

Interfaces Feature Guide for the QFX Series

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Interfaces Feature Guide for the QFX Series
14.1X53
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Documentation and Release Notes

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

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

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Supported Platforms

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

- [QFX Series standalone switches](#)

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

[Table 1 on page xix](#) defines notice icons used in this guide.

Table 1: Notice Icons

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

[Table 2 on page xix](#) 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

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

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host> show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none">Introduces or emphasizes important new terms.Identifies guide names.Identifies RFC and Internet draft titles.	<ul style="list-style-type: none">A policy <i>term</i> is a named structure that defines match conditions and actions.<i>Junos OS CLI User Guide</i>RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none">To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level.The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i>>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none">In the Logical Interfaces box, select All Interfaces.To cancel the configuration, click Cancel.

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

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

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- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

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

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

Self-Help Online Tools and Resources

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

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>

- Download the latest versions of software and review release notes:
<http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications:
<http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

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

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

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

PART 1

Interfaces

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CHAPTER 1

Understanding Interfaces

- [Interfaces Overview on page 3](#)
- [Understanding Interface Naming Conventions on page 5](#)
- [Understanding Interface Ranges on page 11](#)
- [Understanding Management Interfaces on page 12](#)
- [Understanding Port Ranges and System Modes on page 14](#)
- [Configuring the Interface Address on page 40](#)
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- [Configuring Short Reach Mode on page 50](#)
- [Configuring Ethernet Loopback Capability on page 50](#)
- [Configuring an LPM Table With Junos OS Release 13.2X51-D10 on page 52](#)
- [Channelizing Interfaces on page 55](#)
- [Configuring the Port Type on QFX3600 Standalone Switches on page 57](#)
- [Configuring the QSFP+ Port Type on QFX3500 Standalone Switches on page 59](#)
- [Configuring the QSFP+ Port Type on QFX5100 Devices on page 61](#)
- [Configuring the System Mode on page 63](#)
- [Monitoring Interface Status and Traffic on page 65](#)
- [Troubleshooting Network Interfaces on page 66](#)

Interfaces Overview

Juniper Networks devices have two types of interfaces: network interfaces and special interfaces. This topic provides brief information about these interfaces. For additional information, see the *Junos OS Network Interfaces Library for Routing Devices*.

- [Network Interfaces on page 3](#)
- [Special Interfaces on page 4](#)

Network Interfaces

Network interfaces connect to the network and carry network traffic. [Table 3 on page 4](#) lists the types of network interfaces supported.

Table 3: Network Interface Types and Purposes

Type	Purpose
Aggregated Ethernet interfaces	You can group Ethernet interfaces at the physical layer to form a single link-layer interface, also known as a <i>link aggregation group (LAG)</i> or <i>bundle</i> . These aggregated Ethernet interfaces help to balance traffic and increase the uplink bandwidth.
Channelized Interfaces	<p>Depending on the device and software package, 40-Gbps QSFP+ ports can be configured to operate as the following types of interfaces:</p> <ul style="list-style-type: none"> 10-Gigabit Ethernet interfaces (<i>xe</i>) 40-Gigabit Ethernet interfaces (<i>et</i> and <i>xle</i>) 40-Gigabit data plane uplink interfaces (<i>fte</i>) <p>When an <i>et</i> port is channelized to four <i>xe</i> ports, a colon is used to signify the four separate channels. For example, on a QFX3500 standalone switch with port 2 on PIC 1 configured as four 10-Gigabit Ethernet ports, the interface names are <i>xe-0/1/2:0</i>, <i>xe-0/1/2:1</i>, <i>xe-0/1/2:2</i>, and <i>xe-0/1/2:3</i></p> <p>NOTE: You cannot configure channelized interfaces to operate as Virtual Chassis ports.</p>
Ethernet Interfaces	You can configure Gigabit Ethernet, 10-Gigabit Ethernet, 40-Gigabit Ethernet interfaces to connect to other servers, storage, and switches. You can configure 40-Gigabit data plane uplink ports to connect a Node device to an Interconnect devices as well as for Virtual Chassis ports (VCPs).
Fibre Channel interfaces	You can use Fibre Channel interfaces to connect the switch to a Fibre Channel over Ethernet (FCoE) forwarder or a Fibre Channel switch in a storage area network (SAN). You can configure Fibre Channel interfaces only on ports 0 through 5 and 42 through 47 on QFX3500 devices. Fibre Channel interfaces do not forward Ethernet traffic.
LAN access interfaces	You can use these interfaces to connect to other servers, storage, and switches. When you power on a QFX Series product and use the factory-default configuration, the software automatically configures interfaces in access mode for each of the network ports.
Multichassis aggregated Ethernet (MC-AE) interfaces	You can group a LAG on one standalone switch with a LAG on another standalone switch to create a MC-AE. The MC-AE provides load balancing and redundancy across the two standalone switches.
Tagged-access mode interfaces	You can use tagged-access interfaces to connect a switch to an access layer device. Tagged-access interfaces can accept VLAN-tagged packets from multiple VLANs.
Trunk interfaces	You can use trunk interfaces to connect to other switches or routers. To use a port for this type of connection, you must explicitly configure the port interface for trunk mode. The interfaces from the switches or routers must also be configured for trunk mode. In this mode, the interface can be in multiple VLANs and accept tagged packets from multiple devices. Trunk interfaces typically connect to other switches and to routers on the LAN.
Virtual Chassis ports (VCPs)	You can use Virtual Chassis ports to send and receive Virtual Chassis Control Protocol (VCCP) traffic, and to create, monitor, and maintain the Virtual Chassis. On QFX3500, QFX3600, QFX5100, and EX4600 standalone switches, you can configure 40-Gigabit Ethernet QSFP+ uplink ports (non-channelized) or fixed SFP+ 10-Gigabit Ethernet ports as VCPs by issuing the request virtual-chassis-vc-port-set CLI command.

Special Interfaces

Table 4 on page 5 lists the types of special interfaces supported.

Table 4: Special Interface Types and Purposes

Type	Purpose
Console port	Each device has a serial console port, labeled CON or CONSOLE , for connecting tty-type terminals to the switch. The console port does not have a physical address or IP address associated with it. However, it is an interface in the sense that it provides access to the switch.
Loopback interface	A software-only virtual interface that is always up. The loopback interface provides a stable and consistent interface and IP address on the switch.
Management interface	<p>The management Ethernet interface provides an out-of-band method for connecting to a standalone switch and QFabric system.</p> <p>NOTE: On OCX Series switches, the em0 management interface always has the status up in show command outputs, even if the physical port is empty. The me0 interface is a virtual interface between Junos and the host operating system, therefore its status is independent from the status of the physical port.</p>
Routed VLAN interfaces (RVI and IRB interfaces)	<p>Layer 3 routed VLAN interfaces (called RVI in the original CLI, and called IRB in Enhanced Layer 2 Software) route traffic from one broadcast domain to another and perform other Layer 3 functions such as traffic engineering. These functions are typically performed by a router interface in a traditional network.</p> <p>The RVI or IRB functions as a logical router, eliminating the need for having both a switch and a router. The RVI or IRB must be configured as part of a broadcast domain or virtual private LAN service (VPLS) routing instance for Layer 3 traffic to be routed out of it.</p>

Related Documentation

- [Understanding Aggregated Ethernet Interfaces and LACP on page 97](#)
- [Understanding Interface Naming Conventions on page 5](#)
- [Understanding Layer 3 Logical Interfaces on page 91](#)
- [Understanding Management Interfaces on page 12](#)
- *Understanding Integrated Routing and Bridging*
- *Overview of Fibre Channel*

Understanding Interface Naming Conventions

The QFX Series and the EX4600 device uses a naming convention for defining the interfaces that is similar to that of other platforms running under Juniper Networks Junos OS. This topic provides brief information about the naming conventions used for interfaces on the QFX Series and on EX4600 switches.

This topic describes:

- [Physical Part of an Interface Name on page 6](#)
- [Logical Part of an Interface Name on a Switch Running QFabric Software Package on page 10](#)
- [Logical Part of a Channelized Interface Name on a Switch Running Enhanced Layer 2 Software on page 11](#)
- [Wildcard Characters in Interface Names on page 11](#)

Physical Part of an Interface Name

Interfaces in Junos OS are specified as follows:

device-name:type-fpc/pic/port

The convention is as follows:

- *device-name*—(QFabric systems only) The *device-name* is either the serial number or the alias of the QFabric system component, such as a Node device, Interconnect device, or QFabric infrastructure. The name can contain a maximum of 128 characters and cannot contain any colons.
- *type*—The QFX Series and EX4600 device interfaces use the following media types:
 - **fc**—Fibre Channel interface
 - **ge**—Gigabit Ethernet interface
 - **xe**—10-Gigabit Ethernet interface
 - **xle**—40-Gigabit Ethernet interface (QFX3500, QFX3600, and QFX5100 switches running a QFabric software package)
 - **et**—40-Gigabit Ethernet interface (QFX3500, QFX3600, QFX5100, and EX4600 switches running Enhanced Layer 2 Software)
 - **fte**—40-Gigabit data plane uplink interface (QFX3500, QFX3600, and QFX5100 switches running a QFabric software package)
 - **me**—Management interface
 - **em**—Management interface on QFX5100 and EX4600 switches.
- *fpc*—Flexible PIC Concentrator. QFX Series interfaces use the following convention for the FPC number in interface names:
 - On QFX3500, QFX3600, and QFX5100 devices running a QFabric software package, the FPC number is always **0**.

The FPC number indicates the slot number of the line card that contains the physical interface.

- On QFX3500, QFX3600, QFX5100, and EX4600 switches running Enhanced Layer 2 Software, the member ID of a member in a Virtual Chassis determines the FPC number.



NOTE: Every member in a Virtual Chassis must have a unique member ID, otherwise the Virtual Chassis will not be created.

- On standalone QFX5100 and EX4600 switches, the FPC number is always **0**.
- *pic*—QFX Series and EX4600 device interfaces use the following convention for the PIC (Physical Interface Card) number in interface names:

- On a QFX3500 switch running a QFabric software package, PIC 0 can support 48 ports, PIC 1 can support 16 10-Gigabit Ethernet ports, and PIC 2 can support 4 40-Gigabit Ethernet ports.
- On a QFX3500 switch running Enhanced Layer 2 software, PIC 0 can support 48 ports, and PIC 1 can support 16 10-Gigabit Ethernet ports, and 4 40-Gigabit Ethernet ports.
- On a QFX3500 Node device running a QFabric software package, PIC 0 can support 48 ports and PIC 1 can support four 40-Gigabit data plane uplink ports.
- On a QFX3600 switch running a QFabric software package, PIC 0 can support 64 10-Gigabit Ethernet ports, and PIC 1 can support 16 40-Gigabit Ethernet ports.
- On a QFX3600 switch running Enhanced Layer 2 software, PIC 0 can support 64 10-Gigabit Ethernet ports and can also support 16 40-Gigabit Ethernet ports.
- On a QFX3600 Node device running a QFabric software package, PIC 0 can support 56 10-Gigabit Ethernet ports, and PIC 1 can support 8 40-Gigabit data plane uplink ports, and up to 14 40-Gigabit Ethernet ports.
- On a QFX5100-48S switch running Enhanced Layer 2 software, PIC 0 provides six 40-Gbps QSFP+ ports and 48 10-Gigabit Ethernet interfaces.
- On an EX4600 device running Enhanced Layer 2 software, PIC 0 provides 4 40-Gbps QSFP+ ports and 24 10-Gigabit Ethernet interfaces. There are two expansion bays (PIC 1 and PIC 2), and you can insert QFX-EM-4Q expansion modules and EX4600-EM-8F expansion modules. The QFX-EM-4Q expansion module provide 4 40-Gbps QSFP+ ports. The EX4600-EM-8F expansion module provides 8 40-Gbps QSFP+ ports. You can insert any combination of expansion modules. For example, you can insert two EX4600-EM-8F expansion modules, two QFX-EM-4Q expansion modules, or one of each.
- On a QFX5100-48S switch running a QFabric software package, PIC 1 provides six 40-Gbps QSFP+ ports, and PIC 0 provides 48 10-Gigabit Ethernet interfaces.
- On a QFX5100-96S switch running Enhanced Layer 2 software, PIC 0 provides 96 10-Gigabit Ethernet interfaces and 8 40-Gbps QSFP+ ports .
- On a QFX5100-24Q switch running Enhanced Layer 2 software, PIC 0 provides 24 40-Gbps QSFP+ ports. PIC 1 and PIC 2 can each contain a QFX-EM-4Q expansion module, and each expansion module provides 4 40-Gbps QSFP+ ports
- On a QFX5100-24Q Node device running a QFabric software package, PIC 0 can support up to 88 10-Gigabit Ethernet ports labeled Q2 through Q23, and PIC 1 can support up to 8 40-Gigabit data plane uplink ports labeled Q0 through Q7, and up to 22 40-Gigabit Ethernet ports labeled Q2 through Q23. See *Configuring the QSFP+ Port Type on QFX5100 Switches* for information on how to configure the 40-Gbps QSFP+ ports. On a QFX5100-24Q Node device, by default, four 40-Gbps QSFP+ ports (labeled Q0 through Q3) are configured for uplink connections between your Node device and your Interconnect devices, and twenty 40-Gbps QSFP+ ports (labeled Q4 through Q23) use QSFP+ to four SFP+ copper breakout cables to support up to 80 10-Gigabit Ethernet ports for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to

configure the first eight ports (Q0 through Q7) for uplink connections between your Node device and your Interconnect devices, and ports Q2 through Q23 for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks.

- On a QFX5100-24Q switch running a QFabric software package, PIC 0 provides 96 10-Gigabit Ethernet ports, and PIC 1 provides 24 40-Gbps QSFP+ ports. PIC 2 and PIC 3 can each contain a QFX-EM-4Q expansion module, and each expansion module provides 4 40-Gbps QSFP+ ports.
- On a QFX5100-24Q Interconnect device running a QFabric software package, PIC 1 provides 24 40-Gbps QSFP+ ports plus 4 40-Gbps QSFP+ from each QFX-EM-4Q expansion modules[2 in number], to provide a total of 32 40-Gbps QSFP+ ports.
- *port*—Interfaces use the following convention for port numbers:
 - On a QFX3500 switch running a QFabric software package, there are 48 network access ports (10-Gigabit Ethernet) labeled 0 through 47 on PIC 0 and, 16 network access ports labeled 0 through 15 on PIC 1, and four 40-Gbps QSFP+ ports labeled Q0 through Q3 on PIC 2. You can use the QSFP+ ports to connect the Node device to Interconnect devices.

By default, the 40-Gbps QSFP+ ports are configured to operate as 10-Gigabit Ethernet ports. You can use QSFP+ to four SFP+ copper breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches. Optionally, you can choose to configure the QSFP+ ports as 40-Gigabit Ethernet ports (see [“Configuring the QSFP+ Port Type on QFX3500 Standalone Switches” on page 59](#)).

- On a QFX3500 switch running Enhanced Layer 2 software, there are 48 network access ports labeled 0 through 47 on PIC 0 and 4 40-Gbps QSFP+ ports labeled Q0 through Q3 on PIC 1. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.
- On a QFX3600 switch running a QFabric software package, there are 64 network access ports (10-Gigabit Ethernet) labeled Q0 through Q15 on PIC 0, and there are 16 network access ports (40-Gigabit Ethernet) labeled Q0 through Q15 on PIC 1.

By default, all the QSFP+ ports are configured to operate as 40-Gigabit Ethernet ports. Optionally, you can choose to configure the QSFP+ ports as 10-Gigabit Ethernet ports (see [“Configuring the Port Type on QFX3600 Standalone Switches” on page 57](#)) and use QSFP+ to four SFP+ copper breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches.

- On a QFX3600 Node device running a QFabric software package, PIC 0 can support up to 56 10-Gigabit Ethernet ports labeled Q2 through Q15, and PIC 1 can support up to 8 40-Gigabit data plane uplink ports labeled Q0 through Q7, and up to 14 40-Gigabit Ethernet ports labeled Q2 through Q15. See [Configuring the Port Type on QFX3600 Node Devices](#) for information on how to configure the 40-Gbps QSFP+ ports.

On a QFX3600 Node device, by default, four 40-Gbps QSFP+ ports (labeled Q0 through Q3) are configured for uplink connections between your Node device and your Interconnect devices, and twelve 40-Gbps QSFP+ ports (labeled Q4 through Q15) use QSFP+ to four SFP+ copper breakout cables to support up to 48 10-Gigabit

Ethernet ports for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the first eight ports (Q0 through Q7) for uplink connections between your Node device and your Interconnect devices, and ports Q2 through Q15 for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks (see *Configuring the Port Type on QFX3600 Node Devices*).

- On a QFX3600 switch running Enhanced Layer 2 software, PIC 0 can support 64 network access ports (10-Gigabit Ethernet ports) labeled Q0 through Q15 and 16 40-Gigabit Ethernet ports labeled Q0 through Q15. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.
- On a QFX5100-48S switch running Enhanced Layer 2 software, PIC 0 can support 48 network access ports (10-Gigabit Ethernet ports) labeled 0 through 47 and 6 40-Gbps QSFP+ ports labeled 48 through 53. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.
- On an EX4600 switch running Enhanced Layer 2 software, PIC 0 can support 24 network access ports (10-Gigabit Ethernet ports) labeled 0 through 23 and 4 40-Gbps QSFP+ ports labeled 24 through 27. There are two expansion bays (PIC 1 and PIC 2), and you can insert QFX-EM-4Q expansion modules and EX4600-EM-8F expansion modules. The QFX-EM-4Q expansion module provides 4 40-Gbps QSFP+ ports. The EX4600-EM-8F expansion module provides 8 40-Gbps QSFP+ ports. You can insert any combination of expansion modules. For example, you can insert two EX4600-EM-8F expansion modules, two QFX-EM-4Q expansion modules, or one of each. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.
- On a QFX5100-48S switch running a QFabric software package, PIC 0 can support 48 network access ports (10-Gigabit Ethernet ports) labeled 0 through 47, and PIC 1 can support 6 40-Gbps QSFP+ ports labeled 0 through 5. See *Configuring the QSFP+ Port Type on QFX5100 Switches* for information on how to configure the port mode of 40-Gbps QSFP+ ports.
- On a QFX5100-24Q switch running Enhanced Layer 2 software, PIC 0 can support 24 40-Gbps QSFP+ ports labeled 0 through 23. PIC 1 and PIC 2 each support 4 40-Gbps QSFP+ port, for a total of eight 40-Gbps QSFP+ ports. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.



NOTE: You cannot channelize the 40-Gbps QSFP+ ports provided in the two QFX-EM-4Q expansion modules. Also, even though there is a total of 128 physical ports, only 104 logical ports can be channelized.

You can configure different system modes to achieve varying levels of port density on the QFX5100-24Q and QFX5100-96S switches. Depending on the system mode you configure, there are restrictions on which ports you can channelize. If you

channelize ports that are restricted, the configuration is ignored. See [“Configuring the System Mode” on page 63](#) for information on how to configure the system mode.

- On a QFX5100-24Q switch running a QFabric software package, PIC 0 provides 96 10-Gigabit Ethernet ports and PIC 1 provides 24 40-Gbps QSFP+ ports. PIC 2 and PIC 3 can each contain a QFX-EM-4Q expansion module, and each expansion module provides 4 40-Gbps QSFP+ ports.
- On a QFX5100-24Q Interconnect device running a QFabric software package, PIC 1 provides 24 40-Gbps QSFP+ ports plus 4 40-Gbps QSFP+ ports from each QFX-EM-4Q expansion modules [2 in number], to provide a total of 32 40-Gbps QSFP+ ports.
- On a QFX5100-24Q Node device running a QFabric software package, PIC 0 can support up to 88 10-Gigabit Ethernet ports labeled Q2 through Q23, and PIC 1 can support up to 8 40-Gigabit data plane uplink ports labeled Q0 through Q7, and up to 22 40-Gigabit Ethernet ports labeled Q2 through Q23. See [“Configuring the QSFP+ Port Type on QFX5100 Devices” on page 61](#) for information on how to configure the 40-Gbps QSFP+ ports.

On a QFX5100-24Q Node device, by default, four 40-Gbps QSFP+ ports (labeled Q0 through Q3) are configured for uplink connections between your Node device and your Interconnect devices, and twenty 40-Gbps QSFP+ ports (labeled Q4 through Q23) use QSFP+ to four SFP+ copper breakout cables to support up to 80 10-Gigabit Ethernet ports for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the first eight ports (Q0 through Q7) for uplink connections between your Node device and your Interconnect devices, and ports Q2 through Q23 for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks.

- On a QFX5100-96S switch running Enhanced Layer 2 software, PIC 0 can support 96 10-Gigabit Ethernet ports labeled 0 through 95, and 8 40-Gbps QSFP+ ports labeled 96 through 103. See [“Channelizing Interfaces” on page 55](#) for information on how to configure and channelize the 40-Gbps QSFP+ ports.



NOTE: You can only channelize the 40-Gbps QSFP+ ports provided in ports 96 and 100, because only 104 logical ports can be channelized.

You can configure different system modes to achieve varying levels of port density on the QFX5100-24Q and QFX5100-96S switches. Depending on the system mode you configure, there are restrictions on which ports you can channelize. If you channelize ports that are restricted, the configuration is ignored. See [“Configuring the System Mode” on page 63](#) for information on how to configure the system mode.

Logical Part of an Interface Name on a Switch Running QFabric Software Package

The logical unit part of the interface name corresponds to the logical unit number, which can be a number from 0 through 16384. In the virtual part of the name, a period (.) separates the port and logical unit numbers: *device-name* (QFabric systems only): *type-fpc/pic/port.logical-unit-number*. For example, if you issue the **show**

ethernet-switching interfaces command on a system with a default VLAN, the resulting display shows the logical interfaces associated with the VLAN:

Interface	State	VLAN members	Blocking
node-device1:xe-0/0/1.0	down	remote-analyzer	unblocked
node-device1:xe-0/0/2.0	down	default	unblocked
node-device1:xe-0/0/3.0	down	default	unblocked

When you configure aggregated Ethernet interfaces, you configure a logical interface, which is called a *bundle* or a LAG. Each LAG can include up to eight Ethernet interfaces, depending on the switch model.

Logical Part of a Channelized Interface Name on a Switch Running Enhanced Layer 2 Software

Channelizing enables you to configure four 10-Gigabit Ethernet interfaces from a 40-Gigabit Ethernet QSFP+ interface. By default, a 40-Gigabit Ethernet QSFP+ interface is named *et-fpc/pic/port*. The resulting 10-Gigabit Ethernet interfaces appear in the following format: *xe-fpc/pic/port:channel*, where channel can be a value of 0 through 3.

For example, if an *et* interface named **et-0/0/3** is channelized to four 10-Gigabit Ethernet interfaces, the resulting 10-Gigabit Ethernet interface names will be **xe-0/0/3:0**, **xe-0/0/3:1**, **xe-0/0/3:2**, and **xe-0/0/3:3**:

Interface	Admin	Link	Proto	Local	Remote
xe-0/0/3:0	up	down			
xe-0/0/3:1	up	down			
xe-0/0/3:2	up	down			
xe-0/0/3:3	up	down			

Wildcard Characters in Interface Names

In the **show interfaces** and **clear interfaces** commands, you can use wildcard characters in the *interface-name* option to specify groups of interface names without having to type each name individually. You must enclose all wildcard characters except the asterisk (*) in quotation marks (" ").

Related Documentation

- [Interfaces Overview on page 3](#)
- [Channelizing Interfaces on page 55](#)
- [Configuring the System Mode on page 63](#)
- [Understanding Management Interfaces on page 12](#)
- [Understanding Port Ranges and System Modes on page 14](#)
- *Rear Panel of a QFX3500 Device*
- *Front Panel of a QFX3600 Device*
- *Junos OS Network Interfaces Library for Routing Devices*

Understanding Interface Ranges

You can use the interface ranges to group interfaces of the same type that share a common configuration profile. This helps reduce the time and effort in configuring

interfaces. The configurations common to all the interfaces can be included in the interface range definition.

The interface range definition contains the name of the interface range defined, the names of the individual member interfaces that do not fall in a series of interfaces, a range of interfaces defined in the member range, and the configuration statements common to all the interfaces. An interface range defined with member ranges and individual members but without any common configurations is also a valid definition.



NOTE: The interface range definition is supported only for Gigabit Ethernet, 10-Gigabit Ethernet, and Fibre Channel interfaces. OCX Series switches do not support Fibre Channel interfaces.

The common configurations defined in the interface range will be overridden by the local configuration.

The defined interface ranges can be used at places where the **interface** statement is used in the following configuration hierarchies:



NOTE: These statements are not supported on OCX Series switches:

- **protocols isis interface**
- **protocols sflow interfaces**

Related Documentation

- [Interfaces Overview on page 3](#)
- [Interfaces Overview](#)
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces](#)
- [Configuring Link Aggregation on page 101](#)
- [Configuring a Layer 3 Logical Interface on page 92](#)
- [Junos OS Network Interfaces Library for Routing Devices](#)
- [interface-range on page 207](#)

Understanding Management Interfaces

You use management interfaces to access devices remotely. Typically, a management interface is not connected to the in-band network, but is connected to a device in the internal network. Through a management interface, you can access the device over the network using utilities such as **ssh** and **telnet** and configure it from anywhere, regardless of its physical location. As a security feature, users cannot log in as **root** through a management interface. To access the device as **root**, you must use the console port. You can also use **root** to log in using SSH.



NOTE: Before you can use management interfaces, you must configure the logical interfaces with valid IP addresses. Juniper Networks does not support configuring two management interfaces in the same subnet.

Management interface port ranges vary based on device type:

- QFX3500 devices:

The valid port range for a management interface (**me**) on a QFX3500 device is between 0 and 6, with a total of seven available ports. On a QFX3500 standalone switch, however, you can only configure **me0** and **me1** as management interfaces. The management interfaces are labeled **C0** and **C1**, and they correspond to **me0** and **me1**. On a QFX3500 Node device, the RJ-45 management interfaces and SFP management interfaces correspond to **me5** and **me6**.

- QFX3600 devices:

There are two RJ-45 management interfaces (labeled **C0** and **C1**) and two SFP management interfaces (labeled **C0S** and **C1S**). On a QFX3600 standalone switch, the RJ-45 management interfaces and SFP management interfaces correspond to **me0** and **me1**. On a QFX3600 Node device, the RJ-45 management interfaces and SFP management interfaces correspond to **me5** and **me6**. Each pair of management interfaces correspond to one Ethernet interface—for example, both RJ-45 management interfaces (labeled **C0** and **C0s**) can correspond to **me0**, and both SFP management interfaces (labeled **C1** and **C1S**) can correspond to **me1**. By default, both RJ-45 management interfaces are active. If you insert an SFP interface into the SFP management port (**C0S**, for example), the SFP interface would become the active management interface, and the corresponding RJ-45 management interface (**C0**) is disabled.



NOTE: On a QFX3600 device, you can use either the RJ-45 or the SFP management interfaces, but not both at the same time.

- On QFX5100 and EX4600 switches, there is one RJ-45 management interface (labeled **C0**) and one SFP management interface (labeled **C1**), and they correspond to **em0** and **em1**. You can use both management interfaces simultaneously.
- On OCX Series switches:

There is one RJ-45 management interface (labeled **MGMT**), which corresponds to **em0**. The **em0** interface always has the status **up** in show command outputs, even if the physical port is empty. The **me0** interface is a virtual interface between Junos and the host operating system, therefore its status is independent from the status of the physical port.

- QFabric system:

On a QFabric system, there are management interfaces on the Node devices, Interconnect devices, and Director devices. However, you cannot access the management interfaces on the Node devices or Interconnect devices directly. You can

only manage and configure these devices using the Director device. You can connect to the management interface over the network using utilities such as SSH.

For information on how to use management interfaces on a QFabric system, see *Performing the QFabric System Initial Setup on a QFX3100 Director Group and Gaining Access to the QFabric System Through the Default Partition*.

- Related Documentation**
- [Interfaces Overview on page 3](#)
 - [Interfaces Overview](#)

Understanding Port Ranges and System Modes

QFX Series devices and EX4600 switches can support different port ranges depending on the device, media type of the interface, the software that is running on the device, and the system mode.

This topic describes:

- [Port Ranges for Different Media Types on page 14](#)
- [Supported System Modes on page 38](#)

Port Ranges for Different Media Types

The following media types support the following port ranges:

- On a QFX3500 device:
 - The valid port range for a Fibre Channel (fc) interface is **0** through **5** and **42** through **47** on PIC **0**, with a total of 12 available Fibre Channel ports.



NOTE: Fibre Channel ports are not supported on QFX3500, QFX3600, and QFX5100 switches running Enhanced Layer 2 software.

- The valid port range for a Gigabit Ethernet (ge) interface is **6** through **41** on PIC **0** because the ports between **0** and **5** and **42** and **47** are reserved as Fibre Channel ports. The total number of available Gigabit Ethernet ports is 36, because 12 of the remaining 48 ports are reserved for Fibre Channel and 10-Gigabit Ethernet interfaces. Fibre Channel ports cannot be configured as Gigabit Ethernet ports.
 - The valid port range for a 10-Gigabit Ethernet (xe) interface is **0** through **47** on PIC **0**. The valid port range for a 10-Gigabit Ethernet (xe) interface is **0** through **15** on PIC **1**. The total number of available 10-Gigabit Ethernet ports is 64.
 - The valid port range for a 40-Gigabit data plane uplink interface is **0** through **3** on PIC **1**
 - The valid port range for a 40-Gigabit Ethernet interface is **0** through **3** on PIC **2**. There are four available ports.
- On a QFX3600 Node device:

- The valid port range for a 10-Gigabit Ethernet interface is **8** through **63** on PIC **0**. There are 56 available ports.
- The valid port range for a 40-Gigabit Ethernet interface is **2** through **15** on PIC **1**. There are 14 available ports.
- The valid port range for a 40-Gigabit data plane uplink interface is **0** through **7** on PIC **1**. There are eight available ports.

See [Table 7 on page 23](#) for physical port to logical port mappings.

- On a QFX3600 switch running Enhanced Layer 2 Software:
 - The valid port range for a 10-Gigabit Ethernet interface is **0** through **63** on PIC **0**. There are 64 available ports.
 - The valid port range for a 40-Gigabit Ethernet interface is **0** through **15** on PIC **0**. There are 16 available ports.

See [Table 8 on page 26](#) for physical port to logical port mappings.

- On QFX5100-48S and QFX5100-48T switches running Enhanced Layer 2 Software:
 - The valid port range for a 10-Gigabit Ethernet interface is **0** through **47** on PIC **0**. There are 48 available ports. When you channelize the 6 40-Gbps QSFP+ ports on **0** through **5** on PIC **1**, there are 72 available ports.



NOTE: On PIC 1, ports 0 and 1 are reserved for fte ports. You cannot convert these fte ports to xe or xle ports.

- The valid port range for a 40-Gbps QSFP+ port is **0** through **5** on PIC **1**. There are six available ports.

See [Table 10 on page 31](#) for physical port to logical port mappings.

- On EX4600 switches running Enhanced Layer 2 Software:
 - The valid port range for a 10-Gigabit Ethernet interface is **0** through **23** on PIC **0**. There are 24 available ports. When you channelize the 4 40-Gbps QSFP+ ports on **24** through **27** on PIC **0**. There are 40 available ports.

See [Table 10 on page 31](#) for physical port to logical port mappings.

- On QFX5100-48S and QFX5100-48T switches running a QFabric software package:
 - The valid port range for a 10-Gigabit Ethernet interface is **0** through **47** on PIC **0**. There are 48 available ports.
 - The valid port range for a 40-Gbps QSFP+ port is **0** through **5** on PIC **1**. There are six available ports.



NOTE: On PIC 1, ports 0 and 1 are reserved for fte ports. You cannot convert these fte ports to xe or xle ports.

See [Table 11 on page 35](#) for physical port to logical port mappings.

- For QFX5100-24Q and QFX5100-96S switches running Enhanced Layer 2 Software, see [Table 12 on page 38](#) for physical port to logical port mappings for different system modes.

