:
  BIP-B2          1            307
  REI-L           0            0
  RDI-L           3            1 OK
  AIS-L           0            0 OK
  BERR-SF          0            0 OK
  BERR-SD          0            0 OK
  ES-L             1
  SES-L            0
  UAS-L            0
  ES-LFE           3
  SES-LFE          3
  UAS-LFE          0
SONET path:
  BIP-B3          1            35
  REI-P           1            7
  LOP-P           0            0 OK
  AIS-P           0            0 OK
  RDI-P           0            0 OK
  UNEQ-P          0            0 OK
  PLM-P           1            1 OK
  ES-P            1
  SES-P           0
  UAS-P           0
  ES-PFE          1
  SES-PFE         0
  UAS-PFE         0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0

```

```
74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 0d 0a t3-0/1/0:0.....
Transmitted path trace: t3-0/3/0:0
74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 t3-0/3/0:0.....
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 1 (0x00)
CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      bytes
0 best-effort            95    42499200 95        0      low  none
3 network-control        5     2236800  5         0      low  none
```

Meaning

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

Monitor Statistics for a Channelized OC12 Interface

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

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

Sample Output

```

user@host> monitor interfaces t3-0/3/0:11
host          Seconds: 12          Time: 17:27:15          Delay: 32/0/32

Interface: t3-0/3/0:11, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: T3
Traffic statistics:
  Input bytes:          109846 (176 bps)          [44]
  Output bytes:         110308 (176 bps)          [44]
  Input packets:        1687 (1 pps)              [2]
  Output packets:       1693 (1 pps)              [2]
Encapsulation statistics:
  Input keepalives:      8                        [2]
  Output keepalives:     7                        [2]
Error statistics:
  Input errors:          0                        [0]
  Input drops:           0                        [0]
  Input framing errors:  1066                     [0]
  Input runts:           0                        [0]
  Input giants:          0                        [0]
  Policed discards:      0                        [0]
  L3 incompletes:        0                        [0]
  L2 channel errors:     3                        [0]
  L2 mismatch timeouts:  0                        [0]
  Carrier transitions:   7                        [0]
  Output errors:         0      Output drops:     [0]
Interface warnings:
  o Loopback detected while not in test mode

```

Meaning

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



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



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

Monitor Channelized OC12 IQ Interfaces

Purpose

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

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

1. [Display the Status of a Channelized OC12 IQ Interface on page 110](#)
2. [Display the Status of the Controller Channelized OC12 IQ Interface on page 115](#)
3. [Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 117](#)
4. [Display Extensive Status Information for a Channelized OC12 IQ Interface on page 120](#)
5. [Monitor Statistics for a Channelized OC12 IQ Interface on page 123](#)

Display the Status of a Channelized OC12 IQ Interface

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

Action

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

Sample Output 1

```

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

```

Sample Output 2

```

user@host> show interfaces controller
Controller           Admin Link
coc12-0/0/0         up    up
  so-0/0/0:1        up    up
  coc1-0/0/0:2      up    up
    t1-0/0/0:2:1    up    up
    t1-0/0/0:2:2    up    up
    t1-0/0/0:2:3    up    up
    t1-0/0/0:2:4    up    up
    t1-0/0/0:2:5    up    up
    t1-0/0/0:2:6    up    up
    t1-0/0/0:2:7    up    up
    t1-0/0/0:2:8    up    up
    t1-0/0/0:2:9    up    up
    t1-0/0/0:2:10   up    up
    t1-0/0/0:2:11   up    up
    t1-0/0/0:2:12   up    up
    t1-0/0/0:2:13   up    up
    t1-0/0/0:2:14   up    up
    t1-0/0/0:2:15   up    up
    t1-0/0/0:2:16   up    up
    t1-0/0/0:2:17   up    up
    t1-0/0/0:2:18   up    up
    t1-0/0/0:2:19   up    up
    t1-0/0/0:2:20   up    up
    t1-0/0/0:2:21   up    up
    t1-0/0/0:2:22   up    up
    t1-0/0/0:2:23   up    up
    t1-0/0/0:2:24   up    up
    t1-0/0/0:2:25   up    up
    t1-0/0/0:2:26   up    up
    t1-0/0/0:2:27   up    up
    t1-0/0/0:2:28   up    up
  coc1-0/0/0:3      up    up
  t3-0/0/0:3        up    up
  coc1-0/0/0:4      up    up
    ct1-0/0/0:4:1   up    up
    ds-0/0/0:4:1:1  up    up
  coc1-0/0/0:5      up    up
  ct3-0/0/0:5       up    up
    t1-0/0/0:5:1    up    up
  coc1-0/0/0:6      up    up
  ct3-0/0/0:6       up    up
    ct1-0/0/0:6:1   up    up
    ds-0/0/0:6:1:1  up    up

```

Sample Output 3

```

user@host> show interfaces terse
Interface           Admin Link Proto Local Remote
coc12-0/0/0         up    up
so-0/0/0:1          up    up

```

```
so-0/0/0:1.0      up up inet 20.20.20.1/30
coc1-0/0/0:2              up up
t1-0/0/0:2:1              up up
t1-0/0/0:2:1.0            up up inet 20.20.20.5/30
t1-0/0/0:2:2              up up
[...Output Truncated...]
t1-0/0/0:2:27             up up
t1-0/0/0:2:28             up up
coc1-0/0/0:3              up up
t3-0/0/0:3                up up
coc1-0/0/0:4              up up
ct1-0/0/0:4:1             up up
ds-0/0/0:4:1:1            up up
ds-0/0/0:4:1:1.0          up up inet 20.20.20.13/30
coc1-0/0/0:5              up up
ct3-0/0/0:5               up up
t1-0/0/0:5:1              up up
t1-0/0/0:5:1.0            up up inet 20.20.20.17/30
coc1-0/0/0:6              up up
ct3-0/0/0:6               up up
ct1-0/0/0:6:1             up up
ds-0/0/0:6:1:1            up up
ds-0/0/0:6:1:1.0          up up inet 20.20.20.21/30
```

Meaning

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

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

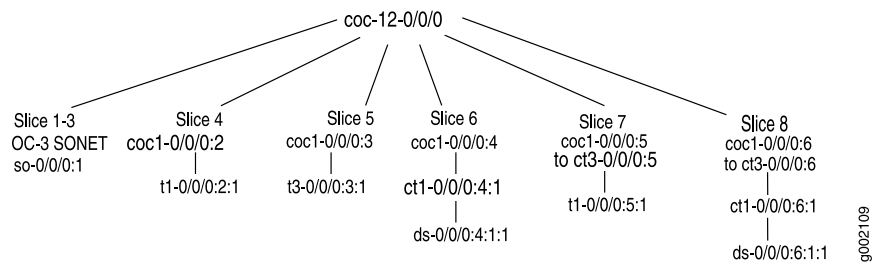
Sample output 2 shows the channels for the channelized interfaces that are configured and the hierarchy, but not the interface address information. At the top, the hierarchy includes the controller interface **coc12-0/0/0**.

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

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

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

Figure 7: Sample Configuration of Channelized OC12 IQ Interface



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

```

interfaces {
  coc12-0/0/0 {
    partition 1 oc-slice 1-3 interface-type so;
    partition 2 oc-slice 4 interface-type coc1;
    partition 3 oc-slice 5 interface-type coc1;
    partition 4 oc-slice 6 interface-type coc1;
    partition 5 oc-slice 7 interface-type coc1;
    partition 6 oc-slice 8 interface-type coc1;
  }
  so-0/0/0:1 {
    description "oc-slice 1-3 of coc12-0/0/0. COC12 > OC3.";
    unit 0 {
      family inet {
        address 20.20.20.2/30;
      }
    }
  }
  coc1-0/0/0:2 {
    description "oc-slice 4 of coc12-0/0/0. COC12 to COC1 VT-mapped to T1s.";
    partition 1-28 interface-type t1;
  }
  t1-0/0/0:2:1 {
    unit 0 {
      family inet {
        address 20.20.20.6/30;
      }
    }
  }
  coc1-0/0/0:3 {
    description " oc-slice 5 of coc12-0/0/0. COC12 to COC1 converted to a T3.";
    no-partition interface-type t3;
  }
  t3-0/0/0:3:1 {
    unit 0 {
      family inet {
        address 20.20.20.10/30;
      }
    }
  }
  coc1-0/0/0:4 {
    description " oc-slice 6 of coc12-0/0/0. CT1 to NxDS-Os.";
    partition 1 interface-type ct1;
  }

```

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

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

- Channels 1 through 3 are for SONET interfaces
- Channel 4 is for T1 interfaces
- Channel 5 is for T3 interfaces
- Channel 6 is for DS0 interfaces

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

Display the Status of the Controller Channelized OC12 IQ Interface

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

Action

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

Sample Output 1

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

Sample Output 2

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

Sample Output 3

```
user@host> show interfaces ct3-0/0/0:5
Physical interface: ct3-0/0/0:5, Enabled, Physical link is Up
  Interface index: 233, SNMP ifIndex: 169
  Link-level type: Controller , Clocking: Internal, Speed: T3, Loopback: None,
  Mode: C/Bit parity, Parent: coc1-0/0/0:5 Interface index 232
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues    : 4 supported
  Last flapped  : Never
  Active alarms  : None
  Active defects : None
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
```

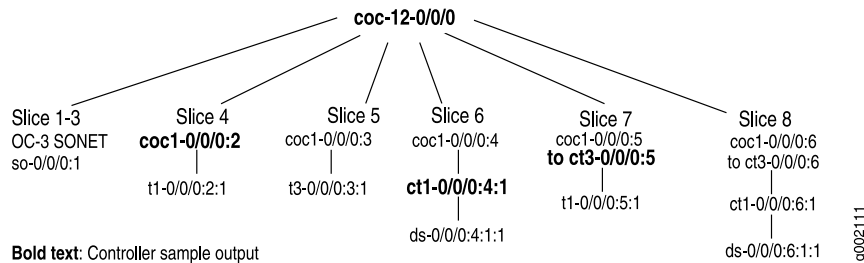
Sample Output 4

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

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

The controller interface is partitioned into other interface types and appears at the top of a specific level of channelization. For a visual representation of the controller interface at different levels of channelization, see [Figure 8 on page 117](#).

Figure 8: Controller Interfaces at Different Levels of Channelization



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

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

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

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

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

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

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

Action

```

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

Sample Output 1

```

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

```

Sample Output 2

```

user@host> show interfaces t1-0/0/0:2:1
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 199, SNMP ifIndex: 133
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 198
  Device flags : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 44 (00:00:07 ago), Output: 46 (00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues : 4 supported
  Last flapped : Never
  Input rate : 0 bps (0 pps)
  Output rate : 0 bps (0 pps)
  DS1 alarms : None
  DS1 defects : None
  SONET alarms : None
  SONET defects : None
  Logical interface t1-0/0/0:2:1.0 (Index 71) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
    Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7

user@host> show interfaces ds-0/0/0:4:1:1