Table 5: Valid Port Ranges on QFX3500 Switches Running QFabric Software Package

Port Number	Fibre Channel Interfaces (On PIC 0)	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 2)
0	fc-0/0/0	Not supported on this port	xe-0/0/0	Not supported on this port	Not supported on this port
1	fc-0/0/1	Not supported on this port	xe-0/0/1	Not supported on this port	Not supported on this port
2	fc-0/0/2	Not supported on this port	xe-0/0/2	Not supported on this port	Not supported on this port
3	fc-0/0/3	Not supported on this port	xe-0/0/3	Not supported on this port	Not supported on this port
4	fc-0/0/4	Not supported on this port	xe-0/0/4	Not supported on this port	Not supported on this port
5	fc-0/0/5	Not supported on this port	xe-0/0/5	Not supported on this port	Not supported on this port
6	Not supported on this port	ge-0/0/6	xe-0/0/6	Not supported on this port	Not supported on this port
7	Not supported on this port	ge-0/0/7	xe-0/0/7	Not supported on this port	Not supported on this port
8	Not supported on this port	ge-0/0/8	xe-0/0/8	Not supported on this port	Not supported on this port
9	Not supported on this port	ge-0/0/9	xe-0/0/9	Not supported on this port	Not supported on this port
10	Not supported on this port	ge-0/0/10	xe-0/0/10	Not supported on this port	Not supported on this port
11	Not supported on this port	ge-0/0/11	xe-0/0/11	Not supported on this port	Not supported on this port
12	Not supported on this port	ge-0/0/12	xe-0/0/12	Not supported on this port	Not supported on this port

Table 5: Valid Port Ranges on QFX3500 Switches Running QFabric Software Package (*continued*)

Port Number	Fibre Channel Interfaces (On PIC 0)	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 2)
13	Not supported on this port	ge-0/0/13	xe-0/0/13	Not supported on this port	Not supported on this port
14	Not supported on this port	ge-0/0/14	xe-0/0/14	Not supported on this port	Not supported on this port
15	Not supported on this port	ge-0/0/15	xe-0/0/15	Not supported on this port	Not supported on this port
16	Not supported on this port	ge-0/0/16	xe-0/0/16	Not supported on this port	Not supported on this port
17	Not supported on this port	ge-0/0/17	xe-0/0/17	Not supported on this port	Not supported on this port
18	Not supported on this port	ge-0/0/18	xe-0/0/18	Not supported on this port	Not supported on this port
19	Not supported on this port	ge-0/0/19	xe-0/0/19	Not supported on this port	Not supported on this port
20	Not supported on this port	ge-0/0/20	xe-0/0/20	Not supported on this port	Not supported on this port
21	Not supported on this port	ge-0/0/21	xe-0/0/21	Not supported on this port	Not supported on this port
22	Not supported on this port	ge-0/0/22	xe-0/0/22	Not supported on this port	Not supported on this port
23	Not supported on this port	ge-0/0/23	xe-0/0/23	Not supported on this port	Not supported on this port
24	Not supported on this port	ge-0/0/24	xe-0/0/24	Not supported on this port	Not supported on this port
25	Not supported on this port	ge-0/0/25	xe-0/0/25	Not supported on this port	Not supported on this port
26	Not supported on this port	ge-0/0/26	xe-0/0/26	Not supported on this port	Not supported on this port
27	Not supported on this port	ge-0/0/27	xe-0/0/27	Not supported on this port	Not supported on this port

Table 5: Valid Port Ranges on QFX3500 Switches Running QFabric Software Package (*continued*)

Port Number	Fibre Channel Interfaces (On PIC 0)	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 2)
28	Not supported on this port	ge-0/0/28	xe-0/0/28	Not supported on this port	Not supported on this port
29	Not supported on this port	ge-0/0/29	xe-0/0/29	Not supported on this port	Not supported on this port
30	Not supported on this port	ge-0/0/30	xe-0/0/30	Not supported on this port	Not supported on this port
31	Not supported on this port	ge-0/0/31	xe-0/0/31	Not supported on this port	Not supported on this port
32	Not supported on this port	ge-0/0/32	xe-0/0/32	Not supported on this port	Not supported on this port
33	Not supported on this port	ge-0/0/33	xe-0/0/33	Not supported on this port	Not supported on this port
34	Not supported on this port	ge-0/0/34	xe-0/0/34	Not supported on this port	Not supported on this port
35	Not supported on this port	ge-0/0/35	xe-0/0/35	Not supported on this port	Not supported on this port
36	Not supported on this port	ge-0/0/36	xe-0/0/36	Not supported on this port	Not supported on this port
37	Not supported on this port	ge-0/0/37	xe-0/0/37	Not supported on this port	Not supported on this port
38	Not supported on this port	ge-0/0/38	xe-0/0/38	Not supported on this port	Not supported on this port
39	Not supported on this port	ge-0/0/39	xe-0/0/39	Not supported on this port	Not supported on this port
40	Not supported on this port	ge-0/0/40	xe-0/0/40	Not supported on this port	Not supported on this port
41	Not supported on this port	ge-0/0/41	xe-0/0/41	Not supported on this port	Not supported on this port
42	fc-0/0/42	Not supported on this port	xe-0/0/42	Not supported on this port	Not supported on this port

Table 5: Valid Port Ranges on QFX3500 Switches Running QFabric Software Package (continued)

Port Number	Fibre Channel Interfaces (On PIC 0)	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 2)
43	fc-0/0/43	Not supported on this port	xe-0/0/43	Not supported on this port	Not supported on this port
44	fc-0/0/44	Not supported on this port	xe-0/0/44	Not supported on this port	Not supported on this port
45	fc-0/0/45	Not supported on this port	xe-0/0/45	Not supported on this port	Not supported on this port
46	fc-0/0/46	Not supported on this port	xe-0/0/46	Not supported on this port	Not supported on this port
47	fc-0/0/47	Not supported on this port	xe-0/0/47	Not supported on this port	Not supported on this port
Q0	Not supported on this port	Not supported on this port	xe-0/1/0 xe-0/1/1 xe-0/1/2 xe-0/1/3 NOTE: Supported on QFX3500 standalone switch only.	fte-0/1/0	xle-0/2/0
Q1	Not supported on this port	Not supported on this port	xe-0/1/4 xe-0/1/5 xe-0/1/6 xe-0/1/7 NOTE: Supported on QFX3500 standalone switch only.	fte-0/1/1	xle-0/2/1

Table 5: Valid Port Ranges on QFX3500 Switches Running QFabric Software Package (continued)

Port Number	Fibre Channel Interfaces (On PIC 0)	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 2)
Q2	Not supported on this port	Not supported on this port	xe-0/1/8 xe-0/1/9 xe-0/1/10 xe-0/1/11 NOTE: Supported on QFX3500 standalone switch only.	fte-0/1/2	xle-0/2/2
Q3	Not supported on this port	Not supported on this port	xe-0/1/12 xe-0/1/13 xe-0/1/14 xe-0/1/15 NOTE: Supported on QFX3500 standalone switch only.	fte-0/1/3	xle-0/2/3

Table 6: Valid Port Ranges on QFX3500 Switches Running Enhanced Layer 2 Software

Port Number	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
0	Not supported on this port	xe-0/0/0	Not supported on this port
1	Not supported on this port	xe-0/0/1	Not supported on this port
2	Not supported on this port	xe-0/0/2	Not supported on this port
3	Not supported on this port	xe-0/0/3	Not supported on this port
4	Not supported on this port	xe-0/0/4	Not supported on this port
5	Not supported on this port	xe-0/0/5	Not supported on this port
6	ge-0/0/6	xe-0/0/6	Not supported on this port
7	ge-0/0/7	xe-0/0/7	Not supported on this port

Table 6: Valid Port Ranges on QFX3500 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
8	ge-0/0/8	xe-0/0/8	Not supported on this port
9	ge-0/0/9	xe-0/0/9	Not supported on this port
10	ge-0/0/10	xe-0/0/10	Not supported on this port
11	ge-0/0/11	xe-0/0/11	Not supported on this port
12	ge-0/0/12	xe-0/0/12	Not supported on this port
13	ge-0/0/13	xe-0/0/13	Not supported on this port
14	ge-0/0/14	xe-0/0/14	Not supported on this port
15	ge-0/0/15	xe-0/0/15	Not supported on this port
16	ge-0/0/16	xe-0/0/16	Not supported on this port
17	ge-0/0/17	xe-0/0/17	Not supported on this port
18	ge-0/0/18	xe-0/0/18	Not supported on this port
19	ge-0/0/19	xe-0/0/19	Not supported on this port
20	ge-0/0/20	xe-0/0/20	Not supported on this port
21	ge-0/0/21	xe-0/0/21	Not supported on this port
22	ge-0/0/22	xe-0/0/22	Not supported on this port
23	ge-0/0/23	xe-0/0/23	Not supported on this port
24	ge-0/0/24	xe-0/0/24	Not supported on this port
25	ge-0/0/25	xe-0/0/25	Not supported on this port
26	ge-0/0/26	xe-0/0/26	Not supported on this port
27	ge-0/0/27	xe-0/0/27	Not supported on this port
28	ge-0/0/28	xe-0/0/28	Not supported on this port
29	ge-0/0/29	xe-0/0/29	Not supported on this port

Table 6: Valid Port Ranges on QFX3500 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
30	ge-0/0/30	xe-0/0/30	Not supported on this port
31	ge-0/0/31	xe-0/0/31	Not supported on this port
32	ge-0/0/32	xe-0/0/32	Not supported on this port
33	ge-0/0/33	xe-0/0/33	Not supported on this port
34	ge-0/0/34	xe-0/0/34	Not supported on this port
35	ge-0/0/35	xe-0/0/35	Not supported on this port
36	ge-0/0/36	xe-0/0/36	Not supported on this port
37	ge-0/0/37	xe-0/0/37	Not supported on this port
38	ge-0/0/38	xe-0/0/38	Not supported on this port
39	ge-0/0/39	xe-0/0/39	Not supported on this port
40	ge-0/0/40	xe-0/0/40	Not supported on this port
41	ge-0/0/41	xe-0/0/41	Not supported on this port
42	Not supported on this port	xe-0/0/42	Not supported on this port
43	Not supported on this port	xe-0/0/43	Not supported on this port
44	Not supported on this port	xe-0/0/44	Not supported on this port
45	Not supported on this port	xe-0/0/45	Not supported on this port
46	Not supported on this port	xe-0/0/46	Not supported on this port
47	Not supported on this port	xe-0/0/47	Not supported on this port
Q0	Not supported on this port	xe-0/1/0:0 xe-0/1/0:1 xe-0/1/0:2 xe-0/1/0:3	et-0/1/0

Table 6: Valid Port Ranges on QFX3500 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	Gigabit Ethernet Interfaces (On PIC 0)	10-Gigabit Ethernet Interfaces (On PIC 0 and 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q1	Not supported on this port	xe-0/1/1:0 xe-0/1/1:1 xe-0/1/1:2 xe-0/1/1:3	et-0/1/1
Q2	Not supported on this port	xe-0/1/2:0 xe-0/1/2:1 xe-0/1/2:2 xe-0/1/2:3	et-0/1/2
Q3	Not supported on this port	xe-0/1/3:0 xe-0/1/3:1 xe-0/1/3:2 xe-0/1/3:3	et-0/1/3

Table 7: Valid Port Ranges on QFX3600 Switches Running QFabric Software Package

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q0	xe-0/0/0 xe-0/0/1 xe-0/0/2 xe-0/0/3	xle-0/1/0
Q1	xe-0/0/4 xe-0/0/5 xe-0/0/6 xe-0/0/7	xle-0/1/1

Table 7: Valid Port Ranges on QFX3600 Switches Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q2	xe-0/0/8	xle-0/1/2
	xe-0/0/9	
	xe-0/0/10	
	xe-0/0/11	
Q3	xe-0/0/12	xle-0/1/3
	xe-0/0/13	
	xe-0/0/14	
	xe-0/0/15	
Q4	xe-0/0/16	xle-0/1/4
	xe-0/0/17	
	xe-0/0/18	
	xe-0/0/19	
Q5	xe-0/0/20	xle-0/1/5
	xe-0/0/21	
	xe-0/0/22	
	xe-0/0/23	
Q6	xe-0/0/24	xle-0/1/6
	xe-0/0/25	
	xe-0/0/26	
	xe-0/0/27	
Q7	xe-0/0/28	xle-0/1/7
	xe-0/0/29	
	xe-0/0/30	
	xe-0/0/31	

Table 7: Valid Port Ranges on QFX3600 Switches Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q8	xe-0/0/32	xle-0/1/8
	xe-0/0/33	
	xe-0/0/34	
	xe-0/0/35	
Q9	xe-0/0/36	xle-0/1/9
	xe-0/0/37	
	xe-0/0/38	
	xe-0/0/39	
Q10	xe-0/0/40	xle-0/1/10
	xe-0/0/41	
	xe-0/0/42	
	xe-0/0/43	
Q11	xe-0/0/44	xle-0/1/11
	xe-0/0/45	
	xe-0/0/46	
	xe-0/0/47	
Q12	xe-0/0/48	xle-0/1/12
	xe-0/0/49	
	xe-0/0/50	
	xe-0/0/51	
Q13	xe-0/0/52	xle-0/1/13
	xe-0/0/53	
	xe-0/0/54	
	xe-0/0/55	

Table 7: Valid Port Ranges on QFX3600 Switches Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q14	xe-0/0/56	xle-0/1/14
	xe-0/0/57	
	xe-0/0/58	
	xe-0/0/59	
Q15	xe-0/0/60	xle-0/1/15
	xe-0/0/61	
	xe-0/0/62	
	xe-0/0/63	

Table 8: Valid Port Ranges on QFX3600 Switches Running Enhanced Layer 2 Software

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
Q0	xe-0/0/0:0	et-0/0/0
	xe-0/0/0:1	
	xe-0/0/0:2	
	xe-0/0/0:3	
Q1	xe-0/0/1:0	et-0/0/1
	xe-0/0/1:1	
	xe-0/0/1:2	
	xe-0/0/1:3	
Q2	xe-0/0/2:0	et-0/0/2
	xe-0/0/2:1	
	xe-0/0/2:2	
	xe-0/0/2:3	

Table 8: Valid Port Ranges on QFX3600 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
Q3	xe-0/0/3:0 xe-0/0/3:1 xe-0/0/3:2 xe-0/0/3:3	et-0/0/3
Q4	xe-0/0/4:0 xe-0/0/4:1 xe-0/0/4:2 xe-0/0/4:3	et-0/0/4
Q5	xe-0/0/5:0 xe-0/0/5:1 xe-0/0/5:2 xe-0/0/5:3	et-0/0/5
Q6	xe-0/0/6:0 xe-0/0/6:1 xe-0/0/6:2 xe-0/0/6:3	et-0/0/6
Q7	xe-0/0/7:0 xe-0/0/7:1 xe-0/0/7:2 xe-0/0/7:3	et-0/0/7
Q8	xe-0/0/8:0 xe-0/0/8:1 xe-0/0/8:2 xe-0/0/8:3	et-0/0/8

Table 8: Valid Port Ranges on QFX3600 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
Q9	xe-0/0/9:0	et-0/0/9
	xe-0/0/9:1	
	xe-0/0/9:2	
	xe-0/0/9:3	
Q10	xe-0/0/10:0	et-0/0/10
	xe-0/0/10:1	
	xe-0/0/10:2	
	xe-0/0/10:3	
Q11	xe-0/0/11:0	et-0/0/11
	xe-0/0/11:1	
	xe-0/0/11:2	
	xe-0/0/11:3	
Q12	xe-0/0/12:0	et-0/0/12
	xe-0/0/12:1	
	xe-0/0/12:2	
	xe-0/0/12:3	
Q13	xe-0/0/13:0	et-0/0/13
	xe-0/0/13:1	
	xe-0/0/13:2	
	xe-0/0/13:3	
Q14	xe-0/0/14:0	et-0/0/14
	xe-0/0/14:1	
	xe-0/0/14:2	
	xe-0/0/14:3	

Table 8: Valid Port Ranges on QFX3600 Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
Q15	xe-0/0/15:0 xe-0/0/15:1 xe-0/0/15:2 xe-0/0/15:3	et-0/0/15

Table 9: Valid Port Ranges on QFX3600 Node Devices Running QFabric Software Package

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q0	Not supported on this port	fte-0/1/0	xle-0/1/0
Q1	Not supported on this port	fte-0/1/1	xle-0/1/1
Q2	xe-0/0/8 xe-0/0/9 xe-0/0/10 xe-0/0/11	fte-0/1/2	xle-0/1/2
Q3	xe-0/0/12 xe-0/0/13 xe-0/0/14 xe-0/0/15	fte-0/1/3	xle-0/1/3
Q4	xe-0/0/16 xe-0/0/17 xe-0/0/18 xe-0/0/19	fte-0/1/4	xle-0/1/4
Q5	xe-0/0/20 xe-0/0/21 xe-0/0/22 xe-0/0/23	fte-0/1/5	xle-0/1/5

Table 9: Valid Port Ranges on QFX3600 Node Devices Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q6	xe-0/0/24	fte-0/1/6	xle-0/1/6
	xe-0/0/25		
	xe-0/0/26		
	xe-0/0/27		
Q7	xe-0/0/28	fte-0/1/7	xle-0/1/7
	xe-0/0/29		
	xe-0/0/30		
	xe-0/0/31		
Q8	xe-0/0/32	Not supported on this port	xle-0/1/8
	xe-0/0/33		
	xe-0/0/34		
	xe-0/0/35		
Q9	xe-0/0/36	Not supported on this port	xle-0/1/9
	xe-0/0/37		
	xe-0/0/38		
	xe-0/0/39		
Q10	xe-0/0/40	Not supported on this port	xle-0/1/10
	xe-0/0/41		
	xe-0/0/42		
	xe-0/0/43		
Q11	xe-0/0/44	Not supported on this port	xle-0/1/11
	xe-0/0/45		
	xe-0/0/46		
	xe-0/0/47		

Table 9: Valid Port Ranges on QFX3600 Node Devices Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)	40-Gigabit Ethernet Interfaces (On PIC 1)
Q12	xe-0/0/48 xe-0/0/49 xe-0/0/50 xe-0/0/51	Not supported on this port	xle-0/1/12
Q13	xe-0/0/52 xe-0/0/53 xe-0/0/54 xe-0/0/55	Not supported on this port	xle-0/1/13
Q14	xe-0/0/56 xe-0/0/57 xe-0/0/58 xe-0/0/59	Not supported on this port	xle-0/1/14
Q15	xe-0/0/60 xe-0/0/61 xe-0/0/62 xe-0/0/63	Not supported on this port	xle-0/1/15

Table 10: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running Enhanced Layer 2 Software

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
0	xe-0/0/0	Not supported on this port
1	xe-0/0/1	Not supported on this port
2	xe-0/0/2	Not supported on this port
3	xe-0/0/3	Not supported on this port
4	xe-0/0/4	Not supported on this port

Table 10: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
5	xe-0/0/5	Not supported on this port
6	xe-0/0/6	Not supported on this port
7	xe-0/0/7	Not supported on this port
8	xe-0/0/8	Not supported on this port
9	xe-0/0/9	Not supported on this port
10	xe-0/0/10	Not supported on this port
11	xe-0/0/11	Not supported on this port
12	xe-0/0/12	Not supported on this port
13	xe-0/0/13	Not supported on this port
14	xe-0/0/14	Not supported on this port
15	xe-0/0/15	Not supported on this port
16	xe-0/0/16	Not supported on this port
17	xe-0/0/17	Not supported on this port
18	xe-0/0/18	Not supported on this port
19	xe-0/0/19	Not supported on this port
20	xe-0/0/20	Not supported on this port
21	xe-0/0/21	Not supported on this port
22	xe-0/0/22	Not supported on this port
23	xe-0/0/23	Not supported on this port
24	xe-0/0/24	Not supported on this port
25	xe-0/0/25	Not supported on this port
26	xe-0/0/26	Not supported on this port

Table 10: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
27	xe-0/0/27	Not supported on this port
28	xe-0/0/28	Not supported on this port
29	xe-0/0/29	Not supported on this port
30	xe-0/0/30	Not supported on this port
31	xe-0/0/31	Not supported on this port
32	xe-0/0/32	Not supported on this port
33	xe-0/0/33	Not supported on this port
34	xe-0/0/34	Not supported on this port
35	xe-0/0/35	Not supported on this port
36	xe-0/0/36	Not supported on this port
37	xe-0/0/37	Not supported on this port
38	xe-0/0/38	Not supported on this port
39	xe-0/0/39	Not supported on this port
40	xe-0/0/40	Not supported on this port
41	xe-0/0/41	Not supported on this port
42	xe-0/0/42	Not supported on this port
43	xe-0/0/43	Not supported on this port
44	xe-0/0/44	Not supported on this port
45	xe-0/0/45	Not supported on this port
46	xe-0/0/46	Not supported on this port
47	xe-0/0/47	Not supported on this port

Table 10: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running Enhanced Layer 2 Software (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 0)
48	xe-0/0/48:0	et-0/0/48
	xe-0/0/48:1	
	xe-0/0/48:2	
	xe-0/0/48:3	
49	xe-0/0/49:0	et-0/0/49
	xe-0/0/49:1	
	xe-0/0/49:2	
	xe-0/0/49:3	
50	xe-0/0/50:0	et-0/0/50
	xe-0/0/50:1	
	xe-0/0/50:2	
	xe-0/0/50:3	
51	xe-0/0/51:0	et-0/0/51
	xe-0/0/51:1	
	xe-0/0/51:2	
	xe-0/0/51:3	
52	xe-0/0/52:0	et-0/0/52
	xe-0/0/52:1	
	xe-0/0/52:2	
	xe-0/0/52:3	
53	xe-0/0/53:0	et-0/0/53
	xe-0/0/53:1	
	xe-0/0/53:2	
	xe-0/0/53:3	

Table 11: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running QFabric Software Package

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
0	xe-0/0/0	Not supported on this port	Not supported on this port
1	xe-0/0/1	Not supported on this port	Not supported on this port
2	xe-0/0/2	Not supported on this port	Not supported on this port
3	xe-0/0/3	Not supported on this port	Not supported on this port
4	xe-0/0/4	Not supported on this port	Not supported on this port
5	xe-0/0/5	Not supported on this port	Not supported on this port
6	xe-0/0/6	Not supported on this port	Not supported on this port
7	xe-0/0/7	Not supported on this port	Not supported on this port
8	xe-0/0/8	Not supported on this port	Not supported on this port
9	xe-0/0/9	Not supported on this port	Not supported on this port
10	xe-0/0/10	Not supported on this port	Not supported on this port
11	xe-0/0/11	Not supported on this port	Not supported on this port
12	xe-0/0/12	Not supported on this port	Not supported on this port
13	xe-0/0/13	Not supported on this port	Not supported on this port
14	xe-0/0/14	Not supported on this port	Not supported on this port
15	xe-0/0/15	Not supported on this port	Not supported on this port
16	xe-0/0/16	Not supported on this port	Not supported on this port
17	xe-0/0/17	Not supported on this port	Not supported on this port
18	xe-0/0/18	Not supported on this port	Not supported on this port
19	xe-0/0/19	Not supported on this port	Not supported on this port
20	xe-0/0/20	Not supported on this port	Not supported on this port
21	xe-0/0/21	Not supported on this port	Not supported on this port

Table 11: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
22	xe-0/0/22	Not supported on this port	Not supported on this port
23	xe-0/0/23	Not supported on this port	Not supported on this port
24	xe-0/0/24	Not supported on this port	Not supported on this port
25	xe-0/0/25	Not supported on this port	Not supported on this port
26	xe-0/0/26	Not supported on this port	Not supported on this port
27	xe-0/0/27	Not supported on this port	Not supported on this port
28	xe-0/0/28	Not supported on this port	Not supported on this port
29	xe-0/0/29	Not supported on this port	Not supported on this port
30	xe-0/0/30	Not supported on this port	Not supported on this port
31	xe-0/0/31	Not supported on this port	Not supported on this port
32	xe-0/0/32	Not supported on this port	Not supported on this port
33	xe-0/0/33	Not supported on this port	Not supported on this port
34	xe-0/0/34	Not supported on this port	Not supported on this port
35	xe-0/0/35	Not supported on this port	Not supported on this port
36	xe-0/0/36	Not supported on this port	Not supported on this port
37	xe-0/0/37	Not supported on this port	Not supported on this port
38	xe-0/0/38	Not supported on this port	Not supported on this port
39	xe-0/0/39	Not supported on this port	Not supported on this port
40	xe-0/0/40	Not supported on this port	Not supported on this port
41	xe-0/0/41	Not supported on this port	Not supported on this port
42	xe-0/0/42	Not supported on this port	Not supported on this port
43	xe-0/0/43	Not supported on this port	Not supported on this port

Table 11: Valid Port Ranges on QFX5100-48S and QFX5100-48T Switches Running QFabric Software Package (*continued*)

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
44	xe-0/0/44	Not supported on this port	Not supported on this port
45	xe-0/0/45	Not supported on this port	Not supported on this port
46	xe-0/0/46	Not supported on this port	Not supported on this port
47	xe-0/0/47	Not supported on this port	Not supported on this port
48	Not supported on this port	Not supported on this PIC	fte-0/1/0 <i>NOTE:</i> This interface is a fixed fte interface and cannot be changed to xle.
49	Not supported on this port	Not supported on this PIC	fte-0/1/1 <i>NOTE:</i> This interface is a fixed fte interface and cannot be changed to xle.
50	Not supported on this port	xle-0/1/2	fte-0/1/2 <i>NOTE:</i> By default, this interface is an fte interface but can be configured as an xle interface.
51	Not supported on this port	xle-0/1/3	fte-0/1/3 <i>NOTE:</i> By default, this interface is an fte interface but can be configured as an xle interface.
52	Not supported on this port	xle-0/1/4 <i>NOTE:</i> By default, this interface is an xle interface but can be configured as an fte interface.	fte-0/1/4
53	Not supported on this port	xle-0/1/5 <i>NOTE:</i> By default, this interface is an xle interface but can be configured as an fte interface.	fte-0/1/5

Supported System Modes



NOTE: There are restrictions on the ports you can channelize on the QFX5100-24Q and QFX5100-96S switches depending on the system mode you configure. If you try to channelize ports that are restricted, the configuration is ignored.

The following system modes are available on the QFX5100-24Q switch:

- Default mode
- Mode-104-port
- Flexi-PIC mode
- Non-oversubscribed mode

See [Table 12 on page 38](#) for more information regarding the supported system modes for your switch.

The following system modes are available on the QFX5100-96S switch:

- Default-mode
- Non-oversubscribed mode

See [Table 12 on page 38](#) for more information regarding the supported system modes for your switch.

Table 12: System Modes Supported on QFX5100 Switches Running Enhanced Layer 2 Software

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-48S and QFX5100-48T	Not supported	Not supported	Not supported	Not supported

Table 12: System Modes Supported on QFX5100 Switches Running Enhanced Layer 2 Software (*continued*)

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-24Q	<p>Supported</p> <p>You do not need to configure the switch to be in this mode. On PIC 0, you can channelize all 24 40-Gbps QSFP+ ports. On PIC 1 and PIC 2, the 40-Gbps QSFP+ ports in the expansion modules are supported but cannot be channelized. In this mode, you can have one of two port combinations: 32 40-Gbps QSFP+ ports, or 96 10-Gigabit Ethernet ports plus 8 40-Gbps QSFP+ ports.</p>	<p>Supported</p> <p>On PIC 0, all 24 40-Gbps QSFP+ ports are channelized by default, which provides 96 10-Gigabit Ethernet ports. 40-Gbps QSFP+ ports contained in an expansion module on PIC 1 are supported. On PIC 1, ports 0 and 2 are channelized by default, and ports 1 and 3 are disabled. If 40-Gbps QSFP+ ports contained in an expansion module are detected on PIC 2, they are ignored.</p>	<p>Supported</p> <p>On PIC 0, the first four ports (ports 0 through 3) cannot be channelized. 40-Gbps QSFP+ ports contained in expansion modules on PIC 1 and PIC 2 are supported but cannot be channelized.</p>	<p>Supported</p> <p>All 24 40-Gbps QSFP+ ports on PIC 0 can be channelized to 96 10-Gigabit Ethernet ports. 40-Gbps QSFP+ ports contained in the expansion modules on PIC 1 and PIC 2 are not supported and cannot be channelized. There is no packet loss for packets of any size in this mode.</p>
QFX5100-96S	<p>Supported</p> <p>You do not need to configure the switch to be in this mode. On PIC 0, all 96 10-Gigabit Ethernet ports are supported. You can only channelize the 40-Gbps QSFP+ interfaces to 10-Gigabit Ethernet interfaces on ports 96 and 100. When you channelize the interfaces on ports 96 and 100, ports 97, 98, 99, 101, 102 and 103 are disabled.</p>	<p>Not supported</p>	<p>Not supported</p>	<p>Supported</p> <p>On PIC 0, all 96 10-Gigabit Ethernet ports are supported. However, the eight 40-Gbps QSFP+ ports are not supported and cannot be channelized. There is no packet loss for packets of any size in this mode.</p>

- Related Documentation**
- [Interfaces Overview on page 3](#)
 - [Channelizing Interfaces on page 55](#)
 - [Configuring the System Mode on page 63](#)
 - [Understanding Interface Naming Conventions on page 5](#)
 - *Rear Panel of a QFX3500 Device*
 - *Front Panel of a QFX3600 Device*

Configuring the Interface Address

You assign an address to an interface by specifying the address when configuring the protocol family. For the **inet** or **inet6** family, configure the interface IP address. For the **iso** family, configure one or more addresses for the loopback interface. For the **ccc**, **ethernet-switching**, **tcc**, **mpls**, **tnp**, and **vpls** families, you never configure an address.



NOTE: The point-to-point (PPP) address is taken from the loopback interface address that has the primary attribute. When the loopback interface is configured as an unnumbered interface, it takes the primary address from the donor interface.

To assign an address to an interface, include the **address** statement:

```
address address {
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  preferred;
  primary;
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

In the **address** statement, specify the network address of the interface.

For each address, you can optionally configure one or more of the following:

- Broadcast address for the interface subnet—Specify this in the **broadcast** statement; this applies only to Ethernet interfaces, such as the management interface **fxp0**, **em0**, or **me0** the Fast Ethernet interface, and the Gigabit Ethernet interface.
- Address of the remote side of the connection (for point-to-point interfaces only)—Specify this in the **destination** statement.
- PPP properties to the remote end—Specify this in the **destination-profile** statement. You define the profile at the [edit access group-profile *name* **ppp**] hierarchy level (for point-to-point interfaces only).
- Whether the router or switch automatically generates the host number portion of interface addresses—The **eui-64** statement applies only to interfaces that carry IPv6 traffic, in which the prefix length of the address is 64 bits or less, and the low-order 64 bits of the address are zero. This option does not apply to the loopback interface (**lo0**).

because IPv6 addresses configured on the loopback interface must have a 128-bit prefix length.

- Whether this address is the preferred address—Each subnet on an interface has a preferred local address. If you configure more than one address on the same subnet, the preferred local address is chosen by default as the source address when you originate packets to destinations on the subnet.

By default, the preferred address is the lowest-numbered address on the subnet. To override the default and explicitly configure the preferred address, include the **preferred** statement when configuring the address.

- Whether this address is the primary address—Each interface has a primary local address. If an interface has more than one address, the primary local address is used by default as the source address when you send packets from an interface where the destination provides no information about the subnet (for example, some **ping** commands).

By default, the primary address on an interface is the lowest-numbered non-127 (in other words, non-loopback) preferred address on the interface. To override the default and explicitly configure the preferred address, include the **primary** statement when configuring the address.



NOTE: If you configure a duplicate IP address on an interface, even when the earlier interface with that IP address is disabled, a Warning message is added to the syslog and not displayed on the screen. Do not configure the same IP address of a disabled interface on another interface.

- [Configuring Interface IPv4 Addresses on page 41](#)
- [Configuring Interface IPv6 Addresses on page 44](#)

Configuring Interface IPv4 Addresses

You can configure router or switch interfaces with a 32-bit IP version 4 (IPv4) address and optionally with a destination prefix, sometimes called a *subnet mask*. An IPv4 address utilizes a 4-octet dotted decimal address syntax (for example, **192.16.1.1**). An IPv4 address with destination prefix utilizes a 4-octet dotted decimal address syntax with a destination prefix appended (for example, **192.16.1.1/30**).

To configure an IPv4 address on routers and switches running Junos OS, use the **edit interface *interface-name* unit *number* family inet address *a.b.c.d/nn*** statement at the **[edit interfaces]** hierarchy level.



NOTE: Juniper Networks routers and switches support /31 destination prefixes when used in point-to-point Ethernet configurations; however, they are not supported by many other devices, such as hosts, hubs, routers, or switches. You must determine if the peer system also supports /31 destination prefixes before configuration.

Operational Behavior of Interfaces When the Same IPv4 Address Is Assigned to Them

You can configure the same IPv4 address on multiple physical interfaces. When you assign the same IPv4 address to multiple physical interfaces, the operational behavior of those interfaces differs, depending on whether they are implicitly or explicitly point-to-point.



NOTE: By default, all interfaces are assumed to be point-to-point (PPP) interfaces. For all interfaces except aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet, you can explicitly configure an interface to be a point-to-point connection.



NOTE: If you configure the same IP address on multiple interfaces in the same routing instance, Junos OS uses only the first configuration. The remaining IP address configurations are ignored, leaving some interfaces without an assigned address. Interfaces without an assigned address cannot be used as a donor interface for an unnumbered Ethernet interface.

In the following example, the IP address configuration for interface xe-0/0/1.0 is ignored:

```
interfaces {
  xe-0/0/0 {
    unit 0 {
      family inet {
        address 192.168.1.1/24;
      }
    }
  }
  xe-0/0/1 {
    unit 0 {
      family inet {
        address 192.168.1.1/24;
      }
    }
  }
}
```

The following examples show the sample configuration of assigning the same IPv4 address to implicitly and explicitly point-to-point interfaces, and their corresponding **show interfaces terse** command outputs to see their operational status.

Configuring same IPv4 address on implicitly PPP interfaces:

```
[edit]
user@host# show
ge-0/1/0 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
```



```

    }
  }
}
ge-3/0/1 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
}

```

The sample output shown below for the above configuration reveals that only **ge-0/1/0.0** was assigned the same IPv4 address **200.1.1.1/24** and its **link** state was **up**, while **ge-3/0/1.0** was not assigned the IPv4 address, though its **link** state was **up**, which means that it will be operational only when it gets a unique IPv4 address other than **200.1.1.1/24**.

```

user@host> show interfaces terse ge*
Interface           Admin Link Proto  Local          Remote
      ge-0/1/0             up   up    inet
      ge-0/1/0.0           up   up    inet    200.1.1.1/24
                        multiservice
      ge-0/1/1             up   down
      ge-3/0/0             up   down
      ge-3/0/1             up   up
      ge-3/0/1.0           up   up    inet
                        multiservice

```

Configuring same IPv4 address on explicitly PPP interfaces:

```

[edit]
user@host# show
so-0/0/0 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
so-0/0/3 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
}

```

The sample output shown below for the above configuration reveals that both **so-0/0/0.0** and **so-0/0/3.0** were assigned the same IPv4 address **200.1.1.1/24** and that their **link** states were **down**, which means that to make them operational at least one of them will have to be configured with a unique IPv4 address other than **200.1.1.1/24**.