```

Sample Output 3

```

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

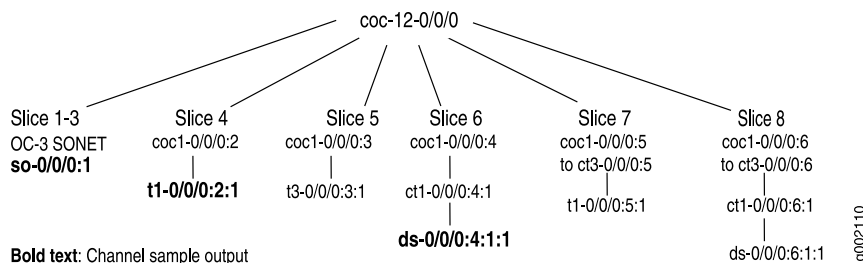
```

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

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

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

Figure 9: Specific Channels of a Channelized OC12 IQ Interface



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

Display Extensive Status Information for a Channelized OC12 IQ Interface

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

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

Sample Output 1

The following sample output is for a controller interface:

```

user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms   : None
  SONET defects  : None
  SONET PHY:
    Seconds      Count  State
    PLL Lock     0       0 OK
    PHY Light     0       0 OK
  SONET section:
    BIP-B1       0       0
    SEF          77       1 OK
    LOS          77       1 OK
    LOF          77       1 OK
    ES-S         77
    SES-S        77
    SEFS-S       77
  SONET line:
    BIP-B2       0       0
    REI-L        82584    1274876
    RDI-L        5       1 OK
    AIS-L        0       0 OK
    BERR-SF      77       1 OK
    BERR-SD      2       1 OK
    ES-L         77
    SES-L        77
    UAS-L        67
    ES-LFE       82589
    SES-LFE      5
    UAS-LFE      0
  Received SONET overhead:
    F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
    S1 : 0x00
  Transmitted SONET overhead:
    F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
    S1 : 0x00

```

Sample Output 2

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

```

user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3

```

```

Keepalive statistics:
  Input : 444 (last seen 00:00:05 ago)
  Output: 442 (last sent 00:00:09 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mp1s:
Not-configured
CHAP state: Not-configured
CoS queues      : 4 supported
Last flapped    : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          10948          0 bps
  Output bytes:          11792          0 bps
  Input packets:           892          0 pps
  Output packets:          940          0 pps
Input errors:
  Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets

  0 best-effort              3              3              0
  1 expedited-fo             0              0              0
  2 assured-forw             0              0              0
  3 network-cont            937             937              0

DS1 alarms :None
DS1 defects :None
TI media:      Seconds      Count  State
SEF              1           1  OK
BEE              2           2  OK
AIS              0           0  OK
LOF             108           1  OK
LOS              0           0  OK
YELLOW           0           0  OK
BPV              0           0
EXZ              0           0
LCV              1           1
PCV              0           0
CS               0           0
LES             108
ES              108
SES             108
SEFS            108
BES              0
UAS             116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds

```

```

    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms :None
SONET defects :None
SONET vt:
    BIP-BIP2                0          0
    REI-V                   25         25
    LOP-V                   93         1 OK
    AIS-V                   0          0 OK
    RDI-V                   0          0 OK
    UNEQ-V                  0          0 OK
    PLM-V                   93         1 OK
    ES-V                    93
    SES-V                   93
    UAS-V                   83
    ES-VFE                  25
    SES-VFE                 25
    UAS-VFE                 0
Received SONET overhead:
    V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
    V5      : 0x02
Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
        Generation: 29

```

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

Monitor Statistics for a Channelized OC12 IQ Interface

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

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

Sample Output

```

user@host> monitor interfaces so-0/0/0:1.0
host          Seconds: 10          Time: 00:23:13          Delay: 0/0/32

Interface: so-0/0/0:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:
  Input bytes:          431244          [0]
  Output bytes:         432268          [0]
  Input packets:        35933          [0]
  Output packets:       36019          [0]
Remote statistics:
  Input bytes:          0 (0 bps)       [0]
  Output bytes:         0 (0 bps)       [0]
  Input packets:        0 (1 pps)       [0]
  Output packets:       0 (0 pps)       [0]
Traffic statistics:
  Input bytes:          431244          [0]
  Output bytes:         432268          [0]
  Input packets:        35933          [0]
  Output packets:       36019          [0]
Protocol: inet, MTU: 4470

user@host> monitor interfaces t1-0/0/0:2:1.0
host          Seconds: 1          Time: 00:32:07          Delay: 0/0/26

Interface: t1-0/0/0:2:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:
  Input bytes:          432028          [0]
  Output bytes:         433076          [0]
  Input packets:        35954          [0]
  Output packets:       36041          [0]
Remote statistics:
  Input bytes:          0 (0 bps)       [0]
  Output bytes:         0 (0 bps)       [0]
  Input packets:        0 (0 pps)       [0]
  Output packets:       0 (0 pps)       [0]
Traffic statistics:
  Input bytes:          432028          [0]
  Output bytes:         433076          [0]
  Input packets:        35954          [0]
  Output packets:       36041          [0]
Protocol: inet, MTU: 1500

user@host> monitor interfaces ds-0/0/0:4:1:1.0
host          Seconds: 3          Time: 00:36:59          Delay: 0/0/0

Interface: ds-0/0/0:4:1:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:
  Input bytes:          432836          [0]
  Output bytes:         433882          [0]
  Input packets:        36065          [0]
  Output packets:       36152          [0]
Remote statistics:
  Input bytes:          0 (0 bps)       [0]
  Output bytes:         0 (0 bps)       [0]
  Input packets:        0 (0 pps)       [0]

```

```

Output packets:                0 (0 pps)                [0]
Traffic statistics:
Input bytes:                    432836                    [0]
Output bytes:                   433882                    [0]
Input packets:                  36065                     [0]
Output packets:                 36152                     [0]
Protocol: inet, MTU: 1500

```

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



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



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

Use Loopback Testing for Channelized OC12 Interfaces

- [Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces on page 125](#)
- [Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface on page 127](#)
- [Create a Loopback on page 127](#)
- [Verify That the Interface Is Up on page 129](#)
- [Clear Interface Statistics on page 132](#)
- [Force the Link Layer to Stay Up on page 132](#)
- [Verify the Status of the Logical Interface on page 134](#)
- [Ping the Channelized Interface on page 135](#)
- [Check for Interface Error Statistics on page 136](#)
- [Diagnose a Suspected Circuit Problem on page 139](#)

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

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

Action [Table 13 on page 126](#) provides links and commands for using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems.

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

| Tasks | Command or Action |
|---|--|
| “Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 127 | |
| 1. Create a Loopback on page 127 | |
| a. Create a Physical Loopback on page 128 | Connect the TX port to the RX port. |
| b. Configure a Local Loopback on page 128 | <code>[edit interfaces t3-fpc/pic/port:channel t3 options] set loopback local show commit</code> |
| 2. Verify That the Interface Is Up on page 129 | <code>show interfaces t3-fpc/pic/port:channel extensive</code> |
| 3. Clear Interface Statistics on page 132 | <code>clear interfaces statistics t3-fpc/pic/port:channel</code> |
| 4. Force the Link Layer to Stay Up on page 132 | |
| a. Configure Encapsulation to Cisco-HDLC on page 133 | <code>[edit interfaces t3-fpc/pic/port:channel] set encapsulation cisco-hdlc show commit</code> |
| b. Configure No-Keepalives on page 133 | <code>[edit interfaces t3-fpc/pic/port:channel] set no-keepalives show commit</code> |
| 5. Verify the Status of the Logical Interface on page 134 | <code>show interfaces t3-fpc/pic/port:channel</code> |
| 6. Ping the Channelized Interface on page 135 | <code>ping interface t3-fpc/pic/port:channel local-IP-address bypass-routing count 1000 rapid</code> |
| 7. Check for Interface Error Statistics on page 136 | <code>show interfaces t3-fpc/pic/port:channel extensive</code> |
| “Diagnose a Suspected Circuit Problem” on page 139 | |
| 1. Loop the Entire T3 Interface Toward the Network on page 139 | <code>[edit interfaces t3-fpc/pic/port:channel t3-options] set loopback remote show commit</code> |
| 2. Create a Loop to the Router from Various Points in the Network on page 140 | Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 127. |

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

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

- Solution**
- [Create a Loopback on page 127](#)
 - [Verify That the Interface Is Up on page 129](#)
 - [Clear Interface Statistics on page 132](#)
 - [Force the Link Layer to Stay Up on page 132](#)
 - [Verify the Status of the Logical Interface on page 134](#)
 - [Ping the Channelized Interface on page 135](#)
 - [Check for Interface Error Statistics on page 136](#)

Create a Loopback

Purpose

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



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

1. [Create a Physical Loopback on page 128](#)
2. [Configure a Local Loopback on page 128](#)

Create a Physical Loopback

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

Configure a Local Loopback

| | |
|---------------|--|
| Action | To configure a local loopback, follow these steps: |
|---------------|--|



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

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

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

2. Configure the local loopback:

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

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

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

3. Verify the configuration:

```
user@host# show
```

For example:

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

4. Commit the configuration:

```
user@host# commit
```

For example:

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


Meaning

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



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

Verify That the Interface Is Up

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

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

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



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

Sample Output

```

user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 4 supported
  Last flapped  : 2004-05-21 15:23:34 UTC (00:05:00 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes  :                0                0 bps
    Output bytes :                0                0 bps
    Input packets:                0                0 pps
    Output packets:              0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3 alarms :None
  SONET alarms :None
  DS3 defects :None
  SONET defects :None
  DS3 media:
    Seconds      Count  State
    AIS          0       0 OK
    LOF          0       0 OK
    LOS          0       0 OK
    IDLE         0       0 OK
    YELLOW       0       0 OK
    BPV          0       0
    EXZ          0       0
    LCV          0       0
    PCV          0       0
    CCV          0       0
    LES          0
    PES          0
    PSES         0
    CES          0
    CSES         0
    SEFS         0
    UAS          0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  Interface transmit queues:
    B/W  WRR      Packets      Bytes
  Queue0      0    0
    Transmitted:              0          0

```

```

        Drops:                                0            0
        Errors:                                0
Queue1      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue2      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue3      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
SONET PHY:      Seconds      Count      State
  PLL Lock      0            0      OK
  PHY Light      0            0      OK
SONET section:
  BIP-B1          1            22
  SEF              0            0      OK
  LOS              0            0      OK
  LOF              0            0      OK
  ES-S            1
  SES-S           0
  SEFS-S          0
SONET line:
  BIP-B2          1            307
  REI-L           0            0
  RDI-L           3            1      OK
  AIS-L           0            0      OK
  BERR-SF         0            0      OK
  BERR-SD         0            0      OK
  ES-L            1
  SES-L           0
  UAS-L           0
  ES-LFE          3
  SES-LFE         3
  UAS-LFE         0
SONET path:
  BIP-B3          1            35
  REI-P           1            7
  LOP-P           0            0      OK
  AIS-P           0            0      OK
  RDI-P           0            0      OK
  UNEQ-P          0            0      OK
  PLM-P           1            1      OK
  ES-P            1
  SES-P           0
  UAS-P           0
  ES-PFE          1
  SES-PFE         0
  UAS-PFE         0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0

```

```

74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 0d 0a  t3-0/1/0:0.....
Transmitted path trace: t3-0/3/0:0
74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00  t3-0/3/0:0.....
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 1 (0x00)
CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      bytes
0 best-effort            95      42499200  95      0      low  none
3 network-control        5      2236800   5      0      low  none

```

Meaning

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

Clear Interface Statistics**Purpose**

You must reset the Channelized OC12 or Channelized OC12 IQ interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input or output errors and packet statistics do not interfere with the current efforts to diagnose the problem.