```

user@host> show interfaces terse so*
Interface           Admin Link Proto  Local          Remote
so-0/0/0             up   up
so-0/0/0.0           up   down inet    200.1.1.1/24
so-0/0/1             up   up
so-0/0/2             up   down

```

so-0/0/3	up	up	
so-0/0/3.0	up	down	inet 200.1.1.1/24
so-1/1/0	up	down	
so-1/1/1	up	down	
so-1/1/2	up	up	
so-1/1/3	up	up	
so-2/0/0	up	up	
so-2/0/1	up	up	
so-2/0/2	up	up	
so-2/0/3	up	down	

Configuring Interface IPv6 Addresses



NOTE: IPv6 is not currently supported for the QFX Series.

You represent IP version 6 (IPv6) addresses in hexadecimal notation using a colon-separated list of 16-bit values.

You assign a 128-bit IPv6 address to an interface by including the **address** statement:

```
address aaaa:bbbb:::zzzz/nn;
```



NOTE: You cannot configure a subnet zero IPv6 address because RFC 2461 reserves the subnet-zero address for anycast addresses, and Junos OS complies with the RFC.

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family inet6]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet6]

The double colon (::) represents all bits set to 0, as shown in the following example:

```
interfaces fe-0/0/1 {
  unit 0 {
    family inet6 {
      address fec0:1:1::2/64;
    }
  }
}
```



NOTE: You must manually configure the router or switch advertisement and advertise the default prefix for autoconfiguration to work on a specific interface.

Related Documentation

- [Configuring IPCP Options](#)
- [Configuring Default, Primary, and Preferred Addresses and Interfaces](#)

Configuring Gigabit and 10-Gigabit Ethernet Interfaces

Devices include a factory default configuration that:

- Enables all 10-Gigabit Ethernet network interfaces on the switch
- Sets a default port mode (access)
- Sets default link settings
- Specifies a logical unit (**unit 0**) and assigns it to **family ethernet-switching**
- Configures Storm Control on all 10-Gigabit Ethernet network interfaces
- Provides basic Rapid Spanning Tree Protocol (RSTP) and Link Layer Discovery Protocol (LLDP) configuration



NOTE: RSTP and LLDP are not supported on the OCX Series.

The **ether-options** statement enables you to modify the following options:

- **802.3ad**—Specify an aggregated Ethernet bundle for both Gigabit Ethernet and 10-Gigabit Ethernet interfaces.
- **autonegotiation**—Enable or disable autonegotiation of flow control, link mode, and speed for interfaces.
- **link-mode**—Specify **full-duplex**, **half-duplex**, or **automatic** for Gigabit Ethernet interfaces.
- **loopback**—Enable or disable a loopback interface for both Gigabit Ethernet and 10-Gigabit Ethernet interfaces.

To set **ether-options** for both Gigabit Ethernet and 10-Gigabit Ethernet interfaces:

```
[edit]
user@switch# set interfaces interface-name ether-options
```

This topic describes:

- [Configuring Port Mode on QFX5100-48S, QFX5100-48T, QFX5100-24Q, and EX4600 Switches on page 46](#)
- [Configuring the Link Settings for Gigabit Ethernet Interfaces on QFX5100-48S, QFX5100-96S, and EX4600 Switches on page 46](#)
- [Configuring Gigabit Ethernet Interfaces on QFX5100-48T Switches on page 47](#)
- [Configuring the Link Settings for 10-Gigabit Ethernet Interfaces on QFX5100-48S, QFX5100-24Q, QFX5100-96S, and EX4600 Switches on page 48](#)
- [Configuring the Link Settings for 10-Gigabit Ethernet Interfaces on QFX5100-48T Switches on page 48](#)
- [Configuring the IP Options on QFX5100-48S, QFX5100-48T, QFX5100-24Q, and EX4600 Switches on page 49](#)

Configuring Port Mode on QFX5100-48S, QFX5100-48T, QFX5100-24Q, and EX4600 Switches

If you are connecting a switch to other switches and to routers on the LAN, you need to assign the interface to a logical port and you need to configure the logical port as a trunk port.

To configure a Gigabit Ethernet or 10-Gigabit interface for trunk port mode on the original CLI:

```
[edit]
user@switch# set interfaces interface-name unit logical-unit-number family ethernet-switching
port-mode trunk
```

To configure a Gigabit Ethernet or 10-Gigabit interface for trunk port mode on the Enhanced Layer 2 software (ELS):

```
[edit]
user@switch# set interfaces interface-name unit logical-unit-number family ethernet-switching
interface-mode trunk
```

Configuring the Link Settings for Gigabit Ethernet Interfaces on QFX5100-48S, QFX5100-96S, and EX4600 Switches

Devices include a factory default configuration that enables Gigabit Ethernet interfaces with applicable link settings.

The following default configurations are available on Gigabit Ethernet interfaces:

- You cannot set the speed on these interfaces.
On QFX5100-48S and QFX5100-96S devices using 1-Gigabit Ethernet SFP interfaces, the speed is set to 1 Gbps by default and cannot be configured to operate in a different speed.
- Gigabit Ethernet interfaces operate in full-duplex mode.
- Autonegotiation is supported by default. Autonegotiation is enabled by default, and will autonegotiate the speed with the link partner. We recommend that you keep autonegotiation enabled for interfaces operating at 100M, 1G, and 10G.

If for some reason you have disabled autonegotiation, you can enable it by issuing the **set interfaces *name* ether-options auto-negotiate** command.

To disable autonegotiation, issue the **delete interfaces *name* ether-options auto-negotiate** command.



NOTE: Do not use the **set interfaces *name* ether-options no-auto-negotiate** command to remove the autonegotiation configuration.

Issue the **show interfaces *name* extensive** command to see if autonegotiation is enabled or disabled and the negotiated speed of the interface.

Configuring Gigabit Ethernet Interfaces on QFX5100-48T Switches

Devices include a factory default configuration that enables Gigabit Ethernet interfaces with applicable link settings.

The following default configurations are available on Gigabit Ethernet interfaces:

- Gigabit Ethernet interfaces operate in full-duplex mode.
- Autonegotiation is enabled by default, and will autonegotiate the speed with the link partner. We recommend that you keep autonegotiation enabled for interfaces operating at 100M, 1G, and 10G.

To disable autonegotiation, issue the **delete interfaces *name* ether-options auto-negotiate** command.



NOTE: Do not use the **set interfaces *name* ether-options no-auto-negotiate** command to remove the autonegotiation configuration.

You can reenable autonegotiation it by issuing the **set interfaces *name* ether-options auto-negotiate** command.

Issue the **show interfaces *name* extensive** command to see if autonegotiation is enabled or disabled and the negotiated speed of the interface.

Configuring the Link Settings for 10-Gigabit Ethernet Interfaces on QFX5100-48S, QFX5100-24Q, QFX5100-96S, and EX4600 Switches

The following default configurations are available on 10-Gigabit Ethernet interfaces:

- All the 10-Gigabit Ethernet interfaces are set to **auto-negotiation**.
- Flow control for 10-Gigabit Ethernet interfaces is set to **enabled** by default. You can disable flow control by specifying the **no-flow-control** option.
- The speed cannot be configured.

On QFX5100-48S, QFX5100-96S, and QFX5100-24Q devices using 10-Gigabit Ethernet SFP interfaces, the speed is set to 10 Gbps by default and cannot be configured to operate in a different speed.

- 10-Gigabit Ethernet interfaces operate in full-duplex mode by default.
- Autonegotiation is enabled by default, and will autonegotiate the speed with the link partner. We recommend that you keep autonegotiation enabled for interfaces operating at 100M, 1G, and 10G.

If for some reason you have disabled autonegotiation, you can enable it by issuing the **set interfaces *name* ether-options auto-negotiate** command.

To disable autonegotiation, issue the **delete interfaces *name* ether-options auto-negotiate** command.



NOTE: Do not use the **set interfaces *name* ether-options no-auto-negotiate** command to remove the autonegotiation configuration.

Issue the **show interfaces *name* extensive** command to see if autonegotiation is enabled or disabled and the negotiated speed of the interface.

Configuring the Link Settings for 10-Gigabit Ethernet Interfaces on QFX5100-48T Switches

The following default configurations are available on 10-Gigabit Ethernet interfaces:

- All the 10-Gigabit Ethernet interfaces are set to **auto-negotiation**.
- Flow control for 10-Gigabit Ethernet interfaces is set to **enabled** by default. You can disable flow control by specifying the **no-flow-control** option.
- The speed cannot be configured.
- 10-Gigabit Ethernet interfaces operate in full-duplex mode by default.
- Autonegotiation is enabled by default, and will autonegotiate the speed with the link partner. We recommend that you keep autonegotiation enabled for interfaces operating at 100M, 1G, and 10G.



NOTE: In Junos OS Release 14.1X53-D35 on QFX5100-48T-6Q devices using 10-Gigabit Ethernet Copper interfaces, autonegotiation is disabled by default on the copper ports, and the interfaces operate at a speed of 100M. You can, however, enable auto-negotiation by issuing the `set interface name ether-options auto-negotiation` command on the interface for which you want to change the interface speed. With autonegotiation enabled, the interface auto-detects the speed in which to operate.

If for some reason you have disabled autonegotiation, you can enable it by issuing the `set interfaces name ether-options auto-negotiate` command.

Issue the `show interfaces name extensive` command to see if autonegotiation is enabled or disabled and the negotiated speed of the interface.

Configuring the IP Options on QFX5100-48S, QFX5100-48T, QFX5100-24Q, and EX4600 Switches

To specify an IP address for the logical unit:

[edit]

user@switch# `set interfaces interface-name unit logical-unit-number family inet address ip-address`

Related Documentation

- [Monitoring Interface Status and Traffic on page 65](#)
- [show interfaces xe on page 391](#)
- `show interfaces ge-`
- [speed on page 228](#)
- [Understanding Interface Naming Conventions on page 5](#)

Configuring Short Reach Mode

You can enable short-reach mode for individual as well as a range of copper-based 10-Gigabit Ethernet interfaces using short cable lengths (less than 10m) on the QFX5100-48T switch. Short-reach mode reduces power consumption up to 5W on these interfaces.

1. To enable short-reach mode on an individual interface, issue the following command:

```
[edit chassis]
user@switch# set fpc fpc-slot pic pic-slot port port-number short-reach-mode enable
```

For example, to enable short-reach mode on port 0 on PIC 0, issue the following command:

```
[edit chassis]
user@switch# set fpc 0 pic 0 port 0 short-reach-mode enable
```

2. To enable short-reach mode on a range of interfaces, issue the following command:

```
[edit chassis]
user@switch# set fpc fpc-slot pic pic-slot port-range port-range-low port-range-high
short-reach-mode enable
```

For example, to enable short-reach mode on a range of interfaces between port 0 and port 47 on PIC 0, issue the following command:

```
[edit chassis]
user@switch# set fpc 0 pic 0 port-range 0 47 short-reach-mode enable
```

3. To disable short-reach mode on an individual interface, issue the following command:

```
[edit chassis]
user@switch# set fpc fpc-slot pic pic-slot port port-number short-reach-mode disable
```

For example, to disable short-reach mode on port 0 on PIC 0, issue the following command:

```
[edit chassis]
user@switch# set fpc 0 pic 0 port 0 short-reach-mode disable
```

4. To disable short-reach mode on a range of interfaces, issue the following command:

```
[edit chassis]
user@switch# set fpc fpc-slot pic pic-slot port-range port-range-low port-range-high
short-reach-mode disable
```

For example, to disable short-reach mode on a range of interfaces between port 0 and port 47 on PIC 0, issue the following command:

```
[edit chassis]
user@switch# set fpc 0 pic 0 port-range 0 47 short-reach-mode disable
```

Related Documentation • [short-reach-mode on page 226](#)

Configuring Ethernet Loopback Capability

To place an interface in loopback mode, include the **loopback** statement:

```
loopback;
```


To return to the default—that is, to disable loopback mode—delete the **loopback** statement from the configuration:

```
[edit]
user@switch# delete interfaces interface-name ether-options loopback
```

To explicitly disable loopback mode, include the **no-loopback** statement:

```
no-loopback;
```

You can include the **loopback** and **no-loopback** statements at the following hierarchy levels:

- [edit interfaces *interface-name* aggregated-ether-options]
- [edit interfaces *interface-name* ether-options]

**Related
Documentation**

- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces](#)

[Configuring an LPM Table With Junos OS Release 13.2X51-D10](#)

In addition to choosing a profile, you can further optimize memory allocation for LPM table entries by configuring how many IPv6 addresses with prefixes in the range /65 through /127 you want to store. If you want to use more than 16 IPv6 addresses with prefixes in this range, you must enter and commit the following statement:

[edit]

```
user@switch# set chassis forwarding-options profile-name num-65-127-prefix value
```

in which *value* can be a value in the range 1 through 128. Each increment adds support for 16 IPv6 addresses with prefixes between /65 and /127, for a maximum of 2048 such addresses (16 x 128 = 2048). The system supports 16 of these addresses by default, so to increase the number of supported addresses, you must enter a value of 2 or greater. For example, if you enter 2, the system will support 32 IPv6 addresses with prefixes in the range /65 through /127.



NOTE: When you configure the `num-65-127-prefix` value, all the data interfaces on the switch restart. The management interfaces are unaffected.

The LPM table is shared, and each increment that you add for IPv6 addresses with prefixes in the range /65 through /127 reduces the number of forwarding table entries that are available for IPv4 addresses and IPv6 addresses with prefixes less than /65.

[Table 13 on page 53](#) provides examples of valid combinations that the LPM table can store, also using the **l2-profile-one** profile. Once again, each row in the table represents a case in which the table is full and cannot accommodate any more entries.

Table 13: LPM Table Combinations Using l2-profile-one with Junos OS 1Release 3.2X51-D10

IPv4 entries	IPv6 Entries (prefix <= 64)	IPv6 Entries (prefix >= 65)	num-65-127-prefix
16K	0K	16	1 (default)
0K	8K	16	1 (default)
8K	4K	16	1 (default)
4K	4K	1K	64
2K	5K	1K	64
0K	6K	1K	64
4K	2K	2K	128
2K	3K	2K	128
0K	4K	2K	128

[Table 14 on page 54](#) provides examples of valid combinations that the LPM table can store when you use the **lpm-profile** profile. As before, each row represents a case in which the table is full and cannot accommodate any more entries.

Table 14: Example LPM Table Combinations Using lpm-profile With Junos OS 13.2X51-D10

IPv4 entries	IPv6 Entries (prefix <= 64)	IPv6 Entries (prefix >= 65)	num-65-127-prefix
128K	0K	16	1 (default)
0K	8K	16	1 (default)
8K	4K	16	1 (default)
4K	4K	1K	64
2K	5K	1K	64
0K	6K	1K	64
4K	2K	2K	128
2K	3K	2K	128
0K	4K	2K	128

**Related
Documentation**

- *Understanding the Unified Forwarding Table*
- *Configuring the Unified Forwarding Table*

Channelizing Interfaces

The QFX3500, QFX3600, QFX5100, and EX4600 switches provide 40-Gbps QSFP+ ports that can be channelized. Channelization allows you to configure 40-Gbps QSFP+ ports to operate as four 10-Gigabit Ethernet (*xe*) interfaces. You can use QSFP+ to four SFP+ breakout cables or QSFP+ transceivers with fiber breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches. By default, the four 40-Gbps QSFP+ ports operate as 40-Gigabit Ethernet (*et*) ports. When an *et* port is channelized to four *xe* ports, a colon is used to signify the four separate channels. For example, on a QFX3500 standalone switch with port 2 on PIC 1 configured as four 10-Gigabit Ethernet ports, the interface names are *xe-0/1/2:0*, *xe-0/1/2:1*, *xe-0/1/2:2*, and *xe-0/1/2:3*.

By default, the 40-Gbps QSFP+ ports on EX4600 and QFX5100 switches are channelized automatically (auto-channelized) if any of the four channels on a 40-Gbps QSFP+ port receive data, unless you have configured channelization either at the chassis level or at the port level. Auto-channelization is not supported on interfaces contained in expansion modules or on Virtual Chassis ports.

You can disable auto-channelization by including the **disable-auto-speed-detection** statement at the **[edit chassis fpc slot-number pic pic-number (port port-number | port-range port-range-low port-range-high) channel-speed]** hierarchy.

There are restrictions on the ports you can channelize on the QFX5100-24Q and QFX5100-96S switches, depending on the system mode you enable. If you try to channelize ports that are restricted, the configuration is ignored. See [“Configuring the System Mode” on page 63](#) for more information.



CAUTION: The Packet Forwarding Engine on the switch is restarted when you configure or delete a port. As a result, you might experience packet loss on the device. When you channelize a 40-Gbps QSFP+ port on the master of a Virtual Chassis, traffic might be disrupted on the master as well as on the line card members, and a mastership switchover occurs.

The following steps describe how to configure a block of ports or an individual port to operate as 10-Gigabit Ethernet ports.

1. To configure a block of 40-Gigabit Ethernet (*et*) ports to operate as 10-Gigabit Ethernet ports, specify a port range and channel speed:

```
[edit chassis fpc fpc-slot pic pic-slot]
user@switch# set port-range port-range-low port-range-high channel-speed speed
```

For example, to configure ports 0 through 3 on PIC 1 to operate as 10-Gigabit Ethernet ports:

```
[edit chassis fpc 0 pic 1]
user@switch# set port-range 0 3 channel-speed 10g
```

2. To configure an individual 40-Gigabit Ethernet (*et*) port to operate as 10-Gigabit Ethernet (*xe*) ports, specify a port number and channel speed:

```
[edit chassis fpc 0 pic 0]
user@switch# set port port-number channel-speed speed
```

For example, to configure port 2 to operate as 10-Gigabit Ethernet ports:

```
[edit chassis fpc 0 pic 0]
user@switch# set port 2 channel-speed 10g
```

3. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

4. To return a range of ports to the default 40-Gigabit Ethernet configuration, delete the 10g statement:

```
[edit chassis fpc 0 pic 1]
user@switch# delete port-range port-range-low port-range-high channel-speed speed
```

For example, to return ports 0 through 3 to the default 40-Gigabit Ethernet configuration:

```
[edit chassis fpc 0 pic 1]
user@switch# delete port-range 0 3 channel-speed 10g
```

5. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

6. To return a port to the default 40-Gigabit Ethernet configuration, delete the 10g statement:

```
[edit chassis fpc 0 pic 0]
user@switch# delete port port-number channel-speed speed
```

For example, to return port 2 to the default 40-Gigabit Ethernet configuration:

```
[edit chassis fpc 0 pic 0]
user@switch# delete port 2 channel-speed 10g
```

7. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

The following steps describe how to disable auto-channelization at the port level.

1. To disable auto-channelization at the port level, include the **disable** statement:

```
[edit]
user@switch# set chassis fpc slot-number pic pic-number (port port-number |
  port-range port-range-low port-range-high) channel-speed
  disable-auto-speed-detection
```

For example, to disable auto-channelization for one port:

```
[edit]
user@switch# set chassis fpc 0 pic 0 port 2 channel-speed
disable-auto-speed-detection
```

For example, to disable auto-channelization for a range of ports:

```
[edit]
user@switch# set chassis fpc 0 pic 0 port-range 2 4 channel-speed
disable-auto-speed-detection
```

2. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

- Related Documentation**
- [Configuring the System Mode on page 63](#)
 - [channel-speed on page 171](#)
 - [fpc on page 196](#)
 - [pic on page 224](#)

Configuring the Port Type on QFX3600 Standalone Switches

The QFX3600 standalone switch provides 16 40-Gbps QSFP+ ports. By default, all 16 ports operate as 40-Gigabit Ethernet (xle) ports. Optionally, you can choose to configure the 40-Gbps ports to operate as four 10-Gigabit Ethernet (xe) ports. You can use QSFP+ to four SFP+ breakout cables or QSFP+ transceivers with fiber breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches. You can configure up to 64 10-Gigabit Ethernet ports on ports **Q0** through **Q15**.

This topic explains how to configure the port type on QFX3600 standalone switches.



CAUTION: The Packet Forwarding Engine on the QFX3600 standalone switch is restarted when you commit the port type configuration changes. As a result, you might experience packet loss on the switch.

The following message may be displayed in the system log file when the Packet Forwarding Engine is restarted. You can ignore this message.

Pipe write error: Broken pipe

flush operation failed

The following steps describe how to configure either a block of ports or an individual port to operate as 10-Gigabit Ethernet (xe) ports, as well as how to delete a 10-Gigabit Ethernet (xe) port configuration.



NOTE: When you delete the xe port type configuration for an individual port or a block of ports, the ports return to operating as 40-Gigabit Ethernet (xle) ports.

1. To configure a block of ports to operate as 10-Gigabit Ethernet (xe) ports, specify a port range:

```
[edit chassis fpc 0 pic 0]
user@switch# set xe port-range port-range-low port-range-high
```

For example, to configure ports Q4 through Q7 to operate as 10-Gigabit Ethernet ports:

```
[edit chassis fpc 0 pic 0]
user@switch# set xe port-range 4 7
```

2. To configure an individual port to operate as a 10-Gigabit Ethernet (xe) port, specify a port number:

```
[edit chassis fpc 0 pic 0]
user@switch# set xe port port-number
```

For example, to configure port Q4 to operate as a 10-Gigabit Ethernet port:

```
[edit chassis fpc 0 pic 0]
user@switch# set xe port 4
```

3. Review your configuration and issue the **commit** command.

```
[edit chassis fpc 0 pic 0]
user@switch# commit
commit complete
```

4. To delete the 10-Gigabit Ethernet (xe) port configuration for a block of ports (and return to the default 40-Gigabit Ethernet configuration), specify a port range:

```
[edit chassis fpc 0 pic 0]
user@switch# delete xe port-range port-range-low port-range-high
```

For example, to delete the 10-Gigabit Ethernet port configuration for ports Q4 through Q7:

```
[edit chassis fpc 0 pic 0]
user@switch# delete xe port-range 4 7
```

5. To delete the 10-Gigabit Ethernet (xe) port configuration for an individual port (and return to the default 40-Gigabit Ethernet configuration), specify a port number:

```
[edit chassis fpc 0 pic 0]
user@switch# delete xe port port-number
```

For example, to delete the 10-Gigabit Ethernet port configuration for port Q4:

```
[edit chassis fpc 0 pic 0]
user@switch# delete xe port 4
```


- Related Documentation**
- [Understanding Interface Naming Conventions on page 5](#)
 - *pic*

Configuring the QSFP+ Port Type on QFX3500 Standalone Switches

By default, the four 40-Gbps QSFP+ ports are configured to operate as 10-Gigabit Ethernet (xe) ports. You can use QSFP+ to four SFP+ breakout cables or QSFP+ transceivers with fiber breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches. You can, however, configure the four 40-Gbps QSFP+ ports to operate as 40-Gigabit Ethernet (xle) ports.



NOTE: Port Q0 supports only three (not the typical four) 10-Gigabit Ethernet ports, because one port is reserved.



CAUTION: The Packet Forwarding Engine on the QFX3500 standalone switch is restarted when you commit port type configuration changes (for example, configuring or deleting an xle port). As a result, you might experience packet loss on the device.

The following steps describe how to configure either a block of ports or an individual port to operate as 40-Gigabit Ethernet (xle) ports, as well as how to delete a 40-Gigabit Ethernet (xle) configuration.



NOTE: When you delete an xle block of ports or individual port, the ports return to operating as 10-Gigabit Ethernet ports.

1. To configure a block of ports to operate as 40-Gigabit Ethernet (xle) ports, specify a port range:

```
[edit chassis fpc 0 pic 2]
user@switch# set xle port-range port-range-low port-range-high
```

For example, to configure ports Q0 through Q3 to operate as 40-Gigabit Ethernet ports:

```
[edit chassis fpc 0 pic 2]
user@switch# set xle port-range 0 3
```

2. To configure an individual port to operate as a 40-Gigabit Ethernet (xle) port, specify a port number:

```
[edit chassis fpc 0 pic 2]
user@switch# set xle port port-number
```

For example, to configure port Q2 to operate as a 40-Gigabit Ethernet port:

```
[edit chassis fpc 0 pic 2]
user@switch# set xle port 2
```

3. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

4. To delete a block of ports configured as 40-Gigabit Ethernet (xle) ports (and return to the default 10-Gigabit Ethernet configuration), specify a port range:

```
[edit chassis fpc 0 pic 2]
user@switch# delete xle port-range port-range-low port-range-high
```

For example, to delete the 40-Gigabit Ethernet (xle) port configuration for ports Q0 through Q3 (and return to the default 10-Gigabit Ethernet configuration):

```
[edit chassis fpc 0 pic 2]
user@switch# delete xle port-range 0 3
```

5. To delete an individual port configured as a 40-Gigabit Ethernet (xle) port (and return to the default 10-Gigabit Ethernet configuration), specify an individual port:

```
[edit chassis fpc 0 pic 2]
user@switch# delete xle port port-number
```

For example, to delete the 40-Gigabit Ethernet (xle) port configuration for port Q2 (and return to the default 10-Gigabit Ethernet configuration):

```
[edit chassis fpc 0 pic 2]
user@switch# delete xle port 2
```

6. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

- Related Documentation**
- [Understanding Interface Naming Conventions on page 5](#)
 - *pic*

Configuring the QSFP+ Port Type on QFX5100 Devices

You can convert default 40-Gigabit Ethernet data plane uplink interfaces (fte) to 40-Gigabit Ethernet access interfaces (xle) ports, and default 40-Gigabit Ethernet interfaces (xle) to 40-Gigabit Ethernet data plane uplink interfaces (fte). Ports Q0 and Q1 are fixed fte ports and cannot be changed. Ports Q2 and Q3 are fte ports by default but can be changed to xle ports. Ports Q4 and Q5 are xle ports by default but can be changed to fte ports.



NOTE: On QFX5100-24Q switches, ports Q1 through Q7 are fixed FTE ports and cannot be changed.



NOTE: You must configure xle ports in pairs, not individually, otherwise functionality is not guaranteed.



CAUTION: The Packet Forwarding Engine on a QFX5100 switch is restarted when you commit port type configuration changes (for example, configuring or deleting an fte or xle port). As a result, you might experience packet loss on the device.

The following steps describe how to configure either a block of ports or an individual port, as well as how to delete these configurations.

1. To configure a block of ports to operate as 40-Gigabit Ethernet interfaces (xle) , specify a port range:

```
[edit chassis node-group name node-device name pic 1]
user@switch# set xle port-range port-range-low port-range-high
```

For example, to configure ports Q4 through Q5 to operate as 40-Gigabit Ethernet interfaces (xle):

```
[edit chassis node-group name node-device name pic 1]
user@switch# set xle port-range 4 5
```

2. To configure a block of ports to operate as 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port range:

```
[edit chassis node-group name node-device name pic 1]
user@switch# set fte port-range port-range-low port-range-high
```

For example, to configure ports Q4 through Q5 to operate as 40-Gigabit Ethernet data plane uplink interfaces (fte):

```
[edit chassis node-group name node-device name pic 1]
user@switch# set fte port-range 4 5
```

3. To configure an individual port to operate as a 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port number:

```
[edit chassis node-group name node-device name pic 1]
user@switch# set fte port port-number
```

For example, to configure port Q4 to operate as a 40-Gigabit Ethernet data plane uplink interfaces (fte):

```
[edit chassis node-group name node-device name pic 1]
user@switch# set fte port 4
```

4. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

5. To delete a block of ports configured as 40-Gigabit Ethernet (xle) ports, specify a port range:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete xle port-range port-range-low port-range-high
```

For example, to delete the 40-Gigabit Ethernet access interface (xle) port configuration for ports Q2 through Q3:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete xle port-range 2 3
```

6. To delete an individual port configured as a 40-Gigabit Ethernet (xle) interface:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete xle port port-number
```

For example, to delete the 40-Gigabit Ethernet interface (xle) for port Q2:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete xle port 2
```

7. To delete a block of ports configured as 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port range:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete fte port-range port-range-low port-range-high
```

For example, to delete the block of ports configured as 40-Gigabit Ethernet data plane uplink interfaces (fte) for ports Q4 through Q5:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete fte port-range 4 5
```

8. To delete an individual port configured as a 40-Gigabit Ethernet data plane uplink interfaces (fte):

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete fte port port-number
```

For example, to delete the 40-Gigabit Ethernet data plane uplink interfaces (fte) for port Q4:

```
[edit chassis node-group name node-device name pic 1]
user@switch# delete fte port 4
```

9. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

- Related Documentation
- [Understanding Interface Naming Conventions on page 5](#)
 - [Understanding Port Ranges and System Modes on page 14](#)
 - *pic*

Configuring the System Mode

You can configure different system modes to achieve varying levels of port density on the QFX5100-24Q and QFX5100-96S switches. Depending on the system mode you configure, there are restrictions on which ports you can channelize. If you channelize ports that are restricted, the configuration is ignored. By default, all QSFP+ interfaces are auto-channelized. Auto-channelization is not supported on interfaces contained in expansion modules or on Virtual Chassis ports. To disable auto-channelization, see “Channelizing Interfaces” on page 55 for more information.



NOTE: When you request the system mode change, we recommend that you reboot the switch for the system mode to take effect.



CAUTION: The Packet Forwarding Engine on the switch is restarted when you issue system mode changes. As a result, you might experience packet loss on the switch.

See [Table 15 on page 63](#), [Table 16 on page 64](#), and [Table 17 on page 65](#) for more information regarding the supported system modes for your switch.

Table 15: System Modes Supported on QFX5100 Switches with QFX-EM-4Q or QFX-PFA-4Q Expansion Modules Installed

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-48S	Not supported	Not supported	Not supported	Not supported

Table 15: System Modes Supported on QFX5100 Switches with QFX-EM-4Q or QFX-PFA-4Q Expansion Modules Installed (*continued*)

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-24Q	<p>Supported</p> <p>You do not need to configure the switch to be in this mode. On PIC 0, you can channelize all 24 40-Gbps QSFP+ ports. On PIC 1 and PIC 2, the 40-Gbps QSFP+ ports in the expansion modules are supported but cannot be channelized. In this mode, you can have one of two port combinations: 32 40-Gbps QSFP+ ports, or 96 10-Gigabit Ethernet ports plus 8 40-Gbps QSFP+ ports.</p>	<p>Supported</p> <p>On PIC 0, all 24 40-Gbps QSFP+ ports are channelized by default, which provides 96 10-Gigabit Ethernet ports. 40-Gbps QSFP+ ports contained in an expansion module on PIC 1 are supported. On PIC 1, ports 0 and 2 are channelized by default, and ports 1 and 3 are disabled. If 40-Gbps QSFP+ ports contained in an expansion module are detected on PIC 2, they are ignored.</p>	<p>Supported</p> <p>On PIC 0, the first four ports (ports 0 through 3) cannot be channelized. 40-Gbps QSFP+ ports contained in expansion modules on PIC 1 and PIC 2 are supported but cannot be channelized.</p>	<p>Supported</p> <p>All 24 40-Gbps QSFP+ ports on PIC 0 can be channelized to 96 10-Gigabit Ethernet ports. 40-Gbps QSFP+ ports contained in the expansion modules on PIC 1 and PIC 2 are not supported and cannot be channelized. There is no packet loss for packets of any size in this mode.</p>
QFX5100-96S	<p>Supported</p> <p>You do not need to configure the switch to be in this mode. On PIC 0, all 96 10-Gigabit Ethernet ports are supported. You can only channelize the 40-Gbps QSFP+ interfaces to 10-Gigabit Ethernet interfaces on ports 96 and 100. When you channelize the interfaces on ports 96 and 100, ports 97, 98, 99, 101, 102 and 103 are disabled.</p>	<p>Not supported</p>	<p>Not supported</p>	<p>Supported</p> <p>On PIC 0, all 96 10-Gigabit Ethernet ports are supported. However, the eight 40-Gbps QSFP+ ports are not supported and cannot be channelized. There is no packet loss for packets of any size in this mode.</p>

Table 16: System Modes Supported on QFX5100-24Q switches with the EX4600-8F Expansion Module Installed

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-24Q	<p>Not supported</p>	<p>Not supported</p>	<p>Supported</p> <p>On PIC 0, you cannot channelize ports 0 through 3.</p>	<p>Not supported</p> <p>Expansion modules cannot be installed in PICs 1 and 2.</p>

Table 17: System Modes Supported on QFX5100-24Q Switches with EX4600-8F and QFX-EM-4Q Expansion Modules Installed

	Default-mode	Mode-104port	Flexi-pic-mode	Non-oversubscribed-mode
QFX5100-24Q	Only the QFX-EM-4Q module is supported.	<p>Only the QFX-EM-4Q module is supported.</p> <p>If you have installed the EX4600-8F expansion module on PIC 1, and you have installed the QFX-EM-4Q module on PIC 2, The 40-Gbps QSFP+ ports in both PIC slots are not supported.</p> <p>If you have installed the EX4600-8F expansion module on PIC 2, and you have installed the QFX-EM-4Q module on PIC 1, only the QFX-EM-4Q module on PIC 1 is supported.</p>	<p>Supported</p> <p>On PIC 0, you cannot channelize ports 0 through 3.</p>	<p>Not supported</p> <p>You cannot install the QFX-EM-4Q or EX4600-8F modules on PICs 1 and 2.</p>

The following steps describe how to change the system mode.

1. To change the system mode, issue the following operational command:

```
{master:0}
root> request chassis system-mode mode
```

For example:

```
{master:0}
root> request chassis system-mode non-oversubscribed-mode
```

2. To return to the default mode (default-mode), issue the following operational command:

```
{master:0}
root> request chassis system-mode default-mode
```

3. To see which system mode is configured, issue the following operational command:

```
{master:0}
root> show chassis system-mode
```

Related Documentation

- [Understanding Interface Naming Conventions on page 5](#)
- [Understanding Port Ranges and System Modes on page 14](#)
- [Channelizing Interfaces on page 55](#)

Monitoring Interface Status and Traffic

Purpose View interface status to monitor interface bandwidth utilization and traffic statistics.

- Action**
- To view interface status for all the interfaces, enter [show interfaces xe](#).
 - To view status and statistics for a specific interface, enter [show interfaces xe interface-name](#).
 - To view status and traffic statistics for all interfaces, enter either [show interfaces xe detail](#) or [show interfaces xe extensive](#).

Meaning For details about output from the CLI commands, see [show interfaces xe](#).

Troubleshooting Network Interfaces

The interface on the port in which an SFP or SFP+ transceiver is installed in an SFP or SFP+ module is down

Problem **Description:** The switch has an SFP or SFP+ module installed. The interface on the port in which an SFP or SFP+ transceiver is installed is down.

Symptoms: When you check the status with the CLI command [show interfaces interface-name](#), the disabled port is not listed.

Cause By default, the SFP or SFP+ module operates in the 10-Gigabit Ethernet mode and supports only SFP or SFP+ transceivers. The operating mode for the module is incorrectly set.