Action

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

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

Sample Output

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

Meaning

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



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

Force the Link Layer to Stay Up**Purpose**

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

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

1. [Configure Encapsulation to Cisco-HDLC on page 133](#)
2. [Configure No-Keepalives on page 133](#)

Configure Encapsulation to Cisco-HDLC

Action

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

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

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

2. Configure Cisco-HDLC:

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

3. Verify the configuration:

```
user@host# show
```

For example:

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

4. Commit the change:

```
user@host# commit
```

For example:

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

Meaning

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

Configure No-Keepalives

Action

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



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

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

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

2. Configure no-keepalives:

```
[edit interfaces t3-fpc/pic/port:channel]
```

```
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

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

4. Commit the change:

```
user@host# commit
```

For example:

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

Meaning

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

Verify the Status of the Logical Interface

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

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



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

Sample Output

```

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

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

```

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

Ping the Channelized Interface

Purpose Use the ping command to verify the loopback connection.

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

```

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

```



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

Sample Output

[illegible]

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

Check for Interface Error Statistics

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

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

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



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

Sample Output

```

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

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

```

```

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

```

```

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

```

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

Diagnose a Suspected Circuit Problem

Purpose

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

To diagnose a suspected circuit problem, follow these steps:

1. [Loop the Entire T3 Interface Toward the Network on page 139](#)
2. [Create a Loop to the Router from Various Points in the Network on page 140](#)

Loop the Entire T3 Interface Toward the Network

Purpose

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



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

Action

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

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

```
[edit]
user@host# edit interfaces t3-fpc/pic/port:channel t3-options
```
2. Configure the loopback:

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

3. Verify the configuration:

```
user@host# show
```

For example:

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

4. Commit the configuration:

```
user@host# commit
```

Meaning

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

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

Purpose

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

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Steps 2 through 7 in [“Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 127](#). Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

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

Locate Channelized OC12 Alarms and Errors

- [Checklist for Channelized OC12 Alarms and Errors on page 140](#)
- [Display Channelized OC12 Alarms and Errors on page 141](#)
- [Display Channelized OC12 IQ Alarms and Errors on page 145](#)

Checklist for Channelized OC12 Alarms and Errors

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

Action [Table 14 on page 141](#) provides links and commands for Channelized OC12 alarms and errors.

Table 14: Checklist for Channelized OC12 Alarms and Errors

| Tasks | Command or Action |
|---|--|
| "Display Channelized OC12 Alarms and Errors" on page 141 | <code>show interfaces t3-fpc/pic/port:channel extensive</code> |
| "Display Channelized OC12 IQ Alarms and Errors" on page 145 | <code>show interfaces interface-type-interface-name extensive</code> |

Display Channelized OC12 Alarms and Errors

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

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

Sample Output 1

```

user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 4 supported
  Last flapped  : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes  :                0                0 bps
    Output bytes :                0                0 bps
    Input packets:                0                0 pps
    Output packets:              0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3 alarms :None
  SONET alarms :None
  DS3 defects :None
  SONET defects :None
  DS3 media:
    Seconds      Count  State
    AIS          0       0 OK
    LOF          0       0 OK
    LOS          0       0 OK
    IDLE         0       0 OK
    YELLOW       0       0 OK
    BPV          0       0
    EXZ          0       0
    LCV          0       0
    PCV          0       0
    CCV          0       0
    LES          0
    PES          0
    PSES         0
    CES          0
    CSES         0
    SEFS         0
    UAS          0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  Interface transmit queues:
    B/W  WRR      Packets      Bytes
  Queue0      0    0
    Transmitted:              0          0

```

```

        Drops:                                0            0
        Errors:                                0
Queue1      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue2      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
Queue3      0      0
        Transmitted:                          0            0
        Drops:                                0            0
        Errors:                                0
SONET PHY:      Seconds      Count      State
  PLL Lock      0            0 OK
  PHY Light      0            0 OK
SONET section:
  BIP-B1          1            22
  SEF              0            0 OK
  LOS              0            0 OK
  LOF              0            0 OK
  ES-S              1
  SES-S            0
  SEFS-S           0
SONET line:
  BIP-B2          1            307
  REI-L            0            0
  RDI-L            3            1 OK
  AIS-L            0            0 OK
  BERR-SF          0            0 OK
  BERR-SD          0            0 OK
  ES-L              1
  SES-L            0
  UAS-L            0
  ES-LFE           3
  SES-LFE           3
  UAS-LFE           0
SONET path:
  BIP-B3          1            35
  REI-P            1            7
  LOP-P            0            0 OK
  AIS-P            0            0 OK
  RDI-P            0            0 OK
  UNEQ-P           0            0 OK
  PLM-P            1            1 OK
  ES-P              1
  SES-P            0
  UAS-P            0
  ES-PFE           1
  SES-PFE          0
  UAS-PFE          0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0

```

```

74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 0d 0a  t3-0/1/0:0.....
Transmitted path trace: t3-0/3/0:0
74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00  t3-0/3/0:0.....
Packet Forwarding Engine configuration:
Destination slot: 0, PLP byte: 1 (0x00)
CoS transmit queue      Bandwidth      Buffer Priority  Limit
                        %      bps      %      bytes
0 best-effort            95      42499200  95      0      low  none
3 network-control        5      2236800   5      0      low  none

```

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

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

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



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

Table 15 on page 144 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 15: T3 Interface Error Counter Definitions

| T3 Alarm or Error | Definition |
|-------------------|-------------------------|
| AIS | Alarm indication signal |
| EXZ | Excessive zeros |
| FERF | Far-end failures |
| IDLE | Idle code detected |
| LCV | Line code violation |
| LOS | Loss of signal |

Table 15: T3 Interface Error Counter Definitions (*continued*)

| T3 Alarm or Error | Definition |
|-------------------|---|
| LOF | Loss of frame |
| YLW | Remote defect indication (yellow alarm) |
| PLL | Phase locked loop |

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

Display Channelized OC12 IQ Alarms and Errors

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

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

Sample Output 1

The following sample output is for a controller interface:

```

user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms   : None
  SONET defects  : None
  SONET PHY:
    Seconds      Count  State
    PLL Lock     0       0 OK
    PHY Light     0       0 OK
  SONET section:
    BIP-B1       0       0
    SEF          77       1 OK
    LOS          77       1 OK
    LOF          77       1 OK
    ES-S         77
    SES-S        77
    SEFS-S       77
  SONET line:
    BIP-B2       0       0
    REI-L        82584    1274876
    RDI-L         5       1 OK
    AIS-L         0       0 OK
    BERR-SF       77       1 OK
    BERR-SD        2       1 OK
    ES-L          77
    SES-L         77
    UAS-L         67
    ES-LFE        82589
    SES-LFE        5
    UAS-LFE        0
  Received SONET overhead:
    F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
    S1 : 0x00
  Transmitted SONET overhead:
    F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
    S1 : 0x00

```

Sample Output 2

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

```

user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3

```

```

Keepalive statistics:
  Input : 444 (last seen 00:00:05 ago)
  Output: 442 (last sent 00:00:09 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
CHAP state: Not-configured
CoS queues      : 4 supported
Last flapped    : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          10948          0 bps
  Output bytes:          11792          0 bps
  Input packets:           892          0 pps
  Output packets:          940          0 pps
Input errors:
  Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:      Queued packets  Transmitted packets  Dropped packets

  0 best-effort              3              3              0
  1 expedited-fo             0              0              0
  2 assured-forw             0              0              0
  3 network-cont            937             937              0

DS1 alarms :None
DS1 defects :None
TI media:
Seconds      Count  State
SEF           1      1  OK
BEE           2      2  OK
AIS           0      0  OK
LOF          108      1  OK
LOS           0      0  OK
YELLOW        0      0  OK
BPV           0      0
EXZ           0      0
LCV           1      1
PCV           0      0
CS            0      0
LES          108
ES            108
SES            108
SEFS          108
BES           0
UAS          116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds

```

```
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms :None
SONET defects :None
SONET vt:
  BIP-BIP2          0          0
  REI-V             25         25
  LOP-V             93         1 OK
  AIS-V             0          0 OK
  RDI-V             0          0 OK
  UNEQ-V            0          0 OK
  PLM-V             93         1 OK
  ES-V              93
  SES-V             93
  UAS-V             83
  ES-VFE            25
  SES-VFE           25
  UAS-VFE           0
Received SONET overhead:
  V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
    Generation: 29
```

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

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

PART 5

Index

- [Index on page 151](#)

Index

Symbols

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

A

| | |
|---|-----|
| alarms | |
| Channelized OC12 interfaces, checklist | 140 |
| Channelized OC12 IQ interfaces, checklist | 140 |

B

| | |
|--|-----|
| BERT | |
| configuring interface diagnostics..... | 93 |
| bert-algorithm statement | |
| usage guidelines..... | 93 |
| bert-error-rate statement | |
| usage guidelines..... | 93 |
| bert-period statement | |
| usage guidelines..... | 93 |
| bit error rate test See BERT | |
| braces, in configuration statements..... | xiv |
| brackets | |
| angle, in syntax descriptions..... | xiv |
| square, in configuration statements..... | xiv |

C

| | |
|---|--------|
| channel, Channelized OC12 IQ interfaces | 117 |
| channelization levels, controller interface | 117 |
| channelized AU-4 interfaces..... | 20, 26 |
| example configuration..... | 21, 26 |
| channelized E1 interfaces | |
| example configuration..... | 23 |
| channelized interfaces | |
| errors..... | 108 |
| OC12 IQ status, displaying..... | 110 |
| OC12 status, displaying..... | 104 |

| | |
|--|---------------|
| physical link down | 104 |
| status..... | 129 |
| extensive..... | 120 |
| channelized OC12 interfaces | |
| example configuration..... | 29, 30, 36 |
| status information, displaying..... | 76 |
| Channelized OC12 interfaces | |
| alarms | 144 |
| alarms and errors | 141 |
| checklist for alarms..... | 140 |
| circuit problem | 139 |
| clear interfaces statistics command..... | 132 |
| defects..... | 144 |
| edit interfaces command | 133 |
| edit interfaces t3-options command | 139 |
| encapsulation, configuring | 133 |
| errors..... | 108, 144 |
| link layer, forcing up | 132 |
| local loopback, configuring | 128 |
| logical interface | 134 |
| loopback, configuring | |
| for entire T3 interface | 139 |
| monitor | |
| checklist..... | 102 |
| statistics..... | 108 |
| monitor interface command..... | 123 |
| no keepalives, configuring | 133 |
| physical link status..... | 104, 129 |
| physical loopback, creating | 128 |
| ping interface command | 135 |
| set cli terminal command..... | 109 |
| set encapsulation command | 133 |
| set loopback local command | 128 |
| set loopback remote command | 140 |
| set no-keepalives command | 134 |
| show command | 128 |
| show interfaces coc1 command..... | 116 |
| show interfaces coc12 command..... | 116 |
| show interfaces command..... | 104, 129 |
| show interfaces ct1 command..... | 116 |
| show interfaces ct3 command..... | 116 |
| show interfaces extensive | |
| command..... | 105, 136, 141 |
| show interfaces terse command..... | 104 |
| statistics | |
| checking error | 136 |
| monitoring | 108 |
| resetting | 132 |

| | | | |
|---|---------------|--|----------|
| status | | statistics | |
| displaying | 129 | checking error..... | 136 |
| displaying for specific..... | 104 | monitoring | 123 |
| extensive..... | 105 | resetting..... | 132 |
| logical interface, verifying | 134 | status | |
| t3-options statement | 128, 139 | displaying..... | 129 |
| channelized OC12 IQ interfaces | | displaying for specific..... | 117 |
| example configuration..... | 32 | extensive..... | 120 |
| status information, displaying..... | 80 | logical interface, verifying..... | 134 |
| Channelized OC12 IQ interfaces | | t3-options statement..... | 139 |
| alarms and errors | 145 | channelized OC12 IQE interfaces | |
| checklist for alarms | 140 | status information, displaying..... | 80 |
| circuit problem | 139 | channelized OC3 interfaces..... | 13 |
| configuration..... | 113 | example configuration..... | 13 |
| figure | 113 | channelized T1 interfaces | |
| controller interface..... | 112 | example configuration..... | 28 |
| channelization levels..... | 117 | VT mapping..... | 15, 23 |
| status, displaying..... | 115, 116 | channelized T1 IQ and IQE interfaces | |
| edit interfaces command..... | 133 | example configuration..... | 28 |
| edit interfaces t3-options command..... | 139 | channelized T1 IQ interfaces | |
| encapsulation, configuring | 133 | VT mapping..... | 29 |
| errors..... | 123 | channelized T3 interfaces | |
| hierarchy..... | 112 | example configuration..... | 12 |
| individual channels down..... | 112 | channelized T3 IQ and IQE interfaces | |
| link layer, forcing up..... | 132 | example configuration..... | 27 |
| local loopback, configuring | 128 | checklist for alarms | |
| logical interface | 134 | Channelized OC12 interfaces | 140 |
| loopback, configuring | | Channelized OC12 IQ interfaces | 140 |
| for entire T3 interface..... | 139 | checklist for monitoring | |
| monitor checklist | 102 | Channelized OC12 interfaces | 102 |
| no keepalives, configuring..... | 133 | Channelized OC12 IQ interfaces | 102 |
| physical link status..... | 112, 129 | circuit problems | |
| physical loopback, creating | 128 | Channelized OC12 interfaces | 139 |
| ping interface command | 135 | Channelized OC12 IQ interfaces..... | 139 |
| set encapsulation command..... | 133 | clear interfaces statistics command | |
| set loopback local command..... | 128 | Channelized OC12 interfaces..... | 132 |
| set loopback remote command..... | 140 | commands for router management, | |
| set no-keepalives command..... | 134 | interfaces..... | 100, 101 |
| show command | 128 | comments, in configuration statements..... | xiv |
| show interfaces command | 115, 117, 129 | configuration, interfaces | |
| show interfaces controller command..... | 111 | Channelized OC12 IQ | 113 |
| show interfaces extensive | 136 | controller interface | |
| show interfaces extensive command..... | 145 | Channelized OC12 IQ interfaces | 112, 115 |
| show interfaces terse coc command..... | 111 | levels of channelization, figure | 117 |
| show interfaces terse command..... | 111 | show interfaces command..... | 115 |
| specific | | conventions | |
| channel, displaying status..... | 117 | text and syntax..... | xiii |
| figure..... | 119 | curly braces, in configuration statements..... | xiv |

-
- customer support.....xv
 - contacting JTAC.....xv
 - D**
 - documentation
 - comments on.....xv
 - DS0 interface.....119
 - E**
 - edit interfaces command.....101
 - Channelized OC12 interfaces133
 - Channelized OC12 IQ interfaces133