Solution Only SFP or SFP+ transceivers can be installed in SFP or SFP+ modules. You must configure the operating mode of the SFP or SFP+ module to match the type of transceiver you want to use. For SFP+ transceivers, configure 10-Gigabit Ethernet operating mode.

PART 2

Ethernet OAM Link Fault Management

- [Understanding Ethernet OAM Link Fault Management on page 69](#)

CHAPTER 2

Understanding Ethernet OAM Link Fault Management

- [Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 69](#)
- [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)
- [Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72](#)

Understanding Ethernet OAM Link Fault Management for an EX Series Switch

Juniper Networks Junos operating system (Junos OS) for Juniper Networks EX Series Ethernet Switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters. The IEEE 802.3ah standard meets the requirement for OAM capabilities even as Ethernet moves from being solely an enterprise technology to a WAN and access technology, and the standard remains backward-compatible with existing Ethernet technology.

Ethernet OAM provides the tools that network management software and network managers can use to determine how a network of Ethernet links is functioning. Ethernet OAM should:

- Rely only on the media access control (MAC) address or virtual LAN identifier for troubleshooting.
- Work independently of the actual Ethernet transport and function over physical Ethernet ports or a virtual service such as pseudowire.
- Isolate faults over a flat (or single operator) network architecture or nested or hierarchical (or multiprovider) networks.

The following OAM LFM features are supported on EX Series switches:

- Discovery and Link Monitoring

The discovery process is triggered automatically when OAM is enabled on the interface. The discovery process permits Ethernet interfaces to discover and monitor the peer

on the link if it also supports the IEEE 802.3ah standard. You can specify the discovery mode used for IEEE 802.3ah OAM support. In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality. In passive mode, the peer initiates the discovery process. After the discovery process has been initiated, both sides participate in discovery. The switch performs link monitoring by sending periodic OAM protocol data units (PDUs) to advertise OAM mode, configuration, and capabilities.

You can specify the number of OAM PDUs that an interface can miss before the link between peers is considered down.

- Remote Fault Detection

Remote fault detection uses flags and events. Flags are used to convey the following: Link Fault means a loss of signal, Dying Gasp means an unrecoverable condition such as a power failure, and Critical Event means an unspecified vendor-specific critical event. You can specify the periodic OAM PDU sending interval for fault detection. The EX Series switch uses the Event Notification OAM PDU to notify the remote OAM device when a problem is detected. You can specify the action to be taken by the system when the configured link-fault event occurs.

- Remote Loopback Mode

Remote loopback mode ensures link quality between the switch and a remote peer during installation or troubleshooting. In this mode, when the interface receives a frame that is not an OAM PDU or a pause frame, it sends it back on the same interface on which it was received. The link appears to be in the active state. You can use the returned loopback acknowledgement to test delay, jitter, and throughput.

Junos OS can place a remote DTE into loopback mode (if remote loopback mode is supported by the remote DTE). When you place a remote DTE into loopback mode, the interface receives the remote loopback request and puts the interface into remote loopback mode. When the interface is in remote loopback mode, all frames except OAM PDUs are looped back without any changes made to the frames. OAM PDUs continue to be sent and processed.

**Related
Documentation**

- [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)
- [Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72](#)

Configuring Ethernet OAM Link Fault Management (CLI Procedure)

Ethernet OAM link fault management (LFM) can be used for physical link-level fault detection and management. The IEEE 802.3ah LFM works across point-to-point Ethernet links either directly or through repeaters.

To configure Ethernet OAM LFM using the CLI:

1. Enable IEEE 802.3ah OAM support on an interface:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name
```



NOTE: You can configure Ethernet OAM LFM on aggregated interfaces.



NOTE: The remaining steps are optional. You can choose which of these features to configure for Ethernet OAM LFM on your switch.

2. Specify whether the interface or the peer initiates the discovery process by configuring the link discovery mode to **active** or **passive** (**active** = interface initiates; **passive** = peer initiates):

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name link-discovery active
```

3. Configure a periodic OAM PDU-sending interval (in milliseconds) for fault detection:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name pdu-interval interval
```

4. Specify the number of OAM PDUs that an interface can miss before the link between peers is considered down:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name pdu-threshold threshold-value
```

5. Configure event threshold values on an interface for the local errors that trigger the sending of link event TLVs:

- Set the threshold value (in seconds) for sending frame-error events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-error count
```

- Set the threshold value (in seconds) for sending frame-period events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-period count
```

- Set the threshold value (in seconds) for sending frame-period-summary events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-period-summary count
```

- Set the threshold value (in seconds) for sending symbol-period events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds symbol-period count
```



NOTE: You can disable the sending of link event TLVs.

To disable the sending of link event TLVs:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name negotiation-options no-allow-link-events
```

6. Create an action profile to define event fault flags and thresholds to be taken when the link fault event occurs. Then apply the action profile to one or more interfaces. (You can also apply multiple action profiles to a single interface.)

- a. Name the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set action-profile profile-name
```

- b. Specify actions to be taken by the system when the link fault event occurs:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set action-profile profile-name action syslog
user@switch# set action-profile profile-name action link-down
```

- c. Specify events for the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set action-profile profile-name event link-adjacency-loss
```



NOTE: For each action profile, you must specify at least one link event and one action. The actions are taken only when all of the events in the action profile are true. If more than one action is specified, all actions are executed. You can set a low threshold for a specific action such as logging the error and set a high threshold for another action such as system logging.

7. Set a remote interface into loopback mode so that all frames except OAM PDUs are looped back without any changes made to the frames. Set the remote DTE in loopback mode (the remote DTE must support remote-loopback mode) and then enable remote loopback support for the local interface.

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name remote-loopback
user@switch# set interface interface-name negotiation-options allow-remote-loopback
```

Related Documentation

- [Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72](#)
- [Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 69](#)

Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches

Junos OS for EX Series switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters.

This example describes how to enable and configure OAM LFM on a Gigabit Ethernet interface:

- [Requirements on page 73](#)
- [Overview and Topology on page 73](#)
- [Configuring Ethernet OAM Link Fault Management on Switch 1 on page 73](#)
- [Configuring Ethernet OAM Link Fault Management on Switch 2 on page 74](#)
- [Verification on page 75](#)

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.4 or later for EX Series switches
- Two EX3200 or EX4200 switches connected directly

Overview and Topology

Junos OS for EX Series switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters.

This example uses two EX4200 switches connected directly. Before you begin configuring Ethernet OAM LFM on two switches, connect the two switches directly through a trunk interface.

Configuring Ethernet OAM Link Fault Management on Switch 1

CLI Quick Configuration To quickly configure Ethernet OAM LFM, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet link-fault-management]
set interface ge-0/0/0
set interface ge-0/0/0 link-discovery active
set interface ge-0/0/0 pdu-interval 800
set interface ge-0/0/0 remote-loopback
```

Step-by-Step Procedure To configure Ethernet OAM LFM on switch 1:

1. Enable IEEE 802.3ah OAM support on an interface:


```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface (OAM LFM) ge-0/0/0
```
2. Specify that the interface initiates the discovery process by configuring the link discovery mode to **active**:


```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface ge-0/0/0 link-discovery active
```
3. Set the periodic OAM PDU-sending interval (in milliseconds) to 800 on switch 1:


```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface pdu-interval 800
```

4. Set a remote interface into loopback mode so that all frames except OAM PDUs are looped back without any changes made to the frames. Ensure that the remote DTE supports remote loopback mode. To set the remote DTE in loopback mode

```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface ge-0/0/0.0 remote-loopback
```

Results

Check the results of the configuration:

```
[edit]
user@switch1# show

protocols {
  oam {
    ethernet {
      link-fault-management {
        interface ge-0/0/0 {
          pdu-interval 800;
          link-discovery active;
          remote-loopback;
        }
      }
    }
  }
}
```

Configuring Ethernet OAM Link Fault Management on Switch 2

CLI Quick Configuration To quickly configure Ethernet OAM LFM on switch 2, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet link-fault-management ]
set interface ge-0/0/1
set interface ge-0/0/1 negotiation-options allow-remote-loopback
```

Step-by-Step Procedure To configure Ethernet OAM LFM on switch 2:

1. Enable OAM on the peer interface on switch 2:

```
[edit protocols oam ethernet link-fault-management]
user@switch2# set interface ge-0/0/1
```

2. Enable remote loopback support for the local interface:

```
[edit protocols oam ethernet link-fault-management]
user@switch2# set interface ge-0/0/1 negotiation-options allow-remote-loopback
```

Results Check the results of the configuration:

```
[edit]
user@switch2# show

protocols {
  oam {
    ethernet {
      link-fault-management {
        interface ge-0/0/1 {
          negotiation-options {
```



```

    allow-remote-loopback;
  }
}
}
}
}

```

Verification

Verifying That OAM LFM Has Been Configured Properly

- Purpose** Verify that OAM LFM has been configured properly.
- Action** Use the `show oam ethernet link-fault-management` command:
- ```
user@switch1#show oam ethernet link-fault-management
```

## Sample Output

```

Interface: ge-0/0/0.0
Status: Running, Discovery state: Send Any
Peer address: 00:19:e2:50:3b:e1
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
Remote entity information:
Remote MUX action: forwarding, Remote parser action: forwarding
Discovery mode: active, Unidirectional mode: unsupported
Remote loopback mode: supported, Link events: supported
Variable requests: unsupported

```

- Meaning** When the output displays the MAC address and the discover state is **Send Any**, it means that OAM LFM has been configured properly.

- Related Documentation**
- [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)
  - [Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 69](#)



## CHAPTER 3

# Flexible Ethernet Services Encapsulation

- [Understanding Flexible Ethernet Services Encapsulation on Switches on page 77](#)
- [Configuring Flexible Ethernet Services Encapsulation on page 79](#)

## Understanding Flexible Ethernet Services Encapsulation on Switches

---

Junos OS supports two different styles of configuration for switch interfaces—the service provider style and the enterprise style. The service provider style requires more configuration but provides greater flexibility. The enterprise style is easier to configure but offers less functionality. Each configuration style requires a different Ethernet encapsulation type. You can configure a physical interface to support both styles of configuration by using flexible Ethernet services.

Flexible Ethernet services is a type of encapsulation that enables a physical interface to support different types of Ethernet encapsulations at the logical interface level. Defining multiple per-unit Ethernet encapsulations makes it easier to customize Ethernet-based services to multiple hosts connected to the same physical interface.

- [Service Provider Style on page 77](#)
- [Enterprise Style on page 78](#)
- [Flexible Ethernet Services on page 78](#)

### Service Provider Style

The service provider style of configuration allows for customization of Ethernet-based services at the logical interface level. Service providers typically have multiple customers connected to the same physical interface. Using the service provider style, you can configure multiple logical interfaces on the physical interface, and associate each logical unit with a different VLAN. This provides the flexibility to configure different services for each customer, but also requires more configuration, because each feature must be explicitly configured on the logical interface.

When configuring a physical interface to support only the service provider style, the physical interface must be encapsulated with the **extended-vlan-bridge** option to support bridging features. The physical interface must also be configured for VLAN tagging so that it can operate in trunk mode and transmit Ethernet frames with VLAN tags for multiple VLANs. Each logical interface is bound to a unique VLAN ID.

## Enterprise Style

The enterprise style of configuration is designed to provide basic bridging functionality for consumers of Ethernet-based services. The isolation of services for different customers on a single port is not required, because each port is typically connected to a host or provides a trunk to another switch.

With the enterprise style of configuration, logical interfaces are placed into Layer 2 mode by specifying **ethernet-switching** as the interface family. If flexible Ethernet services is not used, **ethernet-switching** can only be configured on a single logical unit, unit 0. You cannot bind a VLAN ID to unit 0, because these interfaces operate either in trunk mode, which supports traffic with various VLAN tags, or in access mode, which supports untagged traffic.

## Flexible Ethernet Services

The flexible Ethernet services encapsulation type enables a physical interface to support both styles of configuration. To support the service provider style, flexible Ethernet services enables encapsulations to be configured at the logical interface level instead of the physical interface. To support the enterprise style, flexible Ethernet services enables **ethernet-switching** family to be configured on any logical interface unit number instead of only on unit 0.

For example, the configuration given below shows three logical interfaces configured on a physical interface, xe-0/0/51, that is encapsulated for flexible Ethernet services. Unit 100 and unit 200 are configured in the service provider style and unit 300 is configured in the enterprise style. The encapsulation type of **vlan-bridge** is used to enable bridging on unit 100 and unit 200, and **family ethernet-switching** enables bridging on unit 300.

```
interfaces {
 xe-0/0/51 {
 flexible-vlan-tagging;
 encapsulation flexible-ethernet-services;
 unit 100 {
 encapsulation vlan-bridge;
 vlan-id 100;
 }
 unit 200 {
 encapsulation vlan-bridge;
 vlan-id 200;
 }
 unit 300 {
 family ethernet-switching {
 interface-mode trunk;
 vlan members 300;
 }
 }
 }
}
```



**NOTE:** It is not required that the unit number and VLAN ID match, but it is considered a best practice.

**Related  
Documentation**

- [Configuring Flexible Ethernet Services Encapsulation on page 79](#)

## Configuring Flexible Ethernet Services Encapsulation

Flexible Ethernet services is a type of encapsulation that enables a physical interface to specify Ethernet encapsulations at the logical interface level. Each logical interface can have a different Ethernet encapsulation. Defining multiple per-unit Ethernet encapsulations makes it easier to customize Ethernet-based services to multiple hosts connected to the same physical interface.

An Ethernet interface that is not encapsulated with flexible Ethernet services and is operating in Layer 2 mode is limited to a single logical interface unit (0). Bridging is enabled on the interface by configuring **ethernet-switching** as the interface family on unit 0. The **ethernet-switching** family can be configured only on logical interface unit 0, and no other logical units can be defined on that interface.

Some switching features, however, cannot be configured on logical interface unit 0. Features such as Q-in-Q tunneling require the logical interface to transmit VLAN-tagged frames. To enable a logical interface to receive and forward Ethernet frames tagged with a matching VLAN ID, you must bind the logical interface to that VLAN. These features must be configured on a logical interface unit other than 0, because you cannot bind a VLAN ID to unit 0.

When you encapsulate an interface by using flexible Ethernet services, you can configure a logical interface unit other than 0 with **family ethernet-switching**. You can also configure other logical interfaces on that same interface with different types of Ethernet encapsulations. This enables logical interfaces that are bound to a VLAN ID to coexist with logical interfaces configured with **family ethernet-switching**.

To configure flexible Ethernet services encapsulation on an interface:

1. Enable flexible Ethernet services encapsulation on the interface:

```
[edit interfaces interface-name]
user@switch# encapsulation flexible-ethernet-services
```

2. Enable the interface to transmit packets with 802.1Q VLAN single-tagged and dual-tagged frames:

```
[edit interfaces interface-name]
user@switch# flexible-vlan-tagging
```

3. Configure a logical interface (unit) of the interface:

```
[edit interfaces interface-name]
user@switch# unit unit-number
```



**NOTE:** Do not use logical interface unit 0. You must later bind a VLAN tag ID to the unit you specify in this step, and you cannot bind a VLAN tag ID to unit 0. It is a best practice to match the unit number to the VLAN ID to which the interface is bound.

4. Encapsulate the logical interface for bridging:

```
[edit interfaces interface-name]
user@switch# unit unit-number encapsulation vlan-bridge
```

5. Bind the logical interface to a VLAN ID:

```
[edit interfaces interface-name]
user@switch# unit unit-number vlan-id vlan-id
```

6. Configure another logical interface by using a unit number other than 0:

```
[edit interfaces interface-name]
user@switch# unit unit-number
```

7. Enable the logical interface for bridging:

```
[edit interfaces interface-name]
user@switch# unit unit-number family ethernet-switching
```

8. Assign VLAN membership to the logical interface:

```
[edit interfaces interface-name]
user@switch# unit unit-number family ethernet-switching vlan members vlan-id
```

9. Configure the interface as a trunk interface to transmit frames with 802.1Q VLAN tags:

```
[edit interfaces interface-name]
user@switch# unit unit-number family ethernet-switching interface-mode trunk
```

#### Related Documentation

- [Understanding Flexible Ethernet Services Encapsulation on Switches on page 77](#)
- [Configuring Q-in-Q Tunneling](#)
- [encapsulation on page 179](#)

## PART 3

# Generic Routing Encapsulation (GRE)

- [Understanding GRE on page 83](#)





## CHAPTER 4

# Understanding GRE

- [Understanding Generic Routing Encapsulation on page 83](#)
- [Configuring Generic Routing Encapsulation Tunneling on page 86](#)
- [Verifying That Generic Routing Encapsulation Tunneling Is Working Correctly on page 87](#)

## Understanding Generic Routing Encapsulation

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Generic routing encapsulation (GRE) provides a private, secure path for transporting packets through an otherwise public network by encapsulating (or tunneling) the packets.

This topic describes:

- [Overview of GRE on page 83](#)
- [GRE Tunneling on page 84](#)
- [Using a Firewall Filter to De-encapsulate GRE Traffic on a QFX5100 and OCX Series Switches on page 85](#)
- [Configuration Limitations on page 86](#)

### Overview of GRE

GRE encapsulates data packets and redirects them to a device that de-encapsulates them and routes them to their final destination. This allows the source and destination switches to operate as if they have a virtual point-to-point connection with each other (because the outer header applied by GRE is transparent to the encapsulated payload packet). For example, GRE tunnels allow routing protocols such as RIP and OSPF to forward data packets from one switch to another switch across the Internet. In addition, GRE tunnels can encapsulate multicast data streams for transmission over the Internet.

GRE is described in RFC 2784 (obsoletes earlier RFCs 1701 and 1702). The switches support RFC 2784, but not completely. (For a list of limitations, see [“Configuration Limitations” on page 86.](#))

As a *tunnel source router*, the switch encapsulates a payload packet for transport through the tunnel to a destination network. The payload packet is first encapsulated in a GRE packet, and then the GRE packet is encapsulated in a delivery protocol. The switch performing the role of a *tunnel remote router* extracts the tunneled packet and forwards the packet to its destination. Note that you can use one firewall term to terminate many GRE tunnels on a QFX5100 switch.

## GRE Tunneling

Data is routed by the system to the GRE endpoint over routes established in the route table. (These routes can be statically configured or dynamically learned by routing protocols such as RIP or OSPF.) When a data packet is received by the GRE endpoint, it is de-encapsulated and routed again to its destination address.

GRE tunnels are *stateless*—that is, the endpoint of the tunnel contains no information about the state or availability of the remote tunnel endpoint. Therefore, the switch operating as a tunnel source router cannot change the state of the GRE tunnel interface to down if the remote endpoint is unreachable.

For details about GRE tunneling, see:

- [Encapsulation and De-Encapsulation on the Switch on page 84](#)
- [Number of Source and Destination Tunnels Allowed on a Switch on page 84](#)
- [Class of Service on GRE Tunnels on page 85](#)
- [Applying Firewall Filters to GRE Traffic on page 85](#)

---

### Encapsulation and De-Encapsulation on the Switch

Encapsulation—A switch operating as a tunnel source router encapsulates and forwards GRE packets as follows:

1. When a switch receives a data packet (payload) to be tunneled, it sends the packet to the tunnel interface.
2. The tunnel interface encapsulates the data in a GRE packet and adds an outer IP header.
3. The IP packet is forwarded on the basis of the destination address in the outer IP header.

De-encapsulation—A switch operating as a tunnel remote router handles GRE packets as follows:

1. When the destination switch receives the IP packet from the tunnel interface, the outer IP header and GRE header are removed.
2. The packet is routed based on the inner IP header.

---

### Number of Source and Destination Tunnels Allowed on a Switch

QFX5100 and OCX Series switches support as many as 512 GRE tunnels, including tunnels created with a firewall filter. That is, you can create a total of 512 GRE tunnels, regardless of which method you use.

EX switches support as many as 500 GRE tunnels between switches transmitting IPv4 or IPv6 payload packets over GRE. If a passenger protocol in addition to IPv4 and IPv6 is used, you can configure up to 333 GRE tunnels between the switches.

An EX switch can have a maximum of 20 tunnel source IP addresses configured, and each tunnel source IP can be configured with up to 20 destination IP addresses on a second switch. As a result, the two connected switches can have a maximum of 400 GRE tunnels. If the first switch is also connected to a third switch, the possible maximum number of tunnels is 500.

### Class of Service on GRE Tunnels

When a network experiences congestion and delay, some packets might be dropped. Junos OS class of service (CoS) divides traffic into classes to which you can apply different levels of throughput and packet loss when congestion occurs and thereby set rules for packet loss. For details about CoS, see [Junos OS CoS for EX Series Switches Overview](#).

The following CoS components are available on a switch operating as a GRE tunnel source router or GRE tunnel remote router:

- At the GRE tunnel source—On a switch operating as a tunnel source router, you can apply CoS classifiers on an *ingress port* or on a *GRE port*, with the following results on CoS component support on tunneled packets:
  - Schedulers only—Based on the CoS classification on the ingress port, you can apply CoS schedulers on a GRE port of the switch to define output queues and control the transmission of packets through the tunnel after GRE encapsulation. However, you cannot apply CoS rewrite rules to these packets.
  - Schedulers and rewrite rules—Depending on the CoS classification on the GRE port, you can apply both schedulers and rewrite rules to the encapsulated packets transmitted through the tunnel.
- At the GRE tunnel endpoint—When the switch is a tunnel remote router, you can apply CoS classifiers on the GRE port and schedulers and rewrite rules on the egress port to control the transmission of a de-encapsulated GRE packet out from the egress port.

### Applying Firewall Filters to GRE Traffic

Firewall filters provide rules that define whether to permit, deny, or forward packets that are transiting an interface on a switch. (For details, see [Firewall Filters for EX Series Switches Overview](#).) Because of the encapsulation and de-encapsulation performed by GRE, you are constrained as to where you can apply a firewall filter to filter tunneled packets and which header will be affected. [Table 18 on page 85](#) identifies these constraints.

**Table 18: Firewall Filter Application Points for Tunneled Packets**

| Endpoint Type             | Ingress Interface                          | Egress Interface |
|---------------------------|--------------------------------------------|------------------|
| Source (encapsulating)    | inner header                               | outer header     |
| Remote (de-encapsulating) | Cannot filter packets on ingress interface | inner header     |

### Using a Firewall Filter to De-encapsulate GRE Traffic on a QFX5100 and OCX Series Switches

You can also use a firewall filter to de-encapsulate GRE traffic on switches. This feature provides significant benefits in terms of scalability, performance, and flexibility because

you don't need to create a tunnel interface to perform the de-encapsulation. For example, you can terminate many tunnels from multiple source IP addresses with one firewall term. See *Configuring a Firewall Filter to De-Encapsulate GRE Traffic on a QFX5100 or OCX Switch* for information about how to configure a firewall filter for this purpose.

## Configuration Limitations

Table 19 on page 86 lists features that are not supported with GRE.

**Table 19: Features Not Supported with GRE**

| EX Switches                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | QFX Switches                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| MPLS over GRE tunnels                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | MPLS over GRE tunnels                                                               |
| GRE keepalives                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | GRE keepalives                                                                      |
| GRE keys, payload packet fragmentation, and sequence numbers for fragmented packets                                                                                                                                                                                                                                                                                                                                                                                                    | GRE keys, payload packet fragmentation, and sequence numbers for fragmented packets |
| BGP dynamic tunnels                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BGP dynamic tunnels                                                                 |
| Outer IP address must be IPv4                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Outer IP address must be IPv4                                                       |
| Virtual routing instances                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |
| Bidirectional Forwarding Detection (BFD) protocol over GRE distributed mode                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |
| OSPF limitation—Enabling OSPF on a GRE interface creates two equal-cost routes to the destination: one through the Ethernet network or uplink interface and the other through the tunnel interface. If data is routed through the tunnel interface, the tunnel might fail. To keep the interface operational, we recommend that you use a static route, disable OSPF on the tunnel interface, or configure the peer not to advertise the tunnel destination over the tunnel interface. |                                                                                     |

- Related Documentation**
- *Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)*
  - [Configuring Generic Routing Encapsulation Tunneling on page 86](#)
  - *Configuring a Firewall Filter to De-Encapsulate GRE Traffic on a QFX5100 or OCX Switch*

## Configuring Generic Routing Encapsulation Tunneling

Generic routing encapsulation (GRE) provides a private, secure path for transporting packets through an otherwise public network by encapsulating (or tunneling) the packets. GRE tunneling is accomplished through tunnel endpoints that encapsulate or de-encapsulate traffic.

You can also use a firewall filter to de-encapsulate GRE traffic on QFX5100 and OCX Series switches. This feature provides significant benefits in terms of scalability, performance, and flexibility because you don't need to create a tunnel interface to perform the de-encapsulation. For example, you can terminate many tunnels from multiple source

IP addresses with one firewall term. For more information on this feature, see *Configuring a Firewall Filter to De-Encapsulate GRE Traffic on a QFX5100 or OCX Switch*.

This topic describes:

1. [Configuring a GRE Tunnel on page 87](#)

## Configuring a GRE Tunnel

To configure a GRE tunnel interface:

1. Create a GRE interface with a unit number and address:

```
[edit interfaces]
user@switch# set gr-0/0/0 unit number family inet address
```



**NOTE:** The base name of the interface must be `gr-0/0/0`.

This is a pseudo interface, and the address you specify can be any IP address. The routing table must specify `gr-0/0/0.x` as the outgoing interface for any packets that will be tunneled.

If you configure a GRE interface on a QFX5100 switch that is a member of a Virtual Chassis and later change the Virtual Chassis member number of the switch, the name of the GRE interface does not change in any way (because it is a pseudo interface). For example, if you change the member number from `0` to `5`, the GRE interface name does *not* change from `gr-0/0/0.x` to `gr-5/0/0.x`.

2. Specify the tunnel source address for the logical interface:

```
[edit interfaces]
user@switch# set gr-0/0/0 unit number tunnel source source-address
```

3. Specify the destination address:

```
[edit interfaces]
user@switch# set gr-0/0/0 unit number tunnel destination destination-address
```

The destination address must be reachable through static or dynamic routing. If you use static routing, you must get the destination MAC address (for example, by using `ping`) before user traffic can be forwarded through the tunnel.

### Related Documentation

- [Verifying That Generic Routing Encapsulation Tunneling Is Working Correctly on page 87](#)
- [Understanding Generic Routing Encapsulation on page 83](#)
- [Configuring a Firewall Filter to De-Encapsulate GRE Traffic on a QFX5100 or OCX Switch](#)

## Verifying That Generic Routing Encapsulation Tunneling Is Working Correctly

**Purpose** Verify that the generic routing encapsulation (GRE) interface is sending tunneled traffic.

**Action** Display status information about the specified GRE interface by using the command [show interfaces](#).

```
user@switch> show interfaces gr-0/0/0.0
Physical interface: gr-0/0/0, Enabled, Physical link is Up
Interface index: 132, SNMP ifIndex: 26
 Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
 Device flags : Present Running
 Interface flags: Point-To-Point SNMP-Traps
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)

Logical interface gr-0/0/0.0 (Index 68) (SNMP ifIndex 47)
 Flags: Point-To-Point SNMP-Traps 16384
 IP-Header 1.1.1.2:1.1.1.1:47:df:64:0000000000000000 Encapsulation: GRE-NULL
 Input packets : 0
 Output packets: 0
 Protocol inet, MTU: 1476
 Flags: None
 Addresses, Flags: Is-Primary
 Local: 1.10.1.1
```

**Meaning** The output indicates that the GRE interface gr-0/0/0 is up. The output displays the name of the physical interface and the traffic statistics for this interface---the number of and the rate at which input and output bytes and packets are received and transmitted on the physical interface.

**Related Documentation**

- *Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)*

## PART 4

# Layer 3 Logical Interfaces

- [Understanding Layer 3 Logical Interfaces on page 91](#)





## CHAPTER 5

# Understanding Layer 3 Logical Interfaces

- [Understanding Layer 3 Logical Interfaces on page 91](#)
- [Configuring a Layer 3 Logical Interface on page 92](#)
- [Verifying That Layer 3 Logical Interfaces Are Working on page 92](#)

## Understanding Layer 3 Logical Interfaces

---

A Layer 3 logical interface is a logical division of a physical interface that operates at the network level and therefore can receive and forward 802.1Q VLAN tags. You can use Layer 3 logical interfaces to route traffic among multiple VLANs along a single trunk line that connects a Juniper Networks switch to a Layer 2 switch. Only one physical connection is required between the switches. .



**NOTE:** You can also use Layer 3 logical interfaces to provide alternative gateway addresses for smart DHCP relay

To create Layer 3 logical interfaces on a switch, enable VLAN tagging, partition the physical interface into logical partitions, and bind the VLAN ID to the logical interface.

We recommend that you use the VLAN ID as the logical interface number when you configure the logical interface. QFX Series and EX4600 switches support a maximum of 4089 VLANs, which includes the default VLAN. You can, however, assign a VLAN ID in the range of 1 to 4094, but five of these VLAN IDs are reserved for internal use.

VLAN tagging places the VLAN ID in the frame header, allowing each physical interface to handle multiple VLANs. When you configure multiple VLANs on an interface, you must also enable tagging on that interface. Junos OS on switches supports a subset of the 802.1Q standard for receiving and forwarding routed or bridged Ethernet frames with single VLAN tags and running Virtual Router Redundancy Protocol (VRRP) over 802.1Q-tagged interfaces.

### Related Documentation

- [Interfaces Overview on page 3](#)
- [Configuring a Layer 3 Logical Interface on page 92](#)
- *Configuring DHCP and BOOTP Relay*
- *Junos OS Network Interfaces Library for Routing Devices*

## Configuring a Layer 3 Logical Interface

Devices use Layer 3 logical interfaces to divide a physical interface into multiple logical interfaces, each corresponding to a VLAN. Layer 3 logical interfaces route traffic between subnets.

To configure Layer 3 logical interfaces, enable VLAN tagging and partition one or more physical ports into multiple logical interfaces, each corresponding to a VLAN ID.

Before you begin, make sure you set up your VLANs. See *Configuring VLANs*.

To configure Layer 3 logical interfaces:

1. Enable VLAN tagging:

```
[edit interfaces interface-name]
user@switch# set vlan-tagging
```

2. Bind each VLAN ID to a logical interface:

```
[edit interfaces interface-name]
user@switch# set unit logical-unit-number vlan-id vlan-id-number
```

### Related Documentation

- [Understanding Layer 3 Logical Interfaces on page 91](#)
- [Verifying That Layer 3 Logical Interfaces Are Working on page 92](#)

## Verifying That Layer 3 Logical Interfaces Are Working

**Purpose** After configuring Layer 3 logical interfaces, verify that they are set up properly and transmitting data.

- Action**
1. To determine if you have successfully created the logical interfaces and the links are up:

```
[edit interfaces]
user@switch> show interfaces interface-name terse
```

| Interface      | Admin | Link | Proto | Local      | Remote |
|----------------|-------|------|-------|------------|--------|
| ge-0/0/0       | up    | up   |       |            |        |
| ge-0/0/0.0     | up    | up   | inet  | 1.1.1.1/24 |        |
| ge-0/0/0.1     | up    | up   | inet  | 2.1.1.1/24 |        |
| ge-0/0/0.2     | up    | up   | inet  | 3.1.1.1/24 |        |
| ge-0/0/0.3     | up    | up   | inet  | 4.1.1.1/24 |        |
| ge-0/0/0.4     | up    | up   | inet  | 5.1.1.1/24 |        |
| ge-0/0/0.32767 | up    | up   |       |            |        |

2. Use the **ping** command from a device on one subnet to an address on another subnet to determine if packets were transmitted correctly on the logical interface VLANs:

```
user@switch> ping ip-address
PING 1.1.1.1 (1.1.1.1): 56 data bytes
64 bytes from 1.1.1.1: icmp_seq=0 ttl=64 time=0.157 ms
64 bytes from 1.1.1.1: icmp_seq=1 ttl=64 time=0.238 ms
64 bytes from 1.1.1.1: icmp_seq=2 ttl=64 time=0.255 ms
64 bytes from 1.1.1.1: icmp_seq=3 ttl=64 time=0.128 ms
--- 1.1.1.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
```

**Meaning** The output confirms that the logical interfaces have been created and the links are up.

**Related Documentation**

- [Configuring a Layer 3 Logical Interface on page 92](#)



## PART 5

# Link Aggregation Groups (LAGs) and Link Aggregation Control Protocol (LACP)

- [Understanding LAGs and LACP on page 97](#)



## CHAPTER 6

# Understanding LAGs and LACP

- Understanding Aggregated Ethernet Interfaces and LACP on page 97
- Configuring Aggregated Ethernet LACP on page 100
- Configuring Link Aggregation on page 101
- Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104
- Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108
- Verifying the Status of a LAG Interface on page 113
- Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113
- Troubleshooting an Aggregated Ethernet Interface on page 114

## Understanding Aggregated Ethernet Interfaces and LACP

---

IEEE 802.3ad link aggregation enables you to group Ethernet interfaces to form a single, aggregated Ethernet interface, also known as a *link aggregation group (LAG)* or *bundle*.

Link aggregation is used to aggregate Ethernet interfaces between two devices. You can create a LAG between a Juniper Networks device and a router, switch, aggregation switch, server, or other devices. The aggregated Ethernet interfaces that participate in a LAG are called member links. Because a LAG is composed of multiple member links, even if one member link fails, the LAG continues to carry traffic over the remaining links.



**NOTE:** On QFX5100 and EX4600 standalone switches and on a QFX5100 Virtual Chassis and EX4600 Virtual Chassis, you can configure a mixed rate of link speeds for the aggregated Ethernet bundle. Only link speeds of 40G and 10G are supported. Load balancing will not work if you configure link speeds that are not supported.



**NOTE:** The QFX5200 switches do not support mixed rate aggregated Ethernet bundles.

Link Aggregation Control Protocol (LACP) is a subcomponent of the IEEE 802.3ad standard and is used as a discovery protocol.



**NOTE:** To ensure load balancing across the aggregated Ethernet (AE) interfaces on a redundant server Node group, the members of the AE must be equally distributed across the redundant server Node group.



**NOTE:** During a network Node group switchover, traffic might be dropped for a few seconds.

- [Link Aggregation Group on page 98](#)
- [Link Aggregation Control Protocol \(LACP\) on page 99](#)

## Link Aggregation Group

To create a LAG:

1. Create a logical aggregated Ethernet interface.
2. Define the parameters associated with the logical aggregated Ethernet interface, such as a logical unit, interface properties, and Link Aggregation Control Protocol (LACP).
3. Define the member links to be contained within the aggregated Ethernet interface—for example, two 10-Gigabit Ethernet interfaces.
4. Configure LACP for link detection.

Keep in mind these hardware and software guidelines:

- Up to 32 Ethernet interfaces can be grouped to form a LAG on a redundant server Node group, a server Node group, and a network Node group on a QFabric system. Up to 48 LAGs are supported on redundant server Node groups and server Node groups on a QFabric system, and up to 128 LAGs are supported on network Node groups on a QFabric system. You can configure LAGs across Node devices in redundant server Node groups, server Node groups, and network Node groups.



**NOTE:** If you try to commit a configuration containing more than 32 Ethernet interfaces in a LAG, you will receive an error message saying that the group limit of 32 has been exceeded, and the configuration checkout has failed.

- Up to 64 Ethernet interfaces can be grouped to form a LAG, and up to 448 LAGs are supported on QFX3500, QFX3600, EX4600, and OCX Series switches, and up to 1,000 LAGs are supported on QFX5100 switches.





**NOTE:** If you try to commit a configuration containing more than 64 Ethernet interfaces in a LAG, you will receive an error message saying that the group limit of 64 has been exceeded, and the configuration checkout has failed.

- Up to 64 Ethernet interfaces can be grouped to form a LAG, and up to 144 LAGs are supported on QFX10002-36Q switches, and up to 288 LAGs are supported on QFX10002-72Q switches.
- The LAG must be configured on both sides of the link.
- The interfaces on either side of the link must be set to the same speed and be in full-duplex mode.



**NOTE:** On a QFX5100, EX4600, QFX10002 standalone switch or QFX5100 Virtual Chassis and EX4600 Virtual Chassis, you can configure mixed rate aggregated Ethernet bundles (LAGs with different link speeds). OCX Series switches do not support LAGs with different speeds.



**NOTE:** Junos OS assigns a unique ID and port priority to each port. The ID and priority are not configurable.

- QFabric systems support a special LAG called an FCoE LAG, which enables you to transport FCoE traffic and regular Ethernet traffic (traffic that is not FCoE traffic) across the same link aggregation bundle. Standard LAGs use a hashing algorithm to determine which physical link in the LAG is used for a transmission, so communication between two devices might use different physical links in the LAG for different transmissions. An FCoE LAG ensures that FCoE traffic uses the same physical link in the LAG for requests and replies in order to preserve the virtual point-to-point link between the FCoE device converged network adapter (CNA) and the FC SAN switch across a QFabric system Node device. An FCoE LAG does not provide load balancing or link redundancy for FCoE traffic. However, regular Ethernet traffic uses the standard hashing algorithm and receives the usual LAG benefits of load balancing and link redundancy in an FCoE LAG. See *Understanding FCoE LAGs* for more information.

## Link Aggregation Control Protocol (LACP)

LACP is one method of bundling several physical interfaces to form one logical aggregated Ethernet interface. The LACP mode can be active or passive. The transmitting link is known as the *actor*, and the receiving link is known as the *partner*. If the actor and partner are both in passive mode, they do not exchange LACP packets, and the aggregated Ethernet links do not come up. If either the actor or partner is active, they do exchange LACP packets. By default, LACP is in passive mode on aggregated Ethernet interfaces. To initiate transmission of LACP packets and response to LACP packets, you must enable LACP active mode. You can configure Ethernet links to actively transmit protocol data units (PDUs), or you can configure the links to passively transmit them, sending out LACP

PDUs only when they receive them from another link. You can configure both VLAN-tagged and untagged aggregated Ethernet interfaces without LACP enabled. LACP is defined in IEEE 802.3ad, *Aggregation of Multiple Link Segments*.

LACP was designed to achieve the following:

- Automatic addition and deletion of individual links to the LAG without user intervention.
- Link monitoring to check whether both ends of the bundle are connected to the correct group.

When a dual-homed server is deployed with a switch, the network interface cards form a LAG with the switch. During a server upgrade, the server may not be able to exchange LACP PDUs. In such a situation you can configure an interface to be in the **up** state even if no PDUs are exchanged. Use the **force-up** statement to configure an interface when the peer has limited LACP capability. The interface selects the associated LAG by default, whether the switch and peer are both in active or passive mode. When there are no received PDUs, the partner is considered to be working in the passive mode. Therefore, LACP PDU transmissions are controlled by the transmitting link.

If the remote end of the LAG link is a security device, LACP might not be supported because security devices require a deterministic configuration. In this case, do not configure LACP. All links in the LAG are permanently operational unless the switch detects a link failure within the Ethernet physical layer or data link layers.

**Related  
Documentation**

- [Configuring Link Aggregation on page 101](#)
- [Configuring an FCoE LAG](#)
- [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)
- [Example: Configuring an FCoE LAG on a Redundant Server Node Group](#)
- [Verifying the Status of a LAG Interface on page 113](#)
- [Junos OS Network Interfaces Library for Routing Devices](#)

---

## Configuring Aggregated Ethernet LACP

For aggregated Ethernet interfaces, you can configure the Link Aggregation Control Protocol (LACP). LACP is one method of bundling several physical interfaces to form one logical interface. You can configure aggregated Ethernet with or without LACP enabled.

Before you configure LACP, be sure you have configured the aggregated Ethernet bundles—also known as link aggregation groups (LAGs).

When LACP is enabled, the local and remote sides of the aggregated Ethernet links exchange protocol data units (PDUs), containing information about the state of the link. You can configure Ethernet links to actively transmit PDUs, or you can configure the links to passively transmit them, sending out LACP PDUs only when they receive them from another link. One side of the link must be configured as **active** for the link to be up.



**NOTE:** Do not add LACP to a LAG if the remote end of the LAG link is a security device, unless the security device supports LACP. Security devices often do not support LACP because they require a deterministic configuration.

To configure LACP:

1. Enable the LACP mode:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp mode
```

For example, to specify the mode as active, execute the following command:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp active
```

2. Specify the interval and speed at which the interfaces send LACP packets:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp periodic interval
```

For example, to specify the interval as fast, execute the following command:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp periodic fast
```

## Configuring Link Aggregation

Use the link aggregation feature to aggregate one or more links to form a virtual link or aggregation group. The MAC client can treat this virtual link as if it were a single link. Link aggregation increases bandwidth, provides graceful degradation as failure occurs, and increases link availability.



**NOTE:** An interface with an already configured IP address cannot form part of the aggregation group.



**NOTE:** On QFX5100 and EX4600 standalone switches and on QFX5100 Virtual Chassis and EX4600 Virtual Chassis, you can configure a mixed rate of link speeds for the aggregated Ethernet bundle. Only link speeds of 40G and 10G are supported. Load balancing will not work if you configure link speeds that are not supported.

1. [Creating an Aggregated Ethernet Interface on page 102](#)
2. [Configuring the VLAN Name and VLAN ID Number on page 102](#)
3. [Configuring Aggregated Ethernet LACP on page 103](#)

## Creating an Aggregated Ethernet Interface

To create an aggregated Ethernet interface:

1. Specify the number of aggregated Ethernet interfaces to be created:

```
[edit chassis]
user@switch# set aggregated-devices interfaces device-count device-count
```

For example, to specify 5:

```
[edit chassis]
user@switch# set aggregated-devices interfaces device-count
```

2. Specify the minimum number of links for the aggregated Ethernet interface (aex), that is, the defined bundle, to be labeled “up”:



**NOTE:** By default only one link must be up for the bundle to be labeled “up”.

```
[edit interfaces]
user@switch# set interface-name aggregated-ether-options minimum-links minimum-links
```

For example, to specify 5:

```
[edit interfaces]
user@switch# set interface-name aggregated-ether-options minimum-links 5
```

3. Specify the link speed for the aggregated Ethernet bundle:

```
[edit interfaces]
user@switch# set interface-name aggregated-ether-options link-speed link-speed
```

For example, to specify 10g:

```
[edit interfaces]
user@switch# set interface-name aggregated-ether-options link-speed 10g
```

4. Specify the members to be included within the aggregated Ethernet bundle:

```
[edit interfaces]
user@switch# set interface-name ether-options 802.3ad aex
user@switch# set interface-name ether-options 802.3ad aex
```

## Configuring the VLAN Name and VLAN ID Number



**NOTE:** VLANs are not supported on OCX Series switches.

```
[edit vlans]
user@switch# set vlan-name vlan-id vlan-id-number
```

For example, 100.

## Configuring Aggregated Ethernet LACP

For aggregated Ethernet interfaces, you can configure the Link Aggregation Control Protocol (LACP). LACP is one method of bundling several physical interfaces to form one logical interface. You can configure aggregated Ethernet with or without LACP enabled.

Before you configure LACP, be sure you have configured the aggregated Ethernet bundles—also known as link aggregation groups (LAGs).

When LACP is enabled, the local and remote sides of the aggregated Ethernet links exchange protocol data units (PDUs), containing information about the state of the link. You can configure Ethernet links to actively transmit PDUs, or you can configure the links to passively transmit them, sending out LACP PDUs only when they receive them from another link. One side of the link must be configured as **active** for the link to be up.



**NOTE:** Do not add LACP to a LAG if the remote end of the LAG link is a security device, unless the security device supports LACP. Security devices often do not support LACP because they require a deterministic configuration.

To configure LACP:

1. Enable the LACP mode:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp mode
```

For example, to specify the mode as active, execute the following command:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp active
```

2. Specify the interval and speed at which the interfaces send LACP packets:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp periodic interval
```

For example, to specify the interval as fast, execute the following command:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options lacp periodic fast
```

### Related Documentation

- [Understanding Interface Naming Conventions on page 5](#)
- [Understanding Interface Naming Conventions](#)
- [Configuring an FCoE LAG](#)
- [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)
- [Verifying the Status of a LAG Interface on page 113](#)
- [Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113](#)
- [show lacp statistics interfaces \(View\) on page 432](#)

## Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch

---

A QFX Series product allows you to combine multiple Ethernet links into one logical interface for higher bandwidth and redundancy. The ports that are combined in this manner are referred to as a link aggregation group (LAG) or bundle. The number of Ethernet links you can combine into a LAG depends on your QFX Series product model. You can configure LAGs to connect a QFX Series product to other switches, like aggregation switches, servers, or routers. This example describes how to configure LAGs to connect a QFX3500, QFX3600, or QFX5100 switch to an aggregation switch.

- [Requirements on page 104](#)
- [Overview and Topology on page 104](#)
- [Configuration on page 105](#)
- [Verification on page 107](#)
- [Troubleshooting on page 108](#)

### Requirements

This example uses the following software and hardware components:

- Junos OS Release 11.1 or later for the QFX3500 and QFX3600 switches, and Junos OS 13.2 or later for the QFX5100 switch.
- One QFX3500, QFX3600, or QFX5100 switch.

### Overview and Topology

In this example, the switch has one LAG comprising two 10-Gigabit Ethernet interfaces. This LAG is configured in port mode trunk so that the switch and the VLAN to which it has been assigned can send and receive traffic.

Configuring the Ethernet interfaces as LAGs has the following advantages:

- If one physical port is lost for any reason (a cable is unplugged or a switch port fails), the logical port transparently continues to function over the remaining physical port.
- Link Aggregation Control Protocol (LACP) can optionally be configured for link monitoring and automatic addition and deletion of individual links without user intervention.



**NOTE:** If the remote end of the LAG link is a security device, LACP might not be supported because security devices require a deterministic configuration. In this case, do not configure LACP. All links in the LAG are permanently operational unless the switch detects a link failure within the Ethernet physical layer or data link layers.

---

The topology used in this example consists of one switch with a LAG configured between two of its 10-Gigabit Ethernet interfaces. The switch is connected to an aggregation switch.

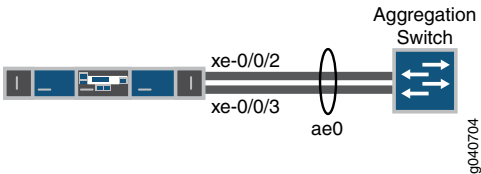


Table 20 on page 105 details the topology used in this configuration example.

Table 20: Components of the Topology for Configuring a LAG Between a QFX3500 Switch and Aggregation Switch

| Hostname | Base Hardware                       | Trunk Port                                                                                         |
|----------|-------------------------------------|----------------------------------------------------------------------------------------------------|
| switch   | QFX3500, QFX3600, or QFX5100 switch | ae0 is configured as a trunk port and combines the following two interfaces: xe-0/0/2 and xe-0/0/3 |

Configuration

To configure a LAG between two 10-Gigabit Ethernet interfaces:

CLI Quick Configuration

To quickly configure a LAG between two 10-Gigabit Ethernet interfaces on a switch, copy the following commands and paste them into the switch terminal window:



**NOTE:** If you are configuring a LAG on the QFX5100 switch, use the **interface-mode** statement instead of the **port-mode** statement. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

```
[edit]
set chassis aggregated-devices ethernet device-count 1
set interfaces ae0 aggregated-ether-options minimum-links 1
set interfaces ae0 aggregated-ether-options link-speed 10g
set interfaces ae0 unit 0 family ethernet-switching vlan members green
set interfaces xe-0/0/2 ether-options 802.ad ae0
set interfaces xe-0/0/3 ether-options 802.ad ae0
set interfaces ae0 unit 0 family ethernet-switching port-mode trunk
set interfaces ae0 aggregated-ether-options lacp active
set interfaces ae0 aggregated-ether-options lacp periodic fast
```

Step-by-Step Procedure

To configure a LAG between a QFX Series switch and an aggregation switch:

- Specify the number of LAGs to be created on the switch:  
[edit chassis]  
user@switch# **set aggregated-devices ethernet device-count 1**
- Specify the number of links that need to be present for the **ae0** LAG interface to be up:

- ```
[edit interfaces]
user@switch# set ae0 aggregated-ether-options minimum-links 1
```
3. Specify the media speed of the **ae0** link:


```
[edit interfaces]
user@switch# set ae0 aggregated-ether-options link-speed 10g
```
 4. Specify the members to be included within the aggregated Ethernet bundle:


```
[edit interfaces]
user@switch# set interfaces xe-0/0/2 ether-options 802.ad ae0
[edit interfaces]
user@switch# set interfaces xe-0/0/3 ether-options 802.ad ae0
```
 5. Assign a port mode of trunk to the **ae0** link:



NOTE: If you are configuring a LAG on the QFX5100 switch, use the **interface-mode** statement instead of the **port-mode** statement. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

- ```
[edit interfaces]
user@switch# set ae0 unit 0 family ethernet-switching port-mode trunk
or
[edit interfaces]
user@switch# set ae0 unit 0 family ethernet-switching interface-mode trunk
```
6. Assign the LAG to a VLAN:
 

```
[edit interfaces]
user@switch# set ae0 unit 0 family ethernet-switching vlan members green vlan-id 200
```
  7. (Optional): Designate one side of the LAG as active for LACP:
 

```
[edit interfaces]
user@switch# set ae0 aggregated-ether-options lacp active
```
  8. (Optional): Designate the interval and speed at which the interfaces send LACP packets:
 

```
[edit interfaces]
user@switch# set ae0 aggregated-ether-options lacp periodic fast
```

## Results

Display the results of the configuration on a QFX3500 or QFX3600 switch:

```
[edit]
chassis {
 aggregated-devices {
 ethernet {
 device-count 1;
 }
 }
}
green {
 vlan-id 200;
}
}
interfaces {
 ae0 {
```



```

aggregated-ether-options {
 link-speed 10g;
 minimum-links 1;
}
unit 0 {
 family ethernet-switching {
 port-mode trunk;
 vlan {
 members green;
 }
 }
}
xe-0/0/2 {
 ether-options {
 802.ad ae0;
 }
}
xe-0/0/3 {
 ether-options {
 802.ad ae0;
 }
}
}

```

## Verification

To verify that switching is operational and one LAG has been created, perform these tasks:

- [Verifying That LAG ae0.0 Has Been Created on page 107](#)
- [Verifying That LAG ae0 Has Been Created on page 107](#)

### Verifying That LAG ae0.0 Has Been Created

**Purpose** Verify that LAG **ae0.0** has been created on the switch.

**Action** `show interfaces ae0 terse`

| Interface | Admin | Link | Proto      | Local | Remote |
|-----------|-------|------|------------|-------|--------|
| ae0       | up    | up   |            |       |        |
| ae0.0     | up    | up   | eth-switch |       |        |

**Meaning** The output confirms that the **ae0.0** link is up and shows the **family** and IP address assigned to this link.

### Verifying That LAG ae0 Has Been Created

**Purpose** Verify that LAG **ae0** has been created on the switch

**Action** `show interfaces ae0 terse`

| Interface | Admin | Link | Proto      | Local | Remote |
|-----------|-------|------|------------|-------|--------|
| ae0       | up    | down |            |       |        |
| ae0.0     | up    | down | eth-switch |       |        |

**Meaning** The output shows that the **ae0.0** link is down.

## Troubleshooting

---

### Troubleshooting a LAG That Is Down

---

**Problem** The **show interfaces terse** command shows that the LAG is **down**.

**Solution** Check the following:

- Verify that there is no configuration mismatch.
- Verify that all member ports are up.
- Verify that a LAG is part of family ethernet switching (Layer 2 LAG) or family inet (Layer 3 LAG).
- Verify that the LAG member is connected to the correct LAG at the other end.

- Related Documentation**
- [Configuring Link Aggregation on page 101](#)
  - [Verifying the Status of a LAG Interface on page 113](#)
  - [Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113](#)
  - [Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108](#)
  - [Example: Configuring an FCoE LAG on a Redundant Server Node Group](#)
  - [show lacp statistics interfaces \(View\) on page 432](#)

---

## Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch

---

QFX Series products allow you to combine multiple Ethernet links into one logical interface for higher bandwidth and redundancy. The ports that are combined in this manner are referred to as a link aggregation group (LAG) or bundle. The number of Ethernet links you can combine into a LAG depends on your QFX Series product model. On a standalone switch, you can group up to 32 Ethernet interfaces to form a LAG. On a QFabric system, you can group up to 8 Ethernet interfaces to form a LAG. QFX Series products allow you to further enhance these links by configuring Link Aggregation Control Protocol (LACP).

This example describes how to overlay LACP on the LAG configurations that were created in “[Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch](#)” on page 104:

- [Requirements on page 109](#)
- [Overview and Topology on page 109](#)
- [Configuring LACP for the LAG on the QFX Series on page 109](#)

- [Verification on page 110](#)
- [Troubleshooting on page 111](#)

## Requirements

This example uses the following software and hardware components:

- Junos OS Release 11.1 or later for the QFX3500 switch, Junos OS Release 12.1 or later for the QFX3600 switch, and Junos OS 13.2 or later for the QFX5100 switch.
- One QFX3500, QFX3600, or QFX5100 switch.

Before you configure LACP, be sure you have:

- Configured the ports on the switches as trunk ports.
- Configured the LAG.

## Overview and Topology

The topology in this example is exactly the same as the topology used in the [Configuring a LAG Between a QFX Switch and an Aggregation Switch](#) example. This example shows how to use LACP to enhance the LAG functionality.

LACP exchanges are made between *actors* (the transmitting link) and *partners* (the receiving link). The LACP mode can be either active or passive.



**NOTE:** If the actor and partner are both in passive mode, they do not exchange LACP packets, which results in the aggregated Ethernet links not coming up. By default, LACP is in passive mode. To initiate transmission of LACP packets and responses to LACP packets, you must enable LACP in active mode.

By default, the actor and partner send LACP packets every second. You can configure the interval at which the interfaces send LACP packets by including the **periodic** statement at the **[edit interfaces *interface-name* aggregated-ether-options lacp]** hierarchy level.

The interval can be fast (every second) or slow (every 30 seconds).

## Configuring LACP for the LAG on the QFX Series

To configure LACP for a QFX Series LAG, perform these tasks:

### CLI Quick Configuration

To quickly configure LACP for the access switch LAGs, copy the following commands and paste them into the switch terminal window:

```
[edit]
set interfaces ae0 aggregated-ether-options lacp active periodic fast
```

**Step-by-Step Procedure**

To configure LACP for LAG ae0 :

1. Specify the aggregated Ethernet options for the LAG:

```
[edit interfaces]
user@switch# set ae0 aggregated-ether-options lacp active periodic fast
```

**Results** Display the results of the configuration:

```
[edit interfaces]
user@switch# show
ae0 {
 aggregated-ether-options {
 lacp {
 active;
 periodic fast;
 }
 }
}
```

**Verification**

To verify that LACP packets are being exchanged, perform the following tasks:

- [Verifying the LACP Settings on page 110](#)
- [Verifying That the LACP Packets Are Being Exchanged on page 110](#)

**Verifying the LACP Settings****Purpose** Verify that LACP has been set up correctly.**Action** Use the **show lacp interfaces *interface-name*** command to check that LACP has been enabled as active on one end.

```
user@switch> show lacp interfaces xe-0/0/02
```

Aggregated interface: ae0

|                |               |                |     |      |     |     |           |         |          |
|----------------|---------------|----------------|-----|------|-----|-----|-----------|---------|----------|
| LACP state:    | Role          | Exp            | Def | Dist | Col | Syn | Aggr      | Timeout | Activity |
| xe-0/0/2       | Actor         | No             | Yes | No   | No  | No  | Yes       | Fast    | Active   |
| xe-0/0/2       | Partner       | No             | Yes | No   | No  | No  | Yes       | Fast    | Passive  |
| LACP protocol: | Receive State | Transmit State |     |      |     |     | Mux State |         |          |
| xe-0/0/2       | Defaulted     | Fast periodic  |     |      |     |     | Detached  |         |          |

**Meaning** The output indicates that LACP has been set up correctly and is active at one end.**Verifying That the LACP Packets Are Being Exchanged****Purpose** Verify that LACP packets are being exchanged.

**Action** Use the **show interfaces aex statistics** command to display LACP information.

```
user@switch> show interfaces ae0 statistics
```

```
Physical interface: ae0, Enabled, Physical link is Down
Interface index: 153, SNMP ifIndex: 30
Link-level type: Ethernet, MTU: 1514, Speed: Unspecified, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
Minimum bandwidth needed: 0
Device flags : Present Running
Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Current address: 02:19:e2:50:45:e0, Hardware address: 02:19:e2:50:45:e0
Last flapped : Never
Statistics last cleared: Never
 Input packets : 0
 Output packets: 0
Input errors: 0, Output errors: 0

Logical interface ae0.0 (Index 71) (SNMP ifIndex 34)
Flags: Hardware-Down Device-Down SNMP-Traps Encapsulation: ENET2
Statistics Packets pps Bytes bps
Bundle:
 Input : 0 0 0 0
 Output: 0 0 0 0
Protocol inet
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255
```

**Meaning** The output here shows that the link is down and that no PDUs are being exchanged.

## Troubleshooting

To troubleshoot a nonworking LACP link, perform these tasks:

- [Troubleshooting a Nonworking LACP Link on page 111](#)

### [Troubleshooting a Nonworking LACP Link](#)

**Problem** The LACP link is not working.

**Solution** Check the following:

- Remove the LACP configuration and verify whether the static LAG is up.
- Verify that LACP is configured at both ends.
- Verify that LACP is not passive at both ends.
- Verify whether LACP protocol data units (PDUs) are being exchanged by running the **monitor traffic-interface lag-member detail** command.

**Related Documentation**

- [Configuring Link Aggregation on page 101](#)
- [Verifying the Status of a LAG Interface on page 113](#)

- [Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113](#)
- [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)
- [Example: Configuring an FCoE LAG on a Redundant Server Node Group](#)
- [show lacp statistics interfaces \(View\) on page 432](#)

## Verifying the Status of a LAG Interface

**Purpose** Verify that a link aggregation group (LAG) (**ae0**) has been created on the switch.

**Action** To verify that the **ae0** LAG has been created:

```
[edit interfaces]
show interfaces ae0 terse
```

| Interface | Admin | Link | Proto | Local         | Remote |
|-----------|-------|------|-------|---------------|--------|
| ae0       | up    | up   |       |               |        |
| ae0.0     | up    | up   | inet  | 10.10.10.2/24 |        |

**Meaning** The output confirms that the **ae0** link is up and shows the family and IP address assigned to this link.

- Related Documentation**
- [Configuring Link Aggregation on page 101](#)
  - [Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113](#)
  - [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)
  - [Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108](#)
  - [show lacp statistics interfaces \(View\) on page 432](#)

## Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets

Verify that LACP has been set up correctly and that the bundle members are transmitting LACP protocol packets.

1. [Verifying the LACP Setup on page 113](#)
2. [Verifying That LACP Packets Are Being Exchanged on page 114](#)

### Verifying the LACP Setup

**Purpose** Verify that the LACP has been set up correctly.

**Action** To verify that LACP has been enabled as active on one end:

```
user@switch>show lacp interfaces xe-0/0/0
```

```
Aggregated interface: ae0
```

| LACP state: | Role    | Exp | Def | Dist | Col | Syn | Aggr | Timeout | Activity |
|-------------|---------|-----|-----|------|-----|-----|------|---------|----------|
| xe-0/1/0    | Actor   | No  | Yes | No   | No  | No  | Yes  | Fast    | Active   |
| xe-0/1/0    | Partner | No  | Yes | No   | No  | No  | Yes  | Fast    | Passive  |

|                |               |                |     |          |
|----------------|---------------|----------------|-----|----------|
| LACP protocol: | Receive State | Transmit State | Mux | State    |
| xe-0/1/0       | Defaulted     | Fast periodic  |     | Detached |

**Meaning** This example shows that LACP has been configured with one side as active and the other as passive. When LACP is enabled, one side must be set as active in order for the bundled link to be up.

## Verifying That LACP Packets Are Being Exchanged

**Purpose** Verify that LACP packets are being exchanged between interfaces.

**Action** Use the `show lacp statistics interfaces interface-name` command to display LACP BPDU exchange information.

`show lacp statistics interfaces ae0`

Aggregated interface: ae0

| LACP Statistics: | LACP Rx | LACP Tx | Unknown Rx | Illegal Rx |
|------------------|---------|---------|------------|------------|
| xe-0/0/2         | 1352    | 2035    | 0          | 0          |
| xe-0/0/3         | 1352    | 2056    | 0          | 0          |

**Meaning** The output here shows that the link is up and that PDUs are being exchanged.

- Related Documentation**
- [Configuring Link Aggregation on page 101](#)
  - [Verifying the Status of a LAG Interface on page 113](#)
  - [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)
  - [Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108](#)
  - [show lacp statistics interfaces \(View\) on page 432](#)

## Troubleshooting an Aggregated Ethernet Interface

**Problem** **Description:** The `show interfaces terse` command shows that the LAG is down.

**Solution** Check the following:

- Verify that there is no configuration mismatch.
- Verify that all member ports are up.
- Verify that a LAG is part of family ethernet-switching (Layer 2 LAG) or family inet (Layer 3 LAG).



**NOTE:** Layer 2 LAGs are not supported on OCX Series switches.



- Verify that the LAG member is connected to the correct LAG at the other end.
- Verify that the LAG members belong to the same switch.

**Related  
Documentation**

- [Verifying the Status of a LAG Interface on page 113](#)
- [Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104](#)



## PART 6

# LAG Local Link Options

- [Understanding Local Link Bias on page 119](#)
- [Understanding Local Minimum Links on page 123](#)



## CHAPTER 7

# Understanding Local Link Bias

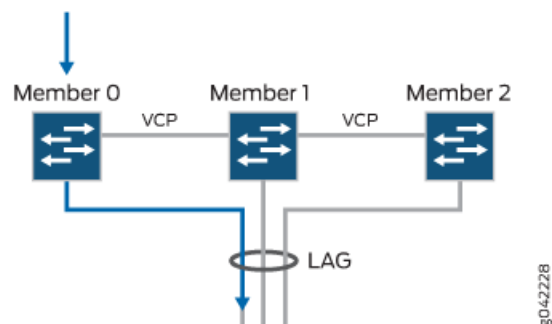
- [Understanding Local Link Bias on page 119](#)
- [Configuring Local Link Bias \(CLI Procedure\) on page 120](#)

### Understanding Local Link Bias

---

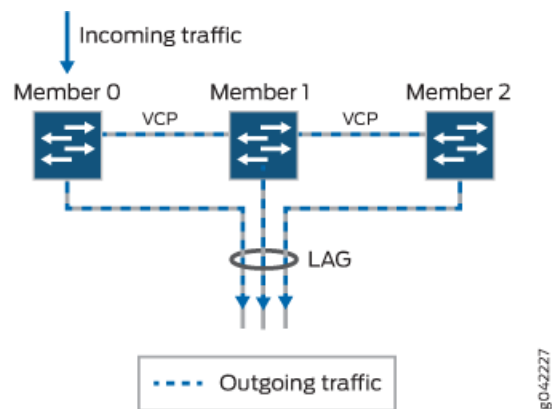
Local link bias conserves bandwidth on Virtual Chassis ports (VCPs) by using local links to forward unicast traffic exiting a Virtual Chassis or Virtual Chassis Fabric (VCF) that has a link aggregation group (LAG) bundle composed of member links on different member switches in the same Virtual Chassis or VCF. A local link is a member link in the LAG bundle that is on the member switch that received the traffic. Because traffic is received and forwarded on the same member switch when local link bias is enabled, no VCP bandwidth is consumed by traffic traversing the VCPs to exit the Virtual Chassis or VCF using a different member link in the LAG bundle. The flow of traffic exiting a Virtual Chassis or VCF over a LAG bundle when local link bias is enabled is illustrated in [Figure 1 on page 119](#).

**Figure 1: Egress Traffic Flow with Local Link Bias**



When local link bias is disabled, egress traffic exiting a Virtual Chassis or VCF on a LAG bundle can be forwarded out of any member link in the LAG bundle. Traffic forwarding decisions are made by an internal algorithm that attempts to load-balance traffic between the member links in the bundle. VCP bandwidth is frequently consumed by egress traffic when local link bias is disabled because the egress traffic traverses the VCPs to reach the destination egress member link in the LAG bundle. The flow of traffic exiting a Virtual Chassis or VCF over a LAG bundle when local link bias is disabled is illustrated in [Figure 2 on page 120](#).

Figure 2: Egress Traffic Flow without Local Link Bias



Starting in Junos OS Release 14.1X53-D25, local link bias can be enabled globally for all LAG bundles in a Virtual Chassis or VCF, or individually per LAG bundle in a Virtual Chassis. In prior Junos OS releases, local link bias could be enabled individually per LAG bundle only.

A Virtual Chassis or VCF that has multiple LAG bundles can contain bundles that have and have not enabled local link bias. Local link bias only impacts the forwarding of unicast traffic exiting a Virtual Chassis or VCF; ingress traffic handling is not impacted by the local link bias setting. Egress multicast, unknown unicast, and broadcast traffic exiting a Virtual Chassis or VCF over a LAG bundle is not impacted by the local link bias setting and is always load-balanced among the member links. Local link bias is disabled, by default.

You should enable local link bias if you want to conserve VCP bandwidth by always forwarding egress unicast traffic on the LAG bundle out of a local link. You should not enable local link bias if you want egress traffic load-balanced across the member links in the LAG bundle as it exits the Virtual Chassis or VCF.

#### Related Documentation

- [Configuring Local Link Bias \(CLI Procedure\) on page 120](#)

## Configuring Local Link Bias (CLI Procedure)

Local link bias is used to conserve bandwidth on Virtual Chassis ports (VCPs) by using local links to forward unicast traffic exiting a Virtual Chassis or Virtual Chassis Fabric (VCF) that has a link aggregation group (LAG) bundle composed of member links on different member switches in the same Virtual Chassis or VCF. A local link is a member link in the LAG bundle that is on the member switch that received the traffic. Because traffic is received and forwarded on the same member switch when local link bias is enabled, no VCP bandwidth is consumed by traffic traversing the VCPs to exit the Virtual Chassis or VCF on a different member link in the LAG bundle.

You should enable local link bias if you want to conserve VCP bandwidth by always forwarding egress unicast traffic on the LAG bundle out of a local link. You should not enable local link bias if you want egress traffic load-balanced across the member links in the LAG bundle as it exits the Virtual Chassis or VCF.

Local link bias can be enabled or disabled globally or per LAG bundle on a Virtual Chassis or VCF. In cases where local link bias is enabled at both the global and per LAG bundle levels, the per LAG bundle configuration takes precedence. For instance, if local link bias is enabled globally but disabled on a LAG bundle named **ae1**, local link bias is disabled on the LAG bundle named **ae1**.

- [Enabling Local Link Bias Globally on page 121](#)
- [Enabling Local Link Bias on a Single LAG Bundle in a Virtual Chassis or Virtual Chassis Fabric on page 121](#)
- [Disabling Local Link Bias Globally in a Virtual Chassis or Virtual Chassis Fabric on page 121](#)
- [Disabling Local Link Bias on a Single LAG Bundle in a Virtual Chassis or Virtual Chassis Fabric on page 122](#)

## Enabling Local Link Bias Globally

When local link bias is enabled globally, local link bias is enabled on all LAG bundles in the Virtual Chassis or VCF except the LAG bundles that have explicitly disabled local link bias.

To enable local link bias globally in a Virtual Chassis or VCF:

```
[edit]
user@switch# set forwarding-options local-bias (forwarding-options)
```

## Enabling Local Link Bias on a Single LAG Bundle in a Virtual Chassis or Virtual Chassis Fabric

When local link bias is enabled for a single LAG bundle, it remains enabled for that LAG bundle regardless of the global local link bias setting. If local link bias is enabled on a single LAG bundle but disabled globally, for instance, local link bias is enabled for the LAG bundle that was individually configured to enable local link bias but disabled for all other LAG bundles in the Virtual Chassis or VCF.

To enable local link bias on an individual LAG bundle:

```
[edit]
user@switch# set interface aex aggregated-ether-options local-bias (edit interfaces ae)
```

where **aex** is the name of the aggregated Ethernet link bundle.

For instance, to enable local link bias on aggregated Ethernet interface ae0:

```
[edit]
user@switch# set interface ae0 aggregated-ether-options local-bias
```

## Disabling Local Link Bias Globally in a Virtual Chassis or Virtual Chassis Fabric

You can disable local link bias globally if it was previously globally enabled.

When local link bias is disabled globally, local link bias is disabled on all LAG bundles in the Virtual Chassis or VCF except the LAG bundles that have explicitly enabled local link bias.

To disable local link bias globally in a Virtual Chassis or VCF:

```
[edit]
user@switch# set forwarding-options local-bias (forwarding-options) disable
```

## Disabling Local Link Bias on a Single LAG Bundle in a Virtual Chassis or Virtual Chassis Fabric

When local link bias is disabled for a single LAG bundle, it remains disabled for that LAG bundle regardless of the global local link bias setting. If local link bias is disabled on the LAG bundle named **ae1**, for instance, but enabled globally, local link bias is disabled on the LAG bundle named **ae1**.

To disable local link bias on an individual LAG bundle:

```
[edit]
user@switch# set interface aex aggregated-ether-options local-bias (edit interfaces ae) disable
```

where **aex** is the name of the aggregated Ethernet link bundle.

For instance, to disable local link bias on aggregated Ethernet interface ae0:

```
[edit]
user@switch# set interface ae0 aggregated-ether-options local-bias disable
```

### Related Documentation

- [Understanding Local Link Bias on page 119](#)



## CHAPTER 8

# Understanding Local Minimum Links

- [Understanding Local Minimum Links on page 123](#)

## Understanding Local Minimum Links

---



**NOTE:** When describing the local minimum links feature, *member links* are links that are part of an aggregated Ethernet bundle (LAG), *member switches* are chassis that are members in a Virtual Chassis or Virtual Chassis Fabric (VCF), and *local member links* (or simply *local links*) are member links of the same LAG that are local to a particular Virtual Chassis or VCF member switch.

A link aggregation group (LAG) can include member links on different chassis, and multiple local member links on member switches in a Virtual Chassis or VCF. If member links in the LAG fail, the LAG continues to carry traffic over the remaining member links that are still active. When multiple member links are local to one chassis and one or more of those links fail, LAG traffic coming into that chassis will be redistributed over the remaining local links. However, the remaining active local links can suffer traffic loss if the failed links result in sufficiently reduced total bandwidth through the chassis.

The local minimum links feature, introduced in Junos OS Release 14.1X53-D40, helps avoid traffic loss due to asymmetric bandwidth on LAG forwarding paths through a Virtual Chassis or VCF member switch when one or more local member links have failed.



**NOTE:** The local minimum links feature is supported on Virtual Chassis or VCFs with QFX5100 member switches only.

Based on a user-configured threshold value, when one or more member links fail, this feature marks any remaining active local links as “down,” forcing LAG traffic to be redistributed only through member links on *other* chassis. To enable this feature on a particular aggregated Ethernet interface (aex), you set the **local-minimum-links-threshold** configuration statement with a threshold value that represents the percentage of local member links that must be up on a chassis for *any* local member links on that chassis to continue to be active in the aggregated Ethernet bundle.

The configured threshold value:

- Applies to a specified aggregated Ethernet interface.
- Applies to any chassis that has links in the specified aggregated Ethernet bundle.
- Represents a percentage of active local member links out of the total number of local member links for the chassis.

When the local minimum links feature is enabled for a LAG, if one or more member links on a chassis fail, the feature compares the percentage of local member links that are still up to the threshold. If the percentage of “up” links is less than the threshold, the feature forces down the remaining active local links, and no traffic for the aggregated Ethernet interface will be forwarded through the member links on that chassis. If the percentage of links that are “up” is greater than or equal to the threshold, the status of the active links remains unchanged, and LAG traffic will continue to be distributed over available member links on that chassis.

For example, consider a member switch in a Virtual Chassis Fabric that has four links that are active member links of a LAG, and the local minimum links feature is enabled with the threshold set to 60:

- If one member link goes down, 75 percent (three out of four) of the links are still up, which is greater than the threshold (60 percent), so the remaining links stay up.
- If two member links go down, only 50 percent (two out of four) of the links are “up”, so the local minimum links feature forces the remaining two active links “down.” The same is true if three member links fail, the remaining link is forced down as well.

The local minimum links feature tracks whether links are down because the link failed or the link was forced down, as well as when active, failed, or forced-down member links are added or removed. As a result, the feature can respond dynamically when:

- Failed local member links come back up.
- You change the configured threshold value, or you disable the local minimum links feature.
- Adding or removing local member links changes the total number of local member links, or changes the ratio of “up” links to total local member links as compared to the threshold.

For example, if a failed member link causes all local member links to be forced down, then that link comes back up and brings the percentage of “up” links above the current threshold, the system adjusts the status of the forced-down links to mark them up again as well.

You should enable this feature only if your system closely manages ingress and egress traffic forwarding paths on LAGs for individual chassis in a Virtual Chassis and VCFs, especially where local link bias is also enabled.

- [Configuring Local Minimum Links on page 125](#)
- [Local Minimum Links Effect on LAG Minimum Links on page 125](#)
- [Local Minimum Links and Local Link Bias on page 125](#)

## Configuring Local Minimum Links

The local minimum links feature is disabled by default. To enable this feature for a LAG bundle (which then applies to any chassis that has local member links in the LAG), simply configure a threshold value for the LAG interface, as follows:

```
[edit interfaces]
user@switch# set aggregated-ether-options aex local-minimum-links-threshold threshold-value
```

To update the threshold value, use the same command with the new threshold value.

To disable the local minimum links feature, delete the **local-minimum-links-threshold** statement from the configuration. Any links that were forced down by this feature are automatically brought up again within a few seconds.

## Local Minimum Links Effect on LAG Minimum Links

The per-chassis local minimum links threshold is similar to the [minimum-links](#) setting for a LAG bundle, which configures the minimum number of member links in the bundle that should be up for the aggregated Ethernet interface as a whole to be considered “up.” (See “[Configuring Link Aggregation](#)” on page 101 for details.) Local member links that fail or are forced down by the local minimum links feature contribute to the count of “up” links for the LAG as a whole. As a result, this feature can cause the entire LAG to be brought down if enough local links are forced down. Enabling and configuring the local minimum links feature is independent of LAG minimum links configuration, but you should carefully consider the combined potential effect on the LAG as a whole when configuring both features.

## Local Minimum Links and Local Link Bias

The local minimum links and local link bias features operate independently, but can influence each other’s traffic forwarding results. For example, when local link bias is enabled and would otherwise favor forwarding traffic out of local links in the aggregated Ethernet bundle, but those links are down because the local minimum links threshold is not currently met, outgoing traffic will be redirected through the VCPs to other Virtual Chassis or VCF member switches for forwarding. In that case, unanticipated increased VCP traffic can impact Virtual Chassis or VCF performance.

See “[Understanding Local Link Bias](#)” on page 119 for details on the local link bias feature.

### Related Documentation

- [local-minimum-links-threshold on page 277](#)
- [Understanding Aggregated Ethernet Interfaces and LACP on page 97](#)
- [Configuring Link Aggregation on page 101](#)

- [Understanding Local Link Bias on page 119](#)

## PART 7

# Redundant Trunk Groups

- [Understanding Redundant Trunk Groups on page 129](#)



## CHAPTER 9

# Understanding Redundant Trunk Groups

- [Understanding Redundant Trunk Links on page 129](#)
- [Example: Configuring Redundant Trunk Links for Faster Recovery on page 131](#)

## Understanding Redundant Trunk Links

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In a typical enterprise network composed of distribution and access layers, a redundant trunk link provides a simple solution for network recovery when a trunk port on a switch goes down. In that case, traffic is routed to another trunk port, keeping network convergence time to a minimum.

To configure a redundant trunk link, create a redundant trunk group. The redundant trunk group is configured on the access switch and contains two links: a primary or active link, and a secondary link. If the active link fails, the secondary link automatically starts forwarding data traffic without waiting for normal spanning-tree protocol convergence.

Data traffic is forwarded only on the active link. Data traffic on the secondary link is dropped and shown as dropped packets when you issue the operational mode command **show interfaces *interface-name* extensive**.

While data traffic is blocked on the secondary link, Layer 2 control traffic is still permitted. For example, an LLDP session can be run between two switches on the secondary link.

Rapid Spanning Tree Protocol (RSTP) is enabled by default on the switches to create a loop-free topology, but an interface is not allowed to be in both a redundant trunk group and in a spanning-tree protocol topology at the same time. You must disable RSTP on an interface if a redundant trunk group is configured on that interface. For example, in [Figure 3 on page 130](#), in addition to disabling RSTP on the Switch 3 interfaces, you must also disable RSTP on the Switch 1 and Switch 2 interfaces connected to Switch 3. Spanning-tree protocols can, however, continue operating on other interfaces on those switches—for example on the link between Switch 1 and Switch 2.

[Figure 3 on page 130](#) shows three switches in a basic topology for redundant trunk links. Switch 1 and Switch 2 make up the distribution layer, and Switch 3 makes up the access layer. Switch 3 is connected to the distribution layer through trunk ports ge-0/0/9.0 (Link 1) and ge-0/0/10.0 (Link 2). Link 1 and Link 2 are in a redundant trunk group called group1. Link 1 is designated as the primary link. Traffic flows between Switch 3 in the access layer and Switch 1 in the distribution layer through Link 1. While Link 1 is active, Link 2 blocks traffic.

Figure 3: Redundant Trunk Group, Link 1 Active

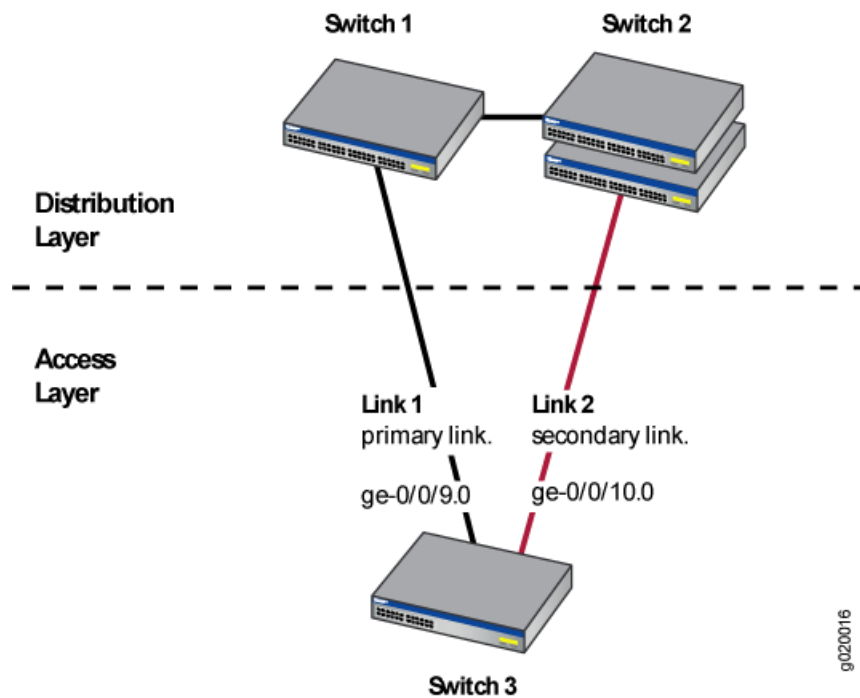
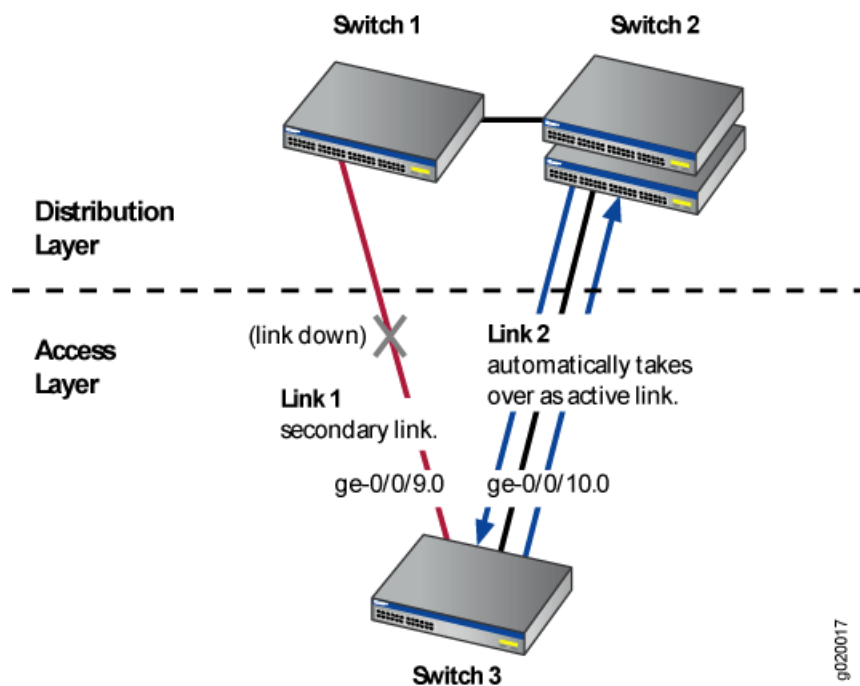


Figure 4 on page 130 illustrates how the redundant trunk link topology works when the primary link goes down.

Figure 4: Redundant Trunk Group, Link 2 Active





When Link 1 between Switch 1 and Switch 3 goes down, Link 2 takes over as the active link. Traffic between the access layer and the distribution layer is then automatically switched to Link 2 between Switch 1 and Switch 2.

**Related  
Documentation**

- [Example: Configuring Redundant Trunk Links for Faster Recovery](#)
- [Example: Configuring Redundant Trunk Links for Faster Recovery on page 131](#)

## Example: Configuring Redundant Trunk Links for Faster Recovery



**NOTE:** This example uses Junos OS for EX Series switches or QFX Series with support for the Enhanced Layer 2 Software (ELS) configuration style. If your EX Series switch runs software that does not support ELS, see *Example: Configuring Redundant Trunk Links for Faster Recovery*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

You can manage network convergence by configuring both a primary link and a secondary link on a switch; this is called a redundant trunk group (RTG). If the primary link in a redundant trunk group fails, it passes its known MAC address locations to the secondary link, which automatically takes over after one minute.

This example describes how to create a redundant trunk group with a primary and a secondary link:

- [Requirements on page 131](#)
- [Overview and Topology on page 132](#)
- [Disabling RSTP on Switches 1 and 2 on page 134](#)
- [Configuring Redundant Trunk Links on Switch 3 on page 134](#)
- [Verification on page 135](#)

## Requirements

This example uses the following hardware and software components:

- Two EX Series or QFX Series distribution switches
- One EX Series or QFX Series access switch
- The appropriate software release for your platform:
  - For EX Series switches: Junos OS Release 13.2X50-D10 or later
  - For the QFX Series: Junos OS Release 13.2X50-D15 or later

Before you configure the redundant trunk links network on the access and distribution switches, be sure you have:

- Configured interfaces ge-0/0/9 and ge-0/0/10 on the access switch, Switch 3, as trunk interfaces.

- Configured one trunk interface on each distribution switch, Switch 1 and Switch 2.
- Connected the three switches as shown in the topology for this example (see [Figure 5 on page 133](#)).

## Overview and Topology

In a typical enterprise network composed of distribution and access layers, a redundant trunk link provides a simple solution for trunk interface network recovery. When a trunk interface fails, data traffic is routed to another trunk interface after one minute, thereby keeping network convergence time to a minimum.

This example shows the configuration of a redundant trunk group that includes one primary link (and its interface) and one unspecified link (and its interface) that serves as the secondary link.

A second type of redundant trunk group, not illustrated in the example, consists of two unspecified links (and their interfaces); in this case, neither of the links is primary. The software selects an active link by comparing the port numbers of the two links and activating the link with the higher port number. For example, if the two link interfaces use interfaces ge-0/1/0 and ge-0/1/1, the software activates ge-0/1/1. (In the interface names, the final number is the port number.)

The two links in a redundant trunk group generally operate the same way, whether they are configured as primary/unspecified or unspecified/unspecified. Data traffic initially passes through the active link but is blocked on the inactive link. While data traffic is blocked on the secondary link, note that Layer 2 control traffic is still permitted if the link is active. For example, an LLDP session can be run between two switches on the secondary link. If the active link either goes down or is disabled administratively, it broadcasts a list of its known MAC addresses for data traffic; the other link immediately picks up and adds the MAC addresses to its address table, becomes active, and begins forwarding traffic.

The one difference in operation between the two types of redundant trunk groups occurs when a primary link is active, goes down, is replaced by the secondary link, and then reactivates. When a primary link is re-enabled while the secondary link is active, the primary link waits 1 second (you can change the time interval by using the preempt cutover timer to accommodate your network) and then takes over as the active link. In other words, the primary link has priority and is always activated if it is available. This differs from the behavior of two unspecified links, both of which act as equals. Because the unspecified links are equal, the active link remains active until it either goes down or is disabled administratively; this is the only time that the other unspecified link learns the MAC addresses and immediately becomes active.

The example given here illustrates a primary/unspecified configuration for a redundant trunk group because that configuration gives you more control and is more commonly used.



**NOTE:** Rapid Spanning Tree Protocol (RSTP) is enabled by default on the switches to create a loop-free topology, but an interface is not allowed to be in both a redundant trunk group and in a spanning-tree protocol topology at the same time. You will need to disable RSTP on the two distribution switches in the example, Switch 1 and Switch 2. Spanning-tree protocols can, however, continue operating in other parts of the network—for example, between the distribution switches and also in links between distribution switches and the enterprise core.

Figure 5 on page 133 displays an example topology containing three switches. Switch 1 and Switch 2 make up the distribution layer, and Switch 3 makes up the access layer. Switch 3 is connected to the distribution layer through trunk interfaces ge-0/0/9.0 (Link 1) and ge-0/0/10.0 (Link 2).

Table 21 on page 134 lists the components used in this redundant trunk group.

Because RSTP and RTGs cannot operate simultaneously on a switch, you disable RSTP on Switch 1 and Switch 2 in the first configuration task, and you disable RSTP on Switch 3 in the second task.

The second configuration task creates a redundant trunk group called example 1 on Switch 3. The trunk interfaces ge-0/0/9.0 and ge-0/0/10.0 are the two links configured in the second configuration task. You configure the trunk interface ge-0/0/9.0 as the primary link. You configure the trunk interface ge-0/0/10.0 as an unspecified link, which becomes the secondary link by default.

Figure 5: Topology for Configuring the Redundant Trunk Links

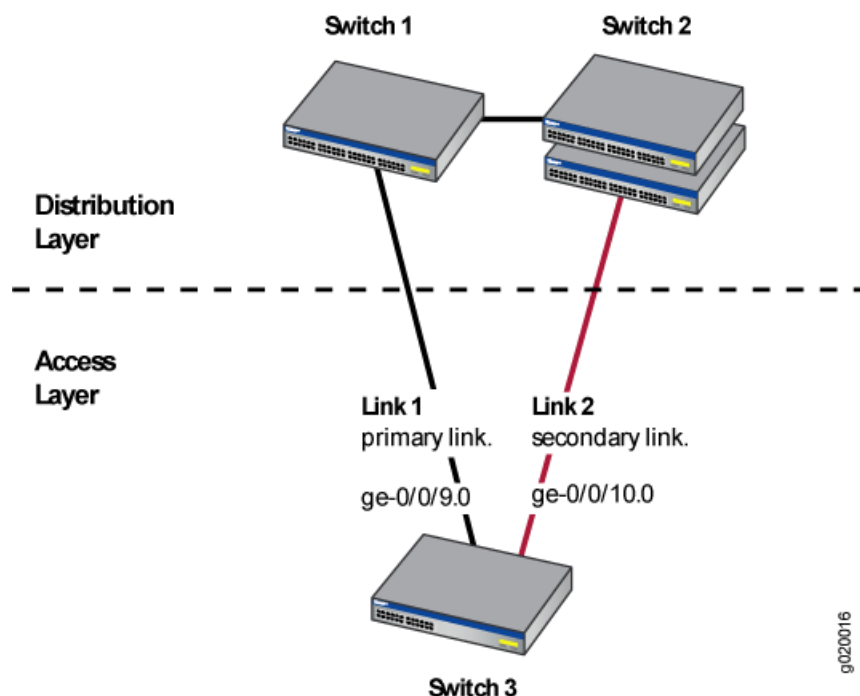


Table 21: Components of the Redundant Trunk Link Topology

| Property              | Settings                                                                                                                                                                                                                           |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Switch hardware       | <ul style="list-style-type: none"> <li>Switch 1–1 EX Series or QFX Series distribution switch</li> <li>Switch 2–1 EX Series or QFX Series distribution switch</li> <li>Switch 3–1 EX Series or QFX Series access switch</li> </ul> |
| Trunk interfaces      | On Switch 3 (access switch): ge-0/0/9.0 and ge-0/0/10.0                                                                                                                                                                            |
| Redundant trunk group | rtg0                                                                                                                                                                                                                               |

## Disabling RSTP on Switches 1 and 2

To disable RSTP on Switch 1 and Switch 2, perform this task on each switch:

**CLI Quick Configuration** To quickly disable RSTP on Switch 1 and Switch 2, copy the following command and paste it into each switch terminal window:

```
[edit]
set protocols rstp disable
```

**Step-by-Step Procedure** To disable RSTP on Switch 1 and Switch 2:

1. Disable RSTP on Switch 1 and Switch 2:

```
[edit]
user@switch# set protocols rstp disable
```

**Results** Check the results of the configuration:

```
[edit]
user@switch# show
protocols {
 rstp {
 disable;
 }
}
```

## Configuring Redundant Trunk Links on Switch 3

To configure redundant trunk links on Switch 3, perform this task:

**CLI Quick Configuration** To quickly configure the redundant trunk group rtg0 on Switch 3, copy the following commands and paste them into the switch terminal window:

```
[edit]
set protocols rstp disable
set switch-options redundant-trunk-group group rtg0 interface ge-0/0/9.0 primary
set switch-options redundant-trunk-group group rtg0 interface ge-0/0/10.0
set redundant-trunk-group group rtg0 preempt-cutover-timer 60
```

**Step-by-Step Procedure** Configure the redundant trunk group rtg0 on Switch 3.

1. Turn off RSTP:

```
[edit]
user@switch# set protocols rstp disable
```

2. Name the redundant trunk group `rtg0` while configuring trunk interface `ge-0/0/9.0` as the primary link and `ge-0/0/10` as an unspecified link to serve as the secondary link:

```
[edit switch-options]
user@switch# set redundant-trunk-group group rtg0 interface ge-0/0/9.0 primary
user@switch# set redundant-trunk-group group rtg0 interface ge-0/0/10.0
```

3. (Optional) Change the time interval (from the default of 1 second) that a re-enabled primary link waits to take over for an active secondary link:

```
[edit switch-options]
user@switch# set redundant-trunk-group group rtg0 preempt-cutover-timer 60
```

**Results** Check the results of the configuration:

```
[edit]
user@switch# show
switch-options
 redundant-trunk-group {
 group rtg0 {
 preempt-cutover-timer 60;
 interface ge-0/0/9.0 {
 primary;
 }
 interface ge-0/0/10.0;
 }
 }
protocols {
 rstp {
 disable;
 }
}
```

## Verification

To confirm that the configuration is set up correctly, perform this task:

- [Verifying That a Redundant Trunk Group Was Created on page 135](#)

### Verifying That a Redundant Trunk Group Was Created

**Purpose** Verify that the redundant trunk group `rtg0` has been created on Switch 1 and that trunk interfaces are members of the redundant trunk group.

**Action** List all redundant trunk groups configured on the switch:

```
user@switch> show redundant-trunk-group
```

| Group name | Interface   | State  | Time of last flap | Flap count |
|------------|-------------|--------|-------------------|------------|
| rtg0       | ge-0/0/9.0  | Up/Pri | Never             | 0          |
|            | ge-0/0/10.0 | Up     | Never             | 0          |

**Meaning** The **show redundant-trunk-group** command lists all redundant trunk groups configured on the switch as well as the interface names and their current states (up or down for an unspecified link, and up or down and primary for a primary link). For this configuration example, the output shows that the redundant trunk group **rtg0** is configured on the switch. The **Up** beside the interfaces indicates that both link cables are physically connected. The **Pri** beside trunk interface **ge-0/0/9.0** indicates that it is configured as the primary link.

**Related Documentation**

- [Understanding Redundant Trunk Links on page 129](#)

## PART 8

# Resilient Hashing

- [Understanding Resilient Hashing on page 139](#)





## CHAPTER 10

# Understanding Resilient Hashing

- [Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139](#)
- [Understanding the Use of Resilient Hashing to Minimize Flow Remapping in Trunk/ECMP Groups on page 144](#)
- [Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic \(CLI Procedure\) on page 146](#)
- [Configuring Resilient Hashing for Trunk/ECMP Groups on page 148](#)

## Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic

---

Juniper Networks EX Series and QFX Series use a hashing algorithm to determine how to forward traffic over a link aggregation group (LAG) bundle or to the next-hop device when equal-cost multipath (ECMP) is enabled.

The hashing algorithm makes hashing decisions based on values in various packet fields, as well as on some internal values like source port ID and source device ID. You can configure some of the fields that are used by the hashing algorithm.

This topic contains the following sections:

- [Understanding the Hashing Algorithm on page 139](#)
- [IP \(IPv4 and IPv6\) on page 140](#)
- [MPLS on page 142](#)
- [MAC-in-MAC Packet Hashing on page 143](#)
- [Layer 2 Header Hashing on page 143](#)

## Understanding the Hashing Algorithm

The hashing algorithm is used to make traffic-forwarding decisions for traffic entering a LAG bundle or for traffic exiting a switch when ECMP is enabled.

For LAG bundles, the hashing algorithm determines how traffic entering a LAG bundle is placed onto the bundle's member links. The hashing algorithm tries to manage bandwidth by evenly load-balancing all incoming traffic across the member links in the bundle.

For ECMP, the hashing algorithm determines how incoming traffic is forwarded to the next-hop device.

The hashing algorithm makes hashing decisions based on values in various packet fields, as well as on some internal values like source port ID and source device ID. The packet fields used by the hashing algorithm varies by the packet's EtherType and, in some instances, by the configuration on the switch. The hashing algorithm recognizes the following EtherTypes:

- IP (IPv4 and IPv6)
- MPLS
- MAC-in-MAC

Traffic that is not recognized as belonging to any of these EtherTypes is hashed based on the Layer 2 header. IP and MPLS traffic are also hashed based on the Layer 2 header when a user configures the hash mode as Layer 2 header.

You can configure some fields that are used by the hashing algorithm to make traffic forwarding decisions. You cannot, however, configure how certain values within a header are used by the hashing algorithm.

Note the following points regarding the hashing algorithm:

- The fields selected for hashing are based on the packet type only. The fields are not based on any other parameters, including forwarding decision (bridged or routed) or egress LAG bundle configuration (Layer 2 or Layer 3).
- The same fields are used for hashing unicast and multicast packets. Unicast and multicast packets are, however, hashed differently.
- The same fields are used by the hashing algorithm to hash ECMP and LAG traffic, but the hashing algorithm hashes ECMP and LAG traffic differently. The different hashing ensures that traffic is not polarized when a LAG bundle is part of the ECMP next-hop path.
- The same fields are used for hashing regardless of whether the switch is or is not participating in a mixed or non-mixed Virtual Chassis or Virtual Chassis Fabric (VCF).

The fields used for hashing by each EtherType as well as the fields used by the Layer 2 header are discussed in the following sections.

## IP (IPv4 and IPv6)

Payload fields in IPv4 and IPv6 packets are used by the hashing algorithm when IPv4 or IPv6 packets need to be placed onto a member link in a LAG bundle or sent to the next-hop device when ECMP is enabled.

The hash mode is set to Layer 2 payload field, by default. IPv4 and IPv6 payload fields are used for hashing when the hash mode is set to Layer 2 payload.

If the hash mode is configured to Layer 2 header, IPv4, IPv6, and MPLS packets are hashed using the Layer 2 header fields. If you want incoming IPv4, IPv6, and MPLS packets hashed

by the source MAC address, destination MAC address, or EtherType fields, you must set the hash mode to Layer 2 header.

Table 22 on page 141 displays the IPv4 and IPv6 payload fields that are used by the hashing algorithm, by default.

- ✓—Field is used by the hashing algorithm, by default.
- X—Field is not used by the hashing algorithm, by default.
- (configurable)—Field can be configured to be used or not used by the hashing algorithm.

**Table 22: IPv4 and IPv6 Hashing Fields**

| Fields                      | EX4300              |                     | QFX5100             |                     |
|-----------------------------|---------------------|---------------------|---------------------|---------------------|
|                             | LAG                 | ECMP                | LAG                 | ECMP                |
| Source MAC                  | X                   | X                   | X                   | X                   |
| Destination MAC             | X                   | X                   | X                   | X                   |
| EtherType                   | X                   | X                   | X                   | X                   |
| VLAN ID                     | X<br>(configurable) | X<br>(configurable) | X<br>(configurable) | X<br>(configurable) |
| Source IP or IPv6           | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| Destination IP or IPv6      | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| Protocol (IPv4 only)        | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| Next header (IPv6 only)     | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| Layer 4 Source Port         | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| Layer 4 Destination Port    | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) | ✓<br>(configurable) |
| IPv6 Flow label (IPv6 only) | X                   | X                   | X                   | X                   |

## MPLS

The hashing algorithm hashes MPLS packets using the source IP, destination IP, MPLS label 0, MPLS label 1, and MPLS label 2 fields.

[Table 23 on page 142](#) displays the MPLS payload fields that are used by the hashing algorithm, by default:

- ✓—Field is used by the hashing algorithm, by default.
- X—Field is not used by the hashing algorithm, by default.

The fields used by the hashing algorithm for MPLS packet hashing are not user-configurable.

The source IP and destination IP fields are not always used for hashing. For non-terminated MPLS packets, the payload is checked if the bottom of stack (BoS) flag is seen in the packet. If the payload is IPv4 or IPv6, then the IP source address and IP destination address fields are used for hashing along with the MPLS labels. If the BoS flag is not seen in the packet, only the MPLS labels are used for hashing.

**Table 23: MPLS Hashing Fields**

| Field                          | EX4300 | QFX5100 |
|--------------------------------|--------|---------|
| Source MAC                     | X      | X       |
| Destination MAC                | X      | X       |
| EtherType                      | X      | X       |
| VLAN ID                        | X      | X       |
| Source IP                      | ✓      | ✓       |
| Destination IP                 | ✓      | ✓       |
| Protocol (for IPv4 packets)    | X      | X       |
| Next header (for IPv6 packets) | X      | X       |
| Layer 4 Source Port            | X      | X       |
| Layer 4 Destination Port       | X      | X       |
| IPv6 Flow lab                  | X      | X       |
| MPLS label 0                   | ✓      | ✓       |
| MPLS label 1                   | ✓      | ✓       |

Table 23: MPLS Hashing Fields (*continued*)

| Field        | EX4300 | QFX5100 |
|--------------|--------|---------|
| MPLS label 2 | ✓      | ✓       |

## MAC-in-MAC Packet Hashing

Packets using the MAC-in-MAC EtherType are hashed by the hashing algorithm using the Layer 2 payload source MAC, Layer 2 payload destination MAC, and Layer 2 payload EtherType fields. See [Table 24 on page 143](#).

Hashing using the fields in the MAC-in-MAC EtherType packet is first supported on EX4300 switches in Release 13.2X51-D20. Hashing using the fields in the MAC-in-MAC EtherType is not supported on earlier releases.

The fields used by the hashing algorithm for MAC-in-MAC hashing are not user-configurable.

- ✓—Field is used by the hashing algorithm, by default.
- X—Field is not used by the hashing algorithm, by default.

Table 24: MAC-in-MAC Hashing Fields

| Field                           | EX4300 | QFX5100 |
|---------------------------------|--------|---------|
| Layer 2 Payload Source MAC      | ✓      | ✓       |
| Layer 2 Payload Destination MAC | ✓      | ✓       |
| Layer 2 Payload EtherType       | ✓      | ✓       |
| Layer 2 Payload Outer VLAN      | X      | X       |

## Layer 2 Header Hashing

Layer 2 header fields are used by the hashing algorithm when a packet's EtherType is not recognized as IP (IPv4 or IPv6), MPLS, or MAC-in-MAC. The Layer 2 header fields are also used for hashing IPv4, IPv6, and MPLS traffic instead of the payload fields when the hash mode is set to Layer 2 header.

- ✓—Field is used by the hashing algorithm, by default.
- X—Field is not used by the hashing algorithm, by default.
- (configurable)—Field can be configured to be used or not used by the hashing algorithm.

Table 25: Layer 2 Header Hashing Fields

| Field           | EX4300              | QFX5100             |
|-----------------|---------------------|---------------------|
| Source MAC      | ✓<br>(configurable) | ✓<br>(configurable) |
| Destination MAC | ✓<br>(configurable) | ✓<br>(configurable) |
| EtherType       | ✓<br>(configurable) | ✓<br>(configurable) |
| VLAN ID         | X<br>(configurable) | X<br>(configurable) |

**Related  
Documentation**

- [Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic \(CLI Procedure\) on page 146](#)

## Understanding the Use of Resilient Hashing to Minimize Flow Remapping in Trunk/ECMP Groups

You use resilient hashing to minimize flow remapping across members of a trunk/ECMP group in a load-balanced system. You can configure resilient hashing in link aggregation groups (LAGs) and in equal cost multipath (ECMP) groups.

- [Why You Might Want to Use Resilient Hashing and How It Works with Static Hashing on page 144](#)
- [Limitations and Caveats for Resilient Hashing on page 145](#)
- [Resilient Hashing on LAGs on page 146](#)
- [Resilient Hashing on ECMP on page 146](#)

### Why You Might Want to Use Resilient Hashing and How It Works with Static Hashing

Resilient hashing works in conjunction with the default static hashing algorithm. When members are added to or deleted from a trunk/ECMP group, the static hashing algorithm might remap destination paths. Resilient hashing distributes traffic across all members of a group by tracking the flow's member utilization. When a flow is affected by a member change, the Packet Forwarding Engine rebalances the flow by reprogramming the flow set table.

Resilient hashing thus provides the following benefits:

- Minimizes traffic-distribution imbalances among members of a trunk/ECMP group when members are added to or deleted from the group.

- Minimizes the impact on flows bound to unaffected members when a new member is added or an existing member is deleted from the group.

In normal hash-based load balancing, with the static hashing algorithm used alone, flows are assigned to members through the mathematical mod (%) operation. Any increase or decrease in the number of group members results in a complete remapping of flows to member IDs, as shown in the following example:

- Member ID = Hash (key) mod (number of members in group)
- Example:
  - Hash (key) = 10
  - $10 \bmod 5 = 0$  (member with ID 0 is selected for flow)
  - $10 \bmod 4 = 2$  (member with ID 2 is selected for the same flow when the number of members is decreased by 1)

Resilient hashing minimizes the destination path remapping when a member in the trunk/ECMP group is added or deleted.

When the flow is affected by a member change in the group, resilient hashing rebalances the flow by reprogramming the flow set table.

**Table 26: Destination Path Results for Static Hashing and for Resilient Hashing When Members Are Added to or Deleted from Trunk Groups**

| Trunk Group Size | Normal (Static) Hashing Result                       | Resilient Hashing Result                                                                | Notes                                                                         |
|------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 4                | Hash(10) % 4 = 2<br>Flow is assigned to member ID 2. | Flow is assigned to one of four group members based on flow set table entries.          | Original trunk/ECMP group size is 4.                                          |
| 3                | Hash(10) % 3 = 1<br>Flow is assigned to member ID 1. | Flow is assigned to same member as in the previous case.                                | Delete one member from original trunk/ECMP group. Trunk/ECMP group size is 3. |
| 5                | Hash(10) % 5 = 0<br>Flow is assigned to member ID 0. | There is minimal redistribution of flows from other members to this newly added member. | Add one member to original trunk group. Trunk/ECMP group size is 5.           |

## Limitations and Caveats for Resilient Hashing

Notice the following limitation and caveats for the resilient hashing feature:

- Resilient hashing applies only to unicast traffic.
- Resilient hashing supports a maximum of 1024 trunk groups, with each group having a maximum of 256 members. (See [“Understanding Aggregated Ethernet Interfaces and LACP” on page 97](#) for details about how many LAGs and LAG members are supported on the switches.)

- Resilient hashing does not guarantee that traffic distribution is even across all group members—it depends on the traffic pattern and on the organization of the resilient hashing flow set table in hardware. Resilient hashing *minimizes* remapping of flows to destination links when members are added to or deleted from the group.
- If resilient hashing is enabled on a trunk group or ECMP group and if **set forwarding-options enhanced-hash-key** with one of the options **hash-mode**, **inet**, **inet6**, or **layer2** is used, some flows might change destination links, because the new hash parameters might generate new hash indexes for the flows, and hence the new destination links.
- Resilient hashing is not supported on Virtual Chassis port (VCP) links.

## Resilient Hashing on LAGs

A LAG combines Ethernet interfaces (members) to form a logical point-to-point link that increases bandwidth, provides reliability, and allows load balancing. Resilient hashing minimizes destination remapping behavior when a new member is added or deleted from the LAG.

A resilient hashing configuration on LAGs is per-aggregated-Ethernet-interface-based.

## Resilient Hashing on ECMP

An ECMP group for a route contains multiple next-hop equal cost addresses for the same destination in the routing table. (Routes of equal cost have the same preference and metric values.)

Junos OS uses the static hashing algorithm to choose one of the next-hop addresses in the ECMP group to install in the forwarding table. Resilient hashing enhances ECMPs by minimizing destination remapping behavior when a new member is added or deleted from the ECMP group.

A resilient hashing configuration on ECMP is global—it applies to all ECMP groups.

### Related Documentation

- [Configuring Resilient Hashing for Trunk/ECMP Groups on page 148](#)

---

## Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic (CLI Procedure)

---

Juniper Networks EX Series and QFX Series switches use a hashing algorithm to determine how to forward traffic over a Link Aggregation group (LAG) bundle or to the next-hop device when equal-cost multipath (ECMP) is enabled.

The hashing algorithm makes hashing decisions based on values in various packet fields, as well as on some internal values like source port ID and source device ID. You can configure some of the fields that are used by the hashing algorithm.

Configuring the fields used by the hashing algorithm is useful in scenarios where most of the traffic entering the bundle is similar and the traffic needs to be managed in the LAG bundle. For instance, if the only difference in the IP packets for all incoming traffic



is the source and destination IP address, you can tune the hashing algorithm to make hashing decisions more efficiently by configuring the algorithm to make hashing decisions using only those fields.

- [Configuring the Hashing Algorithm to Use Fields in the Layer 2 Header for Hashing on page 147](#)
- [Configuring the Hashing Algorithm to Use Fields in the IP Payload for Hashing on page 147](#)
- [Configuring the Hashing Algorithm to Use Fields in the IPv6 Payload for Hashing on page 148](#)

## Configuring the Hashing Algorithm to Use Fields in the Layer 2 Header for Hashing

To configure the hashing algorithm to use fields in the Layer 2 header for hashing:

1. Configure the hash mode to Layer 2 header:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set hash-mode layer2-header
```