 - edit interfaces t3-options command
 - Channelized OC12 interfaces128, 139
 - Channelized OC12 IQ interfaces.....128, 139
 - errors
 - Channelized OC12 interfaces108
 - Channelized OC12 IQ interfaces123
 - F**
 - fast-aps-switch statement.....61
 - font conventions.....xiii
 - fractional T1 interfaces
 - example configuration.....17
 - time slots.....17
 - framing statement
 - channelized OC12 IQ interfaces
 - usage guidelines.....24
 - channelized OC12 IQE interfaces
 - usage guidelines.....18
 - H**
 - hierarchy
 - Channelized OC12 IQ interfaces112
 - I**
 - interface-type statement.....62
 - channelized E1 IQE interfaces
 - usage guidelines.....22
 - channelized E3 interfaces
 - usage guidelines.....21
 - channelized OC3 interfaces
 - usage guidelines.....20
 - channelized OC3 IQ interfaces
 - usage guidelines.....13, 26
 - channelized T1 interfaces
 - usage guidelines.....13
 - channelized T1 IQ interfaces
 - usage guidelines.....28
 - channelized T1 IQE interfaces
 - usage guidelines.....27
 - channelized T3 IQ and IQE interfaces
 - usage guidelines.....27
 - NxDS0 interfaces
 - usage guidelines.....15
 - T3 IQ and IQE interfaces
 - usage guidelines.....27
 - interfaces
 - alarms102
 - configuration statements.....40
 - investigation process102
 - locating alarms.....102
 - loopback test commands, table.....101
 - monitoring commands, table.....100
 - monitoring, general steps.....99
 - troubleshooting overview, (monitoring,
 - loopback testing, and locating alarms).....99
 - investigation process
 - interfaces.....102
 - L**
 - link PIC failover
 - channelized OC12 IQ interfaces.....32
 - logical systems
 - configuration statements.....56
 - loopback testing.....91
 - loopback, configuring local
 - Channelized OC12 interfaces128
 - Channelized OC12 IQ interfaces.....128
 - loopback, creating physical
 - Channelized OC12 interfaces128
 - Channelized OC12 IQ interfaces.....128
 - M**
 - manuals
 - comments on.....xv
 - monitor interface command
 - Channelized OC12 interfaces.....108
 - Channelized OC12 IQ interfaces123
 - N**
 - network.....139

| | |
|---------------------------------------|--------|
| no-partition statement..... | 64 |
| channelized OC12 IQ interfaces | |
| usage guidelines..... | 19, 25 |
| channelized OC12/STM4 interfaces | |
| usage guidelines..... | 11 |
| channelized T3 interfaces | |
| usage guidelines..... | 11 |
| no-termination-request statement..... | 65 |
| NxDS0 interfaces | |
| usage guidelines..... | 23 |
| NxDS0 IQ interfaces | |
| usage guidelines..... | 29 |

O

| | |
|----------------------------|------------|
| oc-slice statement..... | 66 |
| usage guidelines..... | 11, 19, 25 |
| OC1 interface..... | 119 |
| OC12 interfaces | |
| example configuration..... | 29 |
| OC3 SONET interface..... | 119 |

P

| | |
|--|--------|
| parentheses, in syntax descriptions..... | xiv |
| partition statement..... | 67 |
| channelized AU-4 interfaces | |
| usage guidelines..... | 20, 26 |
| channelized E1 IQE interfaces | |
| usage guidelines..... | 22 |
| channelized E3 interfaces | |
| usage guidelines..... | 21 |
| channelized OC3 interfaces | |
| usage guidelines..... | 13 |
| channelized T1 interfaces | |
| usage guidelines..... | 13 |
| channelized T1 IQ interfaces | |
| usage guidelines..... | 28 |
| channelized T1 IQE interfaces | |
| usage guidelines..... | 27 |
| channelized T3 IQ and IQE interfaces | |
| usage guidelines..... | 27 |
| NxDS0 interfaces | |
| usage guidelines..... | 15, 23 |
| NxDS0 IQ interfaces | |
| usage guidelines..... | 29 |
| SDH (VC-4) interfaces | |
| usage guidelines..... | 19, 25 |
| T3 IQ and IQE interfaces | |
| usage guidelines..... | 27 |

| | |
|-------------------------------------|-----|
| physical interfaces | |
| time slots | |
| fractional T1 interfaces..... | 17 |
| physical link down | |
| channelized interfaces..... | 104 |
| physical link up | |
| Channelized OC12 IQ interfaces..... | 112 |
| physical loopback | |
| channelized interfaces | 128 |
| ping interface command | |
| channelized interfaces | 135 |

S

| | |
|--|--------------------|
| SDH (VC-4) interfaces | |
| example configuration..... | 20, 26 |
| SDH (VC-4-4C) interface | |
| example configuration..... | 19, 25 |
| set cli terminal command | |
| Channelized OC12 interfaces | 109 |
| set encapsulation command | |
| Channelized OC12 interfaces | 133 |
| Channelized OC12 IQ interfaces | 133 |
| set loopback local command | |
| Channelized OC12 interfaces | 128 |
| Channelized OC12 IQ interfaces | 128 |
| set loopback remote command | |
| Channelized OC12 interfaces | 140 |
| Channelized OC12 IQ interfaces | 140 |
| set no-keepalives command | |
| Channelized OC12 interfaces | 134 |
| Channelized OC12 IQ interfaces | 134 |
| show command | 128 |
| show interfaces (Channelized OC12 IQ) | |
| command..... | 80 |
| show interfaces (Channelized OC12) | |
| command..... | 76 |
| show interfaces coc1 command | 116 |
| show interfaces coc12 command | 116 |
| show interfaces command | |
| Channelized OC12 interfaces | 104, 129, 134 |
| Channelized OC12 IQ interfaces | |
| | 115, 117, 129, 134 |
| controller interface | 115 |
| show interfaces controller command | 111 |
| show interfaces ct1 command | 116 |
| show interfaces ct3 command | 116 |
| show interfaces extensive command | |
| Channelized OC12 interfaces..... | 105, 136, 141 |
| Channelized OC12 IQ interfaces..... | 136, 145 |

| | |
|--|------|
| show interfaces terse coc command | 111 |
| show interfaces terse command | |
| Channelized OC12 interfaces | 104 |
| Channelized OC12 IQ interfaces | 111 |
| SONET parameters | |
| on channelized OC12 interfaces..... | 29 |
| sonet-options statement..... | 68 |
| usage guidelines..... | 29 |
| statistics | |
| Channelized OC12 interfaces..... | 108 |
| Channelized OC12 IQ interfaces..... | 123 |
| status | |
| channelized interfaces..... | 129 |
| Channelized OC12 interfaces | 104 |
| Channelized OC12 IQ interfaces | 110 |
| controller interface | 116 |
| status extensive | |
| Channelized OC12 interfaces | 105 |
| Channelized OC12 IQ interfaces | 120 |
| status for specific interface | |
| Channelized OC12 | 104 |
| Channelized OC12 IQ | 117 |
| support, technical See technical support | |
| syntax conventions..... | xiii |

T

| | |
|-------------------------------|----------|
| T1 interfaces | |
| clear statistics command..... | 132 |
| T1 IQ and IQE interfaces | |
| example configuration..... | 28 |
| T3 IQ and IQE interfaces | |
| example configuration..... | 27 |
| t3-options statement | 128, 139 |
| technical support | |
| contacting JTAC..... | xv |
| time slots | |
| fractional T1 interfaces..... | 17 |
| timeslots statement..... | 70 |
| fractional T1 interfaces | |
| usage guidelines..... | 17 |
| NxDS0 interfaces | |
| usage guidelines..... | 15 |

V

| | |
|-----------------------------------|--------|
| VT mapping | |
| channelized T1 interfaces..... | 15, 23 |
| channelized T1 IQ interfaces..... | 29 |