The default hash mode is Layer 2 payload. Therefore, this step must be performed if you have not previously configured the hash mode.

2. Configure the fields in the Layer 2 header that the hashing algorithm uses for hashing:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set layer2 {no-destination-mac-address | no-ether-type |
no-source-mac-address | vlan-id}
```

By default, the hashing algorithm uses the values in the destination MAC address, Ethertype, and source MAC address fields in the header to hash traffic on the LAG. You can configure the hashing algorithm to not use the values in these fields by configuring **no-destination-mac-address**, **no-ether-type**, or **no-source-mac-address**.

You can also configure the hashing algorithm to include the VLAN ID field in the header by configuring the **vlan-id** option.

If you want the hashing algorithm to not use the Ethertype field for hashing:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set layer2 no-ether-type
```

## Configuring the Hashing Algorithm to Use Fields in the IP Payload for Hashing

To configure the hashing algorithm to use fields in the IP payload for hashing:

1. Configure the hash mode to Layer 2 payload:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set hash-mode layer2-payload
```

The IP payload is not checked by the hashing algorithm unless the hash mode is set to Layer 2 payload. The default hash mode is Layer 2 payload.

2. Configure the fields in the IP payload that the hashing algorithm uses for hashing:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set inet {no-ipv4-destination-address | no-ipv4-source-address |
no-l4-destination-port | no-l4-source-port | no-protocol | vlan-id}
```

For instance, if you want the hashing algorithm to ignore the Layer 4 destination port, Layer 4 source port, and protocol fields and instead hash traffic based only on the IPv4 source and destination addresses:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set inet no-l4-destination-port no-l4-source-port no-protocol
```

## Configuring the Hashing Algorithm to Use Fields in the IPv6 Payload for Hashing

To configure the hashing algorithm to use fields in the IPv6 payload for hashing:

1. Configure the hash mode to Layer 2 payload:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set hash-mode layer2-payload
```

The IPv6 payload is not checked by the hashing algorithm unless the hash mode is set to Layer 2 payload. The default hash mode is Layer 2 payload.

2. Configure the fields in the IPv6 payload that the hashing algorithm uses for hashing:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set inet6 {no-ipv6-destination-address | no-ipv6-source-address |
no-l4-destination-port | no-l4-source-port | no-next-header | vlan-id}
```

For instance, if you want the hashing algorithm to ignore the Layer 4 destination port, Layer 4 source port, and the Next Header fields and instead hash traffic based only on the IPv6 source and IPv6 destination address fields only:

```
[edit forwarding-options enhanced-hash-key]
user@switch# set inet6 no-l4-destination-port no-l4-source-port no-next-header
```

### Related Documentation

- [Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139](#)
- [Understanding Aggregated Ethernet Interfaces and LACP](#)

---

## Configuring Resilient Hashing for Trunk/ECMP Groups

You use resilient hashing to minimize flow remapping across members of a trunk/ECMP group in a load-balanced system. You can configure resilient hashing in link aggregation groups (LAGs) and in equal cost multipath (ECMP) sets.

This topic includes:

1. [Configuring Resilient Hashing on LAGs on page 149](#)
2. [Configuring Resilient Hashing on ECMP Groups on page 149](#)

## Configuring Resilient Hashing on LAGs

To enable resilient hashing for a LAG:

- Configure resilient hashing on the aggregated Ethernet interface:

```
[edit interfaces]
user@switch# set aex aggregated-ether-options resilient-hash
```

## Configuring Resilient Hashing on ECMP Groups

To enable resilient hashing for ECMP groups:

- Configure resilient hashing for ECMP:

```
[edit forwarding-options]
user@switch# set enhanced-hash-key ecmp-resilient-hash
```

### Related Documentation

- [Understanding the Use of Resilient Hashing to Minimize Flow Remapping in Trunk/ECMP Groups on page 144](#)



## PART 9

# Uplink Failure Detection

- [Understanding Uplink Failure Detection on page 153](#)



## CHAPTER 11

# Understanding Uplink Failure Detection

- [Overview of Uplink Failure Detection on page 153](#)
- [Configuring Interfaces for Uplink Failure Detection on page 155](#)
- [Example: Configuring Interfaces for Uplink Failure Detection on page 156](#)

## Overview of Uplink Failure Detection

---

Uplink failure detection allows a switch to detect link failure on uplink interfaces and to propagate this information to the downlink interfaces, so that servers connected to those downlinks can switch over to secondary interfaces.

Uplink failure detection supports network adapter teaming and provides network redundancy. In network adapter teaming, all of the network interface cards (NICs) on a server are configured in a primary or secondary relationship and share the same IP address. When the primary link goes down, the server transparently shifts the connection to the secondary link. With uplink failure detection, the switch monitors uplink interfaces for link failures. When it detects a failure, it disables the downlink interfaces. When the server detects disabled downlink interfaces, it switches over to the secondary link to help ensure that the traffic of the failed link is not dropped.

This topic describes:

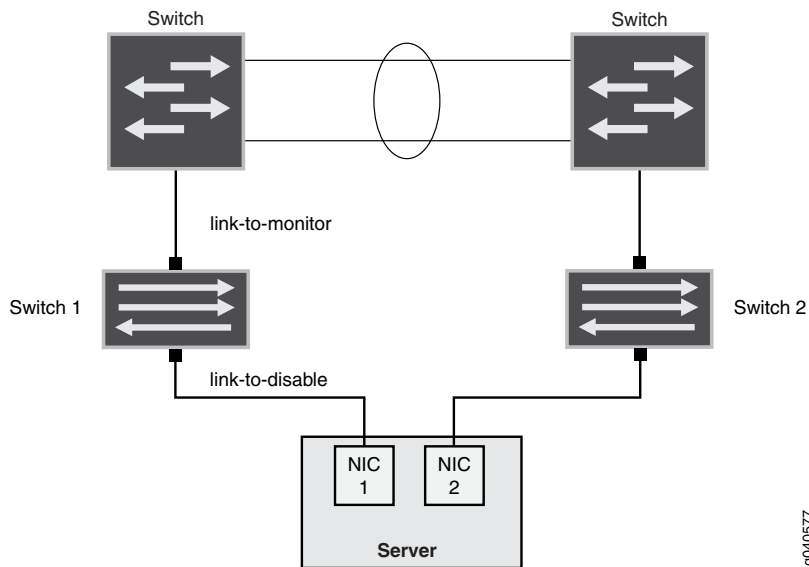
- [Uplink Failure Detection Configuration on page 153](#)
- [Failure Detection Pair on page 154](#)

## Uplink Failure Detection Configuration

Uplink failure detection allows switches to monitor uplink interfaces to spot link failures. When a switch detects a link failure, it automatically disables the downlink interfaces bound to the uplink interface. A server that is connected to the disabled downlink interface triggers a network adapter failover to a secondary link to avoid any traffic loss.

[Figure 6 on page 154](#) illustrates a typical setup for uplink failure detection.

Figure 6: Uplink Failure Detection Configuration on Switches



For uplink failure detection, you specify a group of uplink interfaces to be monitored and downlink interfaces to be brought down when an uplink fails. The downlink interfaces are bound to the uplink interfaces within the group. If all uplink interfaces in a group go down, then the switch brings down all downlink interfaces within that group. If any uplink interface returns to service, then the switch brings all downlink interfaces in that group back to service.

The switch can monitor both physical interface links and logical interface links for uplink failures, but you must put the two types of interfaces into separate groups.



**NOTE:** For logical interfaces, the server must send keepalives between the switch and the server to detect failure of logical links.

## Failure Detection Pair

Uplink failure detection requires that you create pairs of uplink and downlink interfaces in a group. Each pair includes one of each of the following:

- A link-to-monitor interface—The link-to-monitor interfaces specify the uplinks the switch monitors. You can configure a maximum of 48 uplink interfaces as link-to-monitor interfaces for a group.
- A link-to-disable interface—The link-to-disable interfaces specify the downlinks the switch disables when the switch detects an uplink failure. You can configure a maximum of 48 downlinks to disable in the group.

The link-to-disable interfaces are bound to the link-to-monitor interfaces within the group. When a link-to-monitor interface returns to service, the switch automatically enables all link-to-disable interfaces in the group.



- Related Documentation**
- [Configuring Interfaces for Uplink Failure Detection on page 155](#)
  - [Example: Configuring Interfaces for Uplink Failure Detection on page 156](#)

## Configuring Interfaces for Uplink Failure Detection

You can configure uplink failure detection to help ensure balanced traffic flow. Using this feature, switches can monitor and detect link failure on uplink interfaces and can propagate the failure information to downlink interfaces, so that servers connected to those downlinks can switch over to secondary interfaces.

Follow these configuration guidelines:

- Configure an interface in only one group.
- Configure a maximum of 48 groups for each switch.
- Configure a maximum of 48 uplinks to monitor and a maximum of 48 downlinks to disable in each group.
- Configure physical links and logical links in separate groups.

To configure uplink failure detection on a switch:

1. Specify a name for an uplink failure detection group:

```
[edit protocols]
user@switch# set uplink-failure-detection group group-name
```

2. Add an uplink interface to the group:

```
[edit protocols]
user@switch# set uplink-failure-detection group group-name link-to-monitor interface-name
```

3. Repeat Step 2 for each uplink interface you add to the group.

4. Add a downlink interface to the group:

```
[edit protocols]
user@switch# set uplink-failure-detection group group-name link-to-disable interface-name
```

5. Repeat Step 4 for each downlink interface you add to the group.



**NOTE:** After you have configured an uplink failure detection group, use the `show uplink-failure-detection group (Uplink Failure Detection) group-name` command to verify that all interfaces in the group are up. If the interfaces are down, uplink failure detection does not work.

- Related Documentation**
- [Overview of Uplink Failure Detection on page 153](#)
  - [Example: Configuring Interfaces for Uplink Failure Detection on page 156](#)
  - [Verifying That Uplink Failure Detection Is Working Correctly](#)

## Example: Configuring Interfaces for Uplink Failure Detection

---

Uplink failure detection allows a switch to detect link failure on uplink interfaces and to propagate the failure information to the downlink interfaces. All of the network interface cards (NICs) on a server are configured as being either the primary link or the secondary link and share the same IP address. When the primary link goes down, the server transparently shifts the connection to the secondary link to ensure that the traffic on the failed link is not dropped.

This example describes:

- [Requirements on page 156](#)
- [Overview and Topology on page 156](#)
- [Configuring Uplink Failure Detection on Both Switches on page 157](#)
- [Verification on page 158](#)

### Requirements

This example uses the following software and hardware components:

- Junos OS Release 12.1 or later for the QFX Series
- Two QFX3500 switches
- Two aggregation switches
- One dual-homed server

### Overview and Topology

The topology in this example illustrates how to configure uplink failure detection on Switch A and Switch B. Switch A and Switch B are both configured with a link-to-monitor interface (the uplink interface to the aggregation switch) and a link-to-disable interface (the downlink interface to the server). For simplicity, only one group of link-to-monitor interfaces and link-to-disable interfaces is configured for each switch. The server is dual-homed to both Switch A and Switch B. In this scenario, if the link-to-monitor interface to Switch A is disabled, the server uses the link-to-monitor interface to Switch B instead.



**NOTE:** This example does not describe how to configure the dual-homed server or the aggregation switches. Please refer to the documentation for each of these devices for more information.

---

Figure 6 on page 154 illustrates a typical setup for uplink failure detection.

Figure 7: Uplink Failure Detection Configuration on Switches

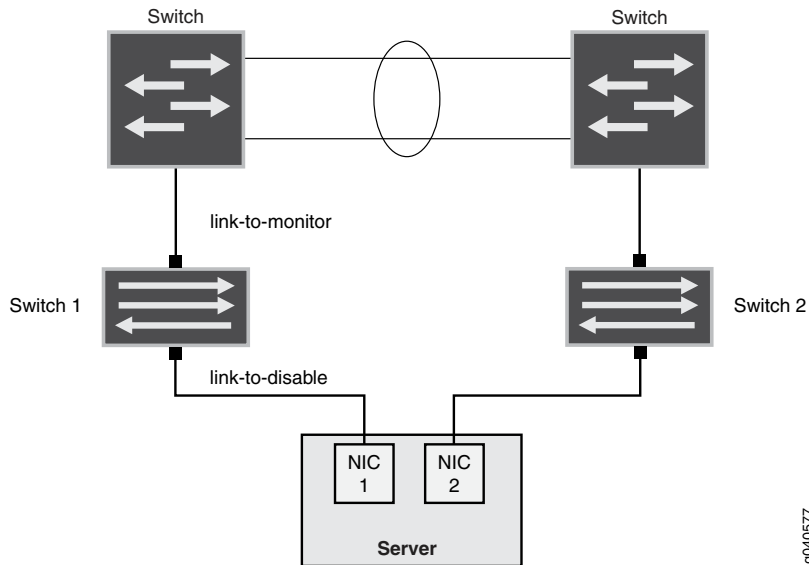


Table 27 on page 157 lists uplink failure settings for each QFX3500 switch.

Table 27: Settings for Uplink Failure Protection Example

| Switch A                                                                                                                                                                     | Switch B                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Group name: Group1</li> <li>Link-to-monitor interface: <b>xe-0/0/0</b></li> <li>Link-to-disable interface: <b>xe-0/0/1</b></li> </ul> | <ul style="list-style-type: none"> <li>Group name: Group2</li> <li>Link-to-monitor interface: <b>xe-0/0/0</b></li> <li>Link-to-disable interface: <b>xe-0/0/1</b></li> </ul> |

## Configuring Uplink Failure Detection on Both Switches

To configure uplink failure detection on both switches, perform these tasks:

### CLI Quick Configuration

To quickly configure uplink failure protection on Switch A and Switch B, copy the following commands and paste them into the switch terminal window:

```
[edit protocols]
set uplink-failure-detection group group1
set uplink-failure-detection group group2
set uplink-failure-detection group group1 link-to-monitor xe-0/0/0
set uplink-failure-detection group group2 link-to-monitor xe-0/0/0
set uplink-failure-detection group group1 link-to-disable xe-0/0/1
set uplink-failure-detection group group2 link-to-disable xe-0/0/1
```

### Step-by-Step Procedure

To configure uplink failure protection on both switches:

- Specify a name for the uplink failure detection group on Switch A:

```
[edit protocols]
user@switch# set uplink-failure-detection group group1
```

- Add an uplink interface to the group on Switch A:

```
[edit protocols]
user@switch# set uplink-failure-detection group group1 link-to-monitor xe-0/0/0
```

3. Add a downlink interface to the group on Switch A:  

```
[edit protocols]
user@switch# set uplink-failure-detection group group1 link-to-disable xe-0/0/1
```
4. Specify a name for the uplink failure detection group on Switch B:  

```
[edit protocols]
user@switch# set uplink-failure-detection group group2
```
5. Add an uplink interface to the group on Switch B:  

```
[edit protocols]
user@switch# set uplink-failure-detection group group2 link-to-monitor xe-0/0/0
```
6. Add a downlink interface to the group on Switch B:  

```
[edit protocols]
user@switch# set uplink-failure-detection group group2 link-to-disable xe-0/0/1
```

**Results** Display the results of the configuration:

```
uplink-failure-detection {
 group {
 group1 {
 link-to-monitor {
 xe-0/0/0;
 }
 link-to-disable {
 xe-0/0/1;
 }
 }
 group2 {
 link-to-monitor {
 xe-0/0/0;
 }
 link-to-disable {
 xe-0/0/1;
 }
 }
 }
}
```

## Verification

To verify that uplink failure detection is working correctly, perform the following tasks on Switch A and Switch B:

- [Verifying That Uplink Failure Detection is Working Correctly on page 158](#)

### Verifying That Uplink Failure Detection is Working Correctly

**Purpose** Verify that the switch disables the downlink interface when it detects an uplink failure.

- Action** 1. View the current uplink failure detection status:

```
user@switch> show uplink-failure-detection
Group : group1
Uplink : xe-0/0/0*
Downlink : xe-0/0/1*
Failure Action : Inactive
```



**NOTE:** The asterisk (\*) indicates that the link is up.

2. Disable the uplink interface:

```
[edit]
user@switch# set interface xe-0/0/0 disable
```

3. Save the configuration on the switch.

4. View the current uplink failure detection status:

```
user@switch> show uplink-failure-detection
Group : group1
Uplink : xe-0/0/0
Downlink : xe-0/0/1
Failure Action : Active
```

**Meaning** The output in Step 1 shows that the uplink interface is up, and hence that the downlink interface is also up, and that the status of **Failure Action** is **Inactive**.

The output in Step 4 shows that both the uplink and downlink interfaces are down (there are no asterisks after the interface name) and that the status of **Failure Action** is changed to **Active**. This output shows that uplink failure detection is working.

**Related Documentation**

- [Overview of Uplink Failure Detection on page 153](#)
- [Configuring Interfaces for Uplink Failure Detection on page 155](#)
- [Verifying That Uplink Failure Detection Is Working Correctly](#)



## PART 10

# Configuration Statements and Operational Commands

- [Interfaces Configuration Statements on page 163](#)
- [Ethernet OAM Link Fault Management Configuration Statements on page 237](#)
- [GRE Configuration Statements on page 259](#)
- [IP Directed Broadcast Configuration Statement on page 261](#)
- [LAGs and LACP Configuration Statements on page 263](#)
- [LAG Local Link Options Configuration Statements on page 275](#)
- [Redundant Trunk Groups Configuration Statements on page 279](#)
- [Resilient Hashing Configuration Statements on page 285](#)
- [Uplink Failure Detection Configuration Statements on page 295](#)
- [Interfaces Operational Commands on page 299](#)
- [Ethernet OAM Link Fault Management Operational Command on page 409](#)
- [LAGs and LACP Operational Commands on page 415](#)
- [Redundant Trunk Group Operational Command on page 435](#)
- [Resilient Hashing Operational Command on page 439](#)
- [Uplink Failure Detection Operational Command on page 443](#)





## CHAPTER 12

# Interfaces Configuration Statements

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- [alarm \(chassis\) on page 168](#)
- [auto-negotiation on page 169](#)
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- [encapsulation \(Logical Interface\) on page 175](#)
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- [no-gratuitous-arp-request on page 223](#)
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- [short-reach-mode on page 226](#)
- [source on page 227](#)
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- [traceoptions \(Individual Interfaces\) on page 230](#)
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- [unit on page 233](#)
- [vlan-id on page 234](#)
- [vlan-tagging on page 235](#)

## address

```

Syntax address address {
 arp ip-address (mac | multicast-mac) mac-address <publish>;
 broadcast address;
 destination address;
 destination-profile name;
 eui-64;
 master-only;
 multipoint-destination address dlcid dlcid-identifier;
 multipoint-destination address {
 epd-threshold cells;
 inverse-arp;
 oam-liveness {
 up-count cells;
 down-count cells;
 }
 oam-period (disable | seconds);
 shaping {
 (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
 length);
 queue-length number;
 }
 vci vpi-identifier.vci-identifier;
 }
 primary;
 preferred;
 (vrrp-group | vrrp-inet6-group) group-number {
 (accept-data | no-accept-data);
 advertise-interval seconds;
 authentication-type authentication;
 authentication-key key;
 fast-interval milliseconds;
 (preempt | no-preempt) {
 hold-time seconds;
 }
 priority-number number;
 track {
 priority-cost seconds;
 priority-hold-time interface-name {
 interface priority;
 bandwidth-threshold bits-per-second {
 priority;
 }
 }
 }
 route ip-address/mask routing-instance instance-name priority-cost cost;
 }
 virtual-address [addresses];
 }
}

```

**Hierarchy Level** [edit interfaces *interface-name* unit *logical-unit-number* family *family*],  
 [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*  
 family *family*]

**Release Information** Statement introduced before Junos OS Release 7.4.  
 Statement introduced in Junos OS Release 11.1 for the QFX Series.  
 Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Configure the interface address.

**Options** *address*—Address of the interface.

- In Junos OS Release 13.3 and later, when you configure an IPv6 host address and an IPv6 subnet address on an interface, the commit operation fails.
- In releases earlier than Junos OS Release 13.3, when you use the same configuration on an interface, the commit operation succeeds, but only one of the IPv6 addresses that was entered is assigned to the interface. The other address is not applied.



**NOTE:** If you configure the same address on multiple interfaces in the same routing instance, Junos OS uses only the first configuration, the remaining address configurations are ignored and can leave interfaces without an address. Interfaces that do not have an assigned address cannot be used as a donor interface for an unnumbered Ethernet interface.

For example, in the following configuration the address configuration of interface xe-0/0/1.0 is ignored:

```
interfaces {
 xe-0/0/0 {
 unit 0 {
 family inet {
 address 192.168.1.1/24;
 }
 }
 }
 xe-0/0/1 {
 unit 0 {
 family inet {
 address 192.168.1.1/24;
 }
 }
 }
}
```

For more information on configuring the same address on multiple interfaces, see [“Configuring the Interface Address” on page 40](#).

The remaining statements are explained separately.



**NOTE:** The `edit logical-systems` hierarchy is not available on QFabric systems.


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

- Related Documentation**
- *Configuring the Protocol Family*
  - *Junos OS Administration Library for Routing Devices*
  - *family*
  - *negotiate-address*
  - *unnumbered-address (Ethernet)*

## alarm (chassis)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>alarm {     interface-type {         alarm-name (ignore   red   yellow);     } }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit chassis],<br>[edit chassis interconnect-device <i>name</i> ],<br>[edit chassis node-group <i>name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 12.2 for the ACX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | <p>Configure the chassis alarms and whether they trigger a red or yellow alarm, or whether they are ignored. Red alarm conditions light the <b>RED ALARM</b> LED on either the router's craft interface or the switch's LCD screen and trigger an audible alarm if one is connected to the contact on the craft interface or LCD screen. Yellow alarm conditions light the <b>YELLOW ALARM</b> LED on either the router's craft interface or the switch's LCD screen and trigger an audible alarm if one is connected to the craft interface or LCD screen.</p> <p>To configure more than one alarm, include multiple <i>alarm-name</i> lines.</p> |
| <b>Options</b>                  | <p><i>alarm-name</i>—Alarm condition. For a list of conditions, see <i>System-Wide Alarms and Alarms for Each Interface Type</i>.</p> <p><i>ignore</i>—The specified alarm condition does not set off any alarm.</p> <p><i>interface-type</i>—Type of interface on which you are configuring the alarm: <b>atm</b>, <b>ethernet</b>, <b>sonet</b>, or <b>t3</b>.</p> <p><b>red</b>—The specified alarm condition sets off a red alarm.</p> <p><b>yellow</b>—The specified alarm condition sets off a yellow alarm.</p>                                                                                                                             |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Understanding Alarms</i></li> <li>• <i>Chassis Conditions That Trigger Alarms</i></li> <li>• <i>Chassis Alarm Messages on a QFX3500 Device</i></li> <li>• <i>Interface Alarm Messages</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                   |

## auto-negotiation

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (auto-negotiation   no-auto-negotiation);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Explicitly enable or disable autonegotiation. On 10-Gigabit Ethernet SFP interfaces, autonegotiation is enabled by default and auto-detects the speed to be either 1Gbps or 10Gbps. On QFX5100-48S, QFX5100-96S, and QFX5100-24Q devices using 10-Gigabit Ethernet SFP interfaces, the speed is set to 10 Gbps by default and cannot be configured to operate in a different speed. On QFX5100-48S and QFX5100-96S devices using 1-Gigabit Ethernet SFP interfaces, the speed is set to 1 Gbps by default and cannot be configured to operate in a different speed.                                                                    |
|                                 | <div>  <p><b>NOTE:</b> In Junos OS Release 14.1X53-D35 on QFX5100-48T-6Q devices using 10-Gigabit Ethernet Copper interfaces, autonegotiation is disabled by default on the copper ports, and the interfaces operate at a speed of 100M. You can, however, enable auto-negotiation by issuing the <code>set interface <i>name</i> ether-options auto-negotiation</code> command on the interface for which you want to change the interface speed. With autonegotiation enabled, the interface auto-detects the speed in which to operate.</p> </div> |
|                                 | <ul style="list-style-type: none"> <li>• <b>auto-negotiation</b>—Enable autonegotiation.</li> <li>• <b>no-auto-negotiation</b>—Disable autonegotiation. When autonegotiation is disabled, you must explicitly configure link mode and speed options.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">speed on page 228</a></li> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> <li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>                                                                                                                                                                                                                                                                                                  |

## autostate-exclude

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | autostate-exclude;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit interface <i>interface-name</i> ether-options]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 14.1x53-D40 on QFX5100 switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | <p>Specify not to include a routed VLAN interface (RVI) in the state calculation for VLAN members. The default behavior is not to exclude an RVI in the state calculation unless all the ports on the interface go down. Because an RVI often has multiple ports in a single VLAN, the state calculation for a VLAN member might include a port that is down, possibly resulting in traffic loss. This feature enables you to exclude a trunk or access interface from the state calculation, which results in the RVI interface being marked as down as soon as the port specifically assigned to a VLAN goes down.</p> <p>RVIs are used to bind specific VLANs to Layer 3 interfaces, enabling a switch to forward packets between those VLANs— without having to configure another device, such as a router, to connect VLANs. In a typical scenario, a port on the interface is assigned to a specific VLAN, while a different port on that interface is assigned to an 802.1Q trunk interface to carry traffic between multiple VLANs, and a third port on that interface is assigned to an access interface used to connect the VLAN to network devices.</p> <p>To ensure that an interface is marked as down and thereby excluded from the state calculation for VLAN members when the port assigned to the VLAN goes down, configure this statement on the trunk or access interface. The trunk or access interface is automatically excluded from the state calculation of the RVI. In this way, when a port assigned to a specified VLAN goes down, the RVI assigned to that VLAN is also marked as down.</p> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Excluding a Routed VLAN Interface from State Calculations</i></li><li>• <i>port-mode</i></li><li>• <i>show ethernet-switching interface</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |




## channel-speed

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|                                 |                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>channel-speed (10g disable-auto-speed-detection) ;</code>                                                                                                                                                                |
| <b>Hierarchy Level</b>          | <code>[edit chassis fpc slot-number pic pic-number (port port-number   port-range port-range-low port-range-high)]</code>                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.2 for the QFX Series.                                                                                                                                                              |
| <b>Description</b>              | (QFX3500, QFX3600, and QFX5100 standalone switches running Enhanced Layer 2 Software only)—Enable the specified port on the PIC to perform in the specified channel speed. Additionally, you can disable auto-speed detection. |
| <b>Default</b>                  | <b>40g</b> (40-Gigabit Ethernet).                                                                                                                                                                                              |
| <b>Options</b>                  | <b>10g</b> —Set the channel speed to 10g (10-Gigabit Ethernet).<br><b>disable-auto-speed-detection</b> —Disable auto-speed detection.                                                                                          |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Channelizing Interfaces on page 55</a></li> </ul>                                                                                                                         |

## configured-flow-control

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>configured-flow-control {     rx-buffers (on   off);     tx-buffers (on   off); }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | <p>Configure Ethernet PAUSE asymmetric flow control on an interface. You can set an interface to generate and send PAUSE messages, and you can set an interface to respond to PAUSE messages sent by the connected peer. You must set both the <b>rx-buffers</b> and the <b>tx-buffers</b> values when you configure asymmetric flow control.</p> <p>Use the <b>flow-control</b> and <b>no-flow-control</b> statements to enable and disable symmetric PAUSE on an interface. Symmetric flow control and asymmetric flow control are mutually exclusive features. If you attempt to configure both, the switch returns a commit error.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p> <b>NOTE:</b> Ethernet PAUSE temporarily stops transmitting all traffic on a link when the buffers fill to a certain threshold. To temporarily pause traffic on individual “lanes” of traffic (each lane contains the traffic associated with a particular IEEE 802.1p code point, so there can be eight lanes of traffic on a link), use priority-based flow control (PFC) by applying a congestion notification profile to the interface.</p> <p>Ethernet PAUSE and PFC are mutually exclusive features, so you cannot configure both of them on the same interface. If you attempt to configure both Ethernet PAUSE and PFC on an interface, the switch returns a commit error.</p> </div> |
| <b>Default</b>                  | Flow control is disabled. You must explicitly configure Ethernet PAUSE flow control on interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">congestion-notification-profile</a></li> <li>• <a href="#">flow-control on page 195</a></li> <li>• <i>Configuring CoS Asymmetric Ethernet PAUSE Flow Control</i></li> <li>• <i>Enabling and Disabling CoS Symmetric Ethernet PAUSE Flow Control</i></li> <li>• <i>Understanding CoS Flow Control (Ethernet PAUSE and PFC)</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## craft-lockout

```
Syntax craft-lockout {
 alarm {
 interface-type {
 link-down (red | yellow | ignore);
 }
 }
 container-devices {
 device-count number;
 }
 fpc slot {
 pic pic-number {
 fibre-channel {
 port-range {
 port-range-low port-range-high;
 }
 }
 }
 }
 routing-engine {
 on-disk-failure {
 disk-failure-action (halt | reboot);
 }
 }
 }
```

**Hierarchy Level** [edit chassis interconnect-device]

**Release Information** Statement introduced in Junos Release 11.3 for the QFX Series.

**Description** Disable the physical operation of the craft interface front panel.

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

**Related Documentation**

- *Configuring the Junos OS to Disable the Physical Operation of the Craft Interface*

## description (Interfaces)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>description text;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | <code>[edit <a href="#">interfaces</a> interface-name]</code> ,<br><code>[edit <a href="#">interfaces</a> interface-name unit logical-unit-number]</code> ,<br><code>[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.<br>Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | <p>Provide a textual description of the interface or the logical unit. Any descriptive text you include is displayed in the output of the <b>show interfaces</b> commands, and is also exposed in the <b>ifAlias</b> Management Information Base (MIB) object. It has no effect on the operation of the interface on the router or switch.</p> <p>The textual description can also be included in the extended DHCP relay option 82 Agent Circuit ID suboption.</p>                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <b>text</b> —Text to describe the interface. If the text includes spaces, enclose the entire text in quotation marks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Interface Description</i></li><li>• <i>Adding a Logical Unit Description to the Configuration</i></li><li>• <i>Configuring Gigabit Ethernet Interfaces (CLI Procedure)</i></li><li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li><li>• <i>Configuring Gigabit Ethernet Interfaces (CLI Procedure)</i></li><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <i>Using DHCP Relay Agent Option 82 Information</i></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li><li>• <i>Example: Connecting Access Switches to a Distribution Switch</i></li></ul> |

## encapsulation (Logical Interface)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | encapsulation (atm-ccc-cell-relay   atm-ccc-vc-mux   atm-cisco-nlpid   atm-mlppp-llc   atm-nlpid   atm-ppp-llc   atm-ppp-vc-mux   atm-snap   atm-tcc-snap   atm-tcc-vc-mux   atm-vc-mux   ether-over-atm-llc   ether-vpls-over-atm-llc   ether-vpls-over-fr   ether-vpls-over-ppp   ethernet   ethernet-ccc   ethernet-vpls   ethernet-vpls-fr   frame-relay-ccc   frame-relay-ether-type   frame-relay-ether-type-tcc   frame-relay-ppp   frame-relay-tcc   gre-fragmentation   multilink-frame-relay-end-to-end   multilink-ppp   ppp-over-ether   ppp-over-ether-over-atm-llc   vlan-bridge   vlan-ccc   vlan-vci-ccc   vlan-tcc   vlan-vpls   vxlan);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>     | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ],<br>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ],<br>[edit interfaces rlsq <i>number</i> unit <i>logical-unit-number</i> ]<br>[edit protocols evpn]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers ( <b>ethernet</b> , <b>vlan-ccc</b> , and <b>vlan-tcc</b> options only).<br>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the <b>atm-ccc-cell-relay</b> and <b>atm-ccc-vc-mux</b> options are supported on ACX Series routers.<br>Support for <b>vlan-bridge</b> option introduced in Junos OS Release 14.1X53-D35 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>         | Configure a logical link-layer encapsulation type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>             | <p><b>atm-ccc-cell-relay</b>—Use ATM cell-relay encapsulation.</p> <p><b>atm-ccc-vc-mux</b>—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the <b>ccc</b> family only.</p> <p><b>atm-cisco-nlpid</b>—Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-mlppp-llc</b>—For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.</p> <p><b>atm-nlpid</b>—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-ppp-llc</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.</p> <p><b>atm-ppp-vc-mux</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.</p> |

**atm-snap**—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation.

**atm-tcc-snap**—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

**atm-tcc-vc-mux**—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

**atm-vc-mux**—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

**ether-over-atm-llc**—(All IP interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) For interfaces that carry IP traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

**ether-vpls-over-atm-llc**—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

**ether-vpls-over-fr**—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, per RFC 2427, *Multiprotocol Interconnect over Frame Relay*.



**NOTE:** The SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, and the DS3/E3 MIC do not support Ethernet over Frame Relay encapsulation.

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**ether-vpls-over-ppp**—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Point-to-Point Protocol (PPP) encapsulation to support Bridged Ethernet over PPP-encapsulated TDM interfaces for VPLS applications.

**ethernet**—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

**ethernet-ccc**—Use Ethernet CCC encapsulation on Ethernet interfaces.

**ethernet-vpls**—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.



**NOTE:** The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

**ethernet-vpls-fr**—Use in a VPLS setup when a CE device is connected to a PE router over a time-division multiplexing (TDM) link. This encapsulation type enables the PE router to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

**frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**frame-relay-ether-type**—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

**frame-relay-ether-type-tcc**—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media. The physical interface must be configured with flexible-frame-relay encapsulation.

**frame-relay-ppp**—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only.

**frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

**gre-fragmentation**—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the do not fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's maximum transmission unit (MTU) value, the packet is fragmented before encapsulation.

**multilink-frame-relay-end-to-end**—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

**multilink-ppp**—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

**ppp-over-ether**—Use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

**ppp-over-ether-over-atm-llc**—(MX Series routers with MPCs using the ATM MIC with SFP only) For underlying ATM interfaces, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

**vlan-bridge**—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

**vlan-ccc**—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**vlan-vci-ccc**—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**vlan-tcc**—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

**vlan-vpls**—Use Ethernet VLAN encapsulation on VPLS circuits.

**vxlan**—Use VXLAN data plane encapsulation for EVPN.

|                                 |                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration. |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|

**Related Documentation**

- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring the Encapsulation for Layer 2 Switching TCCs*
- *Configuring Interface Encapsulation on Logical Interfaces*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Circuit and Translational Cross-Connects Overview*
- *Identifying the Access Concentrator*
- *Configuring ATM Interface Encapsulation*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM for Subscriber Access*
- *CoS on ATM IMA Pseudowire Interfaces Overview*
- *Configuring Policing on an ATM IMA Pseudowire*



## encapsulation (Physical Interface)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | encapsulation (atm-ccc-cell-relay   atm-pvc   cisco-hdlc   cisco-hdlc-ccc   cisco-hdlc-tcc   ethernet-bridge   ethernet-ccc   ethernet-over-atm   ethernet-tcc   ethernet-vpls   ethernet-vpls-fr   ether-vpls-over-atm-llc   ethernet-vpls-ppp   extended-frame-relay-ccc   extended-frame-relay-ether-type-tcc   extended-frame-relay-tcc   extended-vlan-bridge   extended-vlan-ccc   extended-vlan-tcc   extended-vlan-vpls   flexible-ethernet-services   flexible-frame-relay   frame-relay   frame-relay-ccc   frame-relay-ether-type   frame-relay-ether-type-tcc   frame-relay-port-ccc   frame-relay-tcc   generic-services   multilink-frame-relay-uni-nni   ppp   ppp-ccc   ppp-tcc   vlan-ccc   vlan-vci-ccc   vlan-vpls);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>     | [edit interfaces <i>interface-name</i> ],<br>[edit interfaces rlsq <i>number:number</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 11.1 for EX Series switches.<br>Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers ( <b>flexible-ethernet-services</b> , <b>ethernet-ccc</b> , and <b>ethernet-tcc</b> options only).<br>Support for <b>flexible-ethernet-services</b> option introduced in Junos OS Release 14.1X53-D35 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>         | Specify the physical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Default</b>             | <b>ppp</b> —Use serial PPP encapsulation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>             | <p><b>atm-ccc-cell-relay</b>—Use ATM cell-relay encapsulation.</p> <p><b>atm-pvc</b>—Use ATM PVC encapsulation.</p> <p><b>cisco-hdlc</b>—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.</p> <p><b>cisco-hdlc-ccc</b>—Use Cisco-compatible HDLC framing on CCC circuits.</p> <p><b>cisco-hdlc-tcc</b>—Use Cisco-compatible HDLC framing on TCC circuits for connecting different media.</p> <p><b>ethernet-bridge</b>—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.</p> <p><b>ethernet-ccc</b>—Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard Tag Protocol ID (TPID) values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, CCC is not supported.</p> <p><b>ethernet-over-atm</b>—For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 2684, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i>, this encapsulation type allows ATM interfaces to connect to devices that support only bridge protocol data units (BPDUs). Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts</p> |

Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.

**ethernet-tcc**—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

**ethernet-vpls**—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

**ethernet-vpls-fr**—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer Layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

**ethernet-vpls-ppp**—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer Layer 2 PPP connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use it to forward the packet into a given VPLS instance.

**ether-vpls-over-atm-llc**—For ATM intelligent queuing (IQ) interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

**extended-frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

**extended-frame-relay-ether-type-tcc**—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation type is used for circuits with different media on either side of the connection.

**extended-frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits to connect different media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

**extended-vlan-bridge**—Use extended VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q VLAN tagging and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

**extended-vlan-ccc**—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

**extended-vlan-tcc**—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

**extended-vlan-vpls**—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



**NOTE:** The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

**flexible-ethernet-services**—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

**flexible-frame-relay**—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

**frame-relay**—Use Frame Relay encapsulation.

**frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits.

**frame-relay-ether-type**—Use Frame Relay ether type encapsulation for compatibility with the Cisco Frame Relay.

**frame-relay-ether-type-tcc**—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media.

**frame-relay-port-ccc**—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

**frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits to connect different media.

**generic-services**—Use generic services encapsulation for services with a hierarchical scheduler.

**multilink-frame-relay-uni-nni**—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles, and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

**ppp**—Use serial PPP encapsulation.

**ppp-ccc**—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**ppp-tcc**—Use serial PPP encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

**vlan-ccc**—Use Ethernet VLAN encapsulation on CCC circuits.

**vlan-vci-ccc**—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

**vlan-vpls**—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



#### NOTE:

- Label-switched interfaces (LSIs) do not support VLAN VPLS encapsulation. Therefore, you can only use VLAN VPLS encapsulation on a PE-router-to-CE-router interface and not a core-facing interface.
- Starting with Junos OS release 13.3, a commit error occurs when you configure **vlan-vpls** encapsulation on a physical interface and configure **family inet** on one of the logical units. Previously, it was possible to commit this invalid configuration.

#### Required Privilege Level

interface—To view this statement in the configuration.

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

**Related  
Documentation**

- *Configuring Interface Encapsulation on Physical Interfaces*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM Interface Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces*
- *Configuring Interfaces for Layer 2 Circuits*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Configuring TCC*
- *Configuring VPLS Interface Encapsulation*
- *Configuring Interfaces for VPLS Routing*
- *Defining the Encapsulation for Switching Cross-Connects*
- *Configuring Q-in-Q Tunneling (CLI Procedure)*

## ethernet (Alarm)

---

|                                 |                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ethernet {<br>link-down (red   yellow   ignore);<br>}                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit chassis <a href="#">alarm</a> ],<br>[edit chassis interconnect-device <i>name</i> <a href="#">alarm</a> ],<br>[edit chassis node-group <i>name</i> <a href="#">alarm</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                    |
| <b>Description</b>              | Configure alarms for an Ethernet interface.                                                                                                                                      |
| <b>Options</b>                  | The remaining statement is explained separately.—                                                                                                                                |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Understanding Alarms</i></li><li>• <i>Interface Alarm Messages</i></li></ul>                                                          |

## ethernet-switching

**Syntax**

```
ethernet-switching {
 filter {
 group filter-group-number;
 input filter-name;
 input-list [filter-names];
 output filter-name;
 output-list [filter-names];
 }
 interface-mode (access | trunk);
 recovery-timeout seconds;
 storm-control profile-name;
 vlan {
 members (vlan-name | [-vlan-names] | all);
 }
}
```

**Hierarchy Level** [edit [interfaces](#) ge-chassis/slot/port [unit](#) *logical-unit-number*] family

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.

**Description** Configure Ethernet switching protocol family information for the logical interface.  
The remaining statements are explained separately.

**Default** You must configure a logical interface to be able to use the physical device.

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

**Related Documentation**

- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- [JUNOS Software Network Interfaces Configuration Guide](#)

## ether-options

**Syntax** The **auto-negotiation** and **speed** statements are not supported on the OCX Series.

```
ether-options {
 802.3ad aex {
 lacp {
 force-up;
 (primary | backup);
 }
 }
 (auto-negotiation | no-auto-negotiation);
 autostate-exclude;
 configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
 }
 ethernet-switch-profile
 storm-control storm-control-profile;
}
(flow-control | no-flow-control);
link-mode mode;
(loopback | no-loopback);
speed (auto-negotiation | no-auto-negotiation);
}
```

**Hierarchy Level** [edit [interfaces](#) *interface-name*]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.  
**autostate-exclude** option introduced in Junos OS Release 14.1x53-D40 for QFX5100 switches only.

**Description** Configure **ether-options** properties for a Gigabit Ethernet or 10-Gigabit Ethernet interface.



**NOTE:** The **auto-negotiation** and **speed** statements are not supported on the OCX Series.

The statements are explained separately.

**Default** Enabled.

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

**Related Documentation**

- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces](#)
- [Junos OS Network Interfaces Library for Routing Devices](#)



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## eui-64

---

|                                 |                                                                                                                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | eui-64;                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> unit <i>number</i> family inet6 address <i>address</i> ]                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.3 for EX Series switches.<br>Statement introduced in Junos OS Release 12.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>              | For interfaces that carry IP version 6 (IPv6) traffic, automatically generate the host number portion of interface addresses.                                                                                                                                              |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring the Interface Address on page 40</a></li></ul>                                                                                                                                                             |

## family

**Syntax** The **ethernet-switching** statement and all of its substatements are not supported on OCX Series switches.

```
family {
 ethernet-switching {
 filter {
 group filter-group-number;
 input filter-name;
 input-list [filter-names];
 output filter-name;
 output-list [filter-names];
 }
 interface-mode (access | trunk);
 recovery-timeout seconds;
 storm-control profile-name;
 vlan {
 members (vlan-name [-vlan-names] | all);
 }
 }
 inet {
 accounting {
 destination-class-usage;
 source-class-usage {
 input;
 output;
 }
 }
 }
 address ipv4-address {
 arp ip-address (mac | multicast-mac) mac-address <publish>;
 broadcast address;
 preferred;
 primary;
 vrrp-group group-number {
 (accept-data | no-accept-data);
 advertise-interval seconds;
 advertisements-threshold number;
 authentication-key key;
 authentication-type authentication;
 fast-interval milliseconds;
 (preempt | no-preempt) {
 hold-time seconds;
 }
 priority number;
 track {
 interface interface-name {
 priority-cost number;
 }
 priority-hold-time seconds;
 route ip-address/mask routing-instance instance-name priority-cost cost;
 }
 virtual-address [addresses];
 vrrp-inherit-from {
```

```

 active-group group-number;
 active-interface interface-name;
 }
}
filter {
 group filter-group-number;
 input filter-name;
 input-list [filter-names];
 output filter-name;
 output-list [filter-names];
}
mtu bytes;
no-neighbor-learn;
no-redirects;
primary;
rpf-check {
 fail-filter filter-name;
 mode {
 loose;
 }
}
}
inet6 {
 accounting {
 destination-class-usage;
 source-class-usage {
 input;
 output;
 }
 }
}
address address {
 eui-64;
 ndp ip-address (mac | multicast-mac) mac-address <publish>;
 preferred;
 primary;
 vrrp-inet6-group group-id {
 accept-data | no-accept-data;
 advertisements-threshold number;
 authentication-key key;
 authentication-type authentication;
 fast-interval milliseconds;
 inet6-advertise-interval milliseconds;
 preempt | no-preempt {
 hold-time seconds;
 }
 priority number;
 track {
 interface interface-name {
 priority-cost number;
 }
 priority-hold-time seconds;
 route ip-address/mask routing-instance instance-name priority-cost cost;
 }
 }
 virtual-inet6-address [addresses];
 virtual-link-local-address ipv6-address;
}

```

```

 vrrp-inherit-from {
 active-group group-name;
 active-interface interface-name;
 }
 }
 (dad-disable | no-dad-disable);
 filter {
 group filter-group-number;
 input filter-name;
 input-list [filter-names];
 output filter-name;
 output-list [filter-names];
 }
 mtu bytes;
 nd6-stale-time time;
 no-neighbor-learn;
 no-redirects;
 policer {
 input policer-name;
 output policer-name;
 }
 rpf-check {
 fail-filter filter-name;
 mode {
 loose;
 }
 }
 mpls {
 filter {
 group filter-group-number;
 input filter-name;
 input-list [filter-names];
 output filter-name;
 output-list [filter-names];
 }
 mtu bytes;
 }
}

```

|                            |                                                                                                                                                                                                                                                             |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Hierarchy Level</b>     | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> ],<br>[edit <a href="#">interfaces</a> <a href="#">interface-range</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> family] |
| <b>Release Information</b> | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                               |
| <b>Description</b>         | Configure protocol family information for the logical interface on the QFX Series and OCX Series product.                                                                                                                                                   |

**Default**

**NOTE:** The **ethernet-switching** statement and all of its substatements are not supported on OCX Series switches.

Access interfaces on the QFX Series are set to **family ethernet-switching** by default. If you are going to change the family setting for an interface, you might have to delete this default setting or any user-configured family setting first.

You must configure a logical interface to be able to use the physical device.

**Options**

Interface types on the switch are:

- Aggregated Ethernet (**ae**)
- Gigabit Ethernet (**ge**)
- Loopback (**lo0**)
- Management Ethernet (**me0**)
- Routed VLAN interface (RVI) (**vlan**)



**NOTE:** Routed VLAN interfaces, also referred to as integrated routing and bridging (IRB) interfaces, are not supported on OCX Series switches.

- 10-Gigabit Ethernet (**xe**)

Not all interface types support all **family** substatements. Check your switch CLI for supported substatements for a particular protocol family configuration.

**Required Privilege Level**

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

**Related Documentation**

- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- *Configuring Gigabit and 10-Gigabit Ethernet Interfaces*
- [Configuring Link Aggregation on page 101](#)
- *Configuring IRB Interfaces*
- *Junos OS Network Interfaces Library for Routing Devices*

## fibre-channel (Alarm)

---

|                                 |                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>fibre-channel {<br/>    link-down (red   yellow   ignore);<br/>}</code>                                                                         |
| <b>Hierarchy Level</b>          | [edit chassis <b>alarm</b> ],<br>[edit chassis interconnect-device <i>name</i> <b>alarm</b> ],<br>[edit chassis node-group <i>name</i> <b>alarm</b> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.3 for the QFX Series.                                                                                     |
| <b>Description</b>              | Configure alarms for a Fibre Channel interface.                                                                                                       |
| <b>Options</b>                  | The remaining statement is explained separately.—                                                                                                     |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Understanding Alarms</i></li><li>• <i>Interface Alarm Messages</i></li></ul>                               |

## filter

|                            |                                                                                                                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>filter {   group <i>filter-group-number</i>;   input <i>filter-name</i>;   input-list [ <i>filter-names</i> ];   output <i>filter-name</i>;   output-list [ <i>filter-names</i> ]; }</pre>                                                    |
| <b>Hierarchy Level</b>     | <pre>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>   family <i>family</i>]</pre> |
| <b>Release Information</b> | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>                                      |
| <b>Description</b>         | <p>Apply a filter to an interface. You can also use filters for encrypted traffic. When you configure filters, you can configure them under the <b>family ethernet-switching</b>, <b>inet</b>, <b>inet6</b>, <b>mpls</b>, or <b>vpls</b> only.</p> |




**NOTE:** On QFX3500 and QFX3600 switches running Enhanced Layer 2 Software and on OCX Series switches, VPLS is not supported.

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Options</b>                  | <p><b>group <i>filter-group-number</i></b>—Define an interface to be part of a filter group.<br/> <b>Range:</b> 1 through 255</p> <p><b>input <i>filter-name</i></b>—Name of one filter to evaluate when packets are received on the interface.</p> <p><b>output <i>filter-name</i></b>—Name of one filter to evaluate when packets are transmitted on the interface.</p> <p>The remaining statements are explained separately.</p>                                                                            |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Applying a Filter to an Interface</i></li> <li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li> <li>• <i>Routing Policies, Firewall Filters, and Traffic Policers Feature Guide for Routing Devices</i></li> <li>• <i>Junos OS Administration Library for Routing Devices</i></li> <li>• <i>Configuring Gigabit Ethernet Interfaces (CLI Procedure)</i></li> <li>• <i>Configuring Gigabit Ethernet Interfaces (CLI Procedure)</i></li> </ul> |

- *Configuring Gigabit and 10-Gigabit Ethernet Interfaces*
- *Configuring Firewall Filters (CLI Procedure)*
- *Configuring Firewall Filters and Policers for VPLS*
- *family*
- *family*



## flow-control

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (flow-control   no-flow-control);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <b>interfaces</b> <i>interface-name</i> <b>ether-options</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | <p>Explicitly enable or disable symmetric Ethernet PAUSE flow control, which regulates the flow of packets from the switch to the remote side of the connection by pausing all traffic flows on a link during periods of network congestion. Symmetric flow control means that Ethernet PAUSE is enabled in both directions. The interface generates and sends Ethernet PAUSE messages when the receive buffers fill to a certain threshold and the interface responds to PAUSE messages received from the connected peer. By default, flow control is disabled.</p> <p>You can configure asymmetric flow control by including the <b>configured-flow-control</b> statement at the [edit <b>interfaces</b> <i>interface-name</i> <b>ether-options</b> hierarchy level. Symmetric flow control and asymmetric flow control are mutually exclusive features. If you attempt to configure both, the switch returns a commit error.</p> <hr/> <div>  <p><b>NOTE:</b> Ethernet PAUSE temporarily stops transmitting all traffic on a link when the buffers fill to a certain threshold. To temporarily pause traffic on individual “lanes” of traffic (each lane contains the traffic associated with a particular IEEE 802.1p code point, so there can be eight lanes of traffic on a link), use priority-based flow control (PFC).</p> <p>Ethernet PAUSE and PFC are mutually exclusive features, so you cannot configure both of them on the same interface. If you attempt to configure both Ethernet PAUSE and PFC on an interface, the switch returns a commit error.</p> <p>OCX Series switches do not support PFC.</p> </div> <hr/> <ul style="list-style-type: none"> <li>• <b>flow-control</b>—Enable flow control; flow control is useful when the remote device is a Gigabit Ethernet switch.</li> <li>• <b>no-flow-control</b>—Disable flow control.</li> </ul> |
| <b>Default</b>                  | Flow control is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">configured-flow-control on page 172</a></li> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

- *Configuring Gigabit and 10-Gigabit Ethernet Interfaces*
- *Understanding CoS Flow Control (Ethernet PAUSE and PFC)*
- *Junos OS Network Interfaces Library for Routing Devices*

## fpc


|                                 |                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>fpc slot {   auto-speed-detection disable;   pic <i>pic-number</i> {     <b>tunnel-port</b> <i>port-number</i> tunnel-services;     port <i>port-number</i> {       channel-speed (<i>speed</i> disable-auto-speed-detection) ;     }     port-range <i>port-range-low port-range-high</i> {       channel-speed (<i>speed</i> disable-auto-speed-detection);     }   } }</pre> |
| <b>Hierarchy Level</b>          | [edit chassis]                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                             |
| <b>Description</b>              | <p>Configure the FPC slot number. For QFX3500 switches, the slot is a line card slot.</p> <p>For generic routing encapsulation (GRE) tunneling, use the <b>tunnel-port</b> statement to specify the port that you want to convert to a GRE tunnel port.</p>                                                                                                                          |
| <b>Options</b>                  | <p><b>slot</b>—Number of the FPC slot. For QFX3500, QFX3600, and OCX Series devices, the slot number is always 0.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>show chassis fpc</i></li> <li>• <i>Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)</i></li> </ul>                                                                                                                                                                                                                    |

## gratuitous-arp-reply

---

|                                 |                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (gratuitous-arp-reply   no-gratuitous-arp-reply);                                                                       |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> ],<br>[edit interfaces <b>interface-range</b> <i>interface-range-name</i> ]      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                       |
| <b>Description</b>              | Enable processing of ARP updates received via gratuitous ARP reply messages.                                            |
| <b>Default</b>                  | Updating of the ARP cache is disabled on all Ethernet interfaces.                                                       |
| <b>Options</b>                  | <b>gratuitous-arp-reply</b> —Update the ARP cache.<br><b>no-gratuitous-arp-reply</b> —Do not update the ARP cache.      |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration. |

## hold-time (Physical Interface)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | hold-time up <i>milliseconds</i> down <i>milliseconds</i> ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | [edit <b>interfaces</b> <i>interface-name</i> ],<br>[edit <b>interfaces</b> <i>interface-range</i> <i>interface-range-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 10.4R5 for EX Series switches.<br>Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                   |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Specify the <b>hold-time</b> value to use to damp shorter interface transitions milliseconds.<br>When an interface goes from up to down, it is not advertised to the rest of the system as being down until it has remained down for the hold-time period. Similarly, an interface is not advertised as being up until it has remained up for the hold-time period.                                                                                                                                                                                                                                                       |
| <div>  <b>NOTE:</b> <ul style="list-style-type: none"> <li>We recommend that you configure the hold-time value after determining an appropriate value by performing repeated tests in the actual hardware environment. This is because the appropriate value for hold-time depends on the hardware (XFP, SFP, SR, ER, or LR) used in the networking environment.</li> <li>The hold-time option is not available for controller interfaces.</li> </ul> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Default</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Interface transitions are not damped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p><b>down <i>milliseconds</i></b>—Hold time to use when an interface transitions from up to down. Junos OS advertises the transition within 100 milliseconds of the time value you specify.</p> <p><b>Range:</b> 0 through 4,294,967,295</p> <p><b>Default:</b> 0 (interface transitions are not damped)</p> <p><b>up <i>milliseconds</i></b>—Hold time to use when an interface transitions from down to up. Junos OS advertises the transition within 100 milliseconds of the time value you specify.</p> <p><b>Range:</b> 0 through 4,294,967,295</p> <p><b>Default:</b> 0 (interface transitions are not damped)</p> |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li><i>advertise-interval</i></li> <li><i>interfaces (for EX Series switches)</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

- *Physical Interface Damping Overview*
- *Damping Shorter Physical Interface Transitions*
- *Damping Longer Physical Interface Transitions*

## irb (Interfaces)

```
Syntax irb {
 accounting-profile name;
 arp-l2-validate;
 description text;

 (gratuitous-arp-reply | no-gratuitous-arp-reply);
 hold-time up milliseconds down milliseconds;
 mtu bytes;
 no-gratuitous-arp-request;

 traceoptions {
 flag flag;
 }
 (traps | no-traps);
 unit logical-unit-number {
 accounting-profile name;
 bandwidth rate;
 description text;
 disable;
 encapsulation type;
 family inet {
 accounting {
 destination-class-usage;
 source-class-usage {
 input;
 output;
 }
 }
 }
 address ipv4-address {
 arp ip-address (mac | multicast-mac) mac-address <publish>;
 broadcast address;
 preferred;
 primary;
 vrrp-group group-number {
 (accept-data | no-accept-data);
 advertise-interval seconds;
 advertisements-threshold number;
 authentication-key key;
 authentication-type authentication;
 fast-interval milliseconds;
 (preempt | no-preempt) {
 hold-time seconds;
 }
 priority number;
 track {
 interface interface-name {
 bandwidth-threshold bandwidth;
 priority-cost number;
 }
 }
 priority-hold-time seconds;
 route ip-address/mask routing-instance instance-name priority-cost cost;
 }
 }
 }
}
```

```

 virtual-address [addresses];
 vrrp-inherit-from {
 active-group group-number;
 active-interface interface-name;
 }
}
filter {
 input filter-name;
 output filter-name;
}
mtu bytes;
no-neighbor-learn;
no-redirects;
primary;
rpf-check {
 fail-filter filter-name;
 mode {
 loose;
 }
}
targeted-broadcast {
 forward-and-send-to-re;
 forward-only;
}
}
family inet6 {
 accounting {
 destination-class-usage;
 source-class-usage {
 input;
 output;
 }
 }
}
address address {
 eui-64;
 ndp ip-address (mac | multicast-mac) mac-address <publish>;
 preferred;
 primary;
 vrrp-inet6-group group-id {
 accept-data | no-accept-data;
 advertisements-threshold number;
 authentication-key key;
 authentication-type authentication;
 fast-interval milliseconds;
 inet6-advertise-interval milliseconds;
 preempt | no-preempt {
 hold-time seconds;
 }
 priority number;
 track {
 interface interface-name {
 bandwidth-threshold bandwidth priority-cost number;
 priority-cost number;
 }
 priority-hold-time seconds;
 }
 }
}

```

```

 route ip-address/mask routing-instance instance-name priority-cost cost;
 }
 virtual-inet6-address [addresses];
 virtual-link-local-address ipv6-address;
 vrrp-inherit-from {
 active-group group-number;
 active-interface interface-name;
 }
}
}
(dad-disable | no-dad-disable);
filter {
 input filter-name;
 output filter-name;
}
mtu bytes;
nd6-stale-time seconds;
no-neighbor-learn;
no-redirects;
policer {
 input policer-name;
 output policer-name;
}
rpf-check {
 fail-filter filter-name;
 mode {
 loose;
 }
}
}
family iso {
 address interface-address;
 mtu bytes;
}
family mpls {
 filter {
 input filter-name;
 output filter-name;
 }
 mtu bytes;
 policer {
 input policer-name;
 output policer-name;
 }
}
native-inner-vlan-id vlan-id;
proxy-arp (restricted | unrestricted);
(traps | no-traps);
vlan-id-list [vlan-id's];
vlan-id-range [vlan-id-range];
}
}

```

Hierarchy Level [edit interfaces *interface-name*



|                                 |                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3R2 for EX Series switches.<br><b>irb</b> option introduced in Junos OS Release 13.2 for the QFX Series.                                                       |
| <b>Description</b>              | Configure the properties of a specific integrated bridging and routing (IRB) interface.<br><br>The remaining statements are explained separately.                                                          |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">[edit interfaces] Hierarchy Level</a></li> <li>• <a href="#">[edit interfaces] Configuration Statement Hierarchy on EX Series Switches</a></li> </ul> |

## inet (interfaces)



|                                 |                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>inet {     address <i>address</i> {         primary;         filter input <i>filter-name</i>;         filter output <i>filter-name</i>;         targeted-broadcast;     } }</pre> |
| <b>Hierarchy Level</b>          | <a href="#">[edit interfaces interface-name unit logical-unit-number family]</a> ,<br><a href="#">[edit interfaces interface-range interface-name unit logical-unit-number family]</a> |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                          |
| <b>Description</b>              | Configure the primary IP address for the logical interface.                                                                                                                            |
| <b>Default</b>                  | You must configure a logical interface to be able to use the physical device.                                                                                                          |
| <b>Options</b>                  | The remaining statements are explained separately.—                                                                                                                                    |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> </ul>                                                  |

## inet6 (interfaces)

---

|                                 |                                                                                                                                                                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>inet6 {<br/>    address address {<br/>        eui-64<br/>        preferred<br/>        primary;<br/>        filter input <i>filter-name</i>;<br/>        filter output <i>filter-name</i>;<br/>    }<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces interface-name unit logical-unit-number</a> family],<br>[edit <a href="#">interfaces interface-range interface-name unit logical-unit-number</a> family]                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                         |
| <b>Description</b>              | Configure the primary IP address for the logical interface.                                                                                                                                                           |
| <b>Default</b>                  | You must configure a logical interface to be able to use the physical device.                                                                                                                                         |
| <b>Options</b>                  | The remaining statements are explained separately.—                                                                                                                                                                   |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.interface-control—To add this statement to the configuration.                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces</a></li></ul>  |

## interface-mode

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | interface-mode (access   trunk);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Hierarchy Level          | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge],<br>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ethernet-switching],<br>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Release Information      | Statement introduced in Junos OS Release 9.2.<br>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Description              | <p> <b>NOTE:</b> This statement supports the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see <i>port-mode</i>. For ELS details, see <i>Getting Started with Enhanced Layer 2 Software</i>.</p> <p>(QFX Series 3500 and 3600 standalone switches)—Determine whether the logical interface accepts or discards packets based on VLAN tags. Specify the <b>trunk</b> option to accept packets with a VLAN ID that matches the list of VLAN IDs specified in the <b>vlan-id</b> or <b>vlan-id-list</b> statement, then forward the packet within the bridge domain or VLAN configured with the matching VLAN ID. Specify the <b>access</b> option to accept packets with no VLAN ID, then forward the packet within the bridge domain or VLAN configured with the VLAN ID that matches the VLAN ID specified in the <b>vlan-id</b> statement.</p> <p> <b>NOTE:</b> On MX Series routers, if you want IGMP snooping to be functional for a bridge domain, then you should not configure <b>interface-mode</b> and <b>irb</b> for that bridge. Such a configuration commit succeeds, but IGMP snooping is not functional, and a message informing the same is displayed. For more information, see <i>Configuring a Trunk Interface on a Bridge Network</i>.</p> |
| Options                  | <p><b>access</b>—Configure a logical interface to accept untagged packets. Specify the VLAN to which this interface belongs using the <b>vlan-id</b> statement.</p> <p><b>trunk</b>—Configure a single logical interface to accept packets tagged with any VLAN ID specified with the <b>vlan-id</b> or <b>vlan-id-list</b> statement.</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"> <li>• <i>Configuring a Logical Interface for Access Mode</i></li> <li>• <i>Configuring a Logical Interface for Trunk Mode</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

- *Example: Connecting Access Switches to a Distribution Switch*

## interface-range

**Syntax** The `vlan-id` statement is not supported on OCX Series switches.

```
interface-range interface-range-name {
 disable;
 description text;
 ether-options {
 802.3ad aex {
 lacp {
 force-up;
 }
 }
 }
 (auto-negotiation| no-auto-negotiation);
 (flow-control | no-flow-control);
 link-mode mode;
 speed (auto-negotiation | speed);
}
hold-time milliseconds down milliseconds;
member interface-name;
member-range starting-interface-name to ending-interface-name;
mtu bytes;
unit logical-unit-number {
 description text;
 disable;
 family family-name {...}
 (traps | no traps);
 vlan-id vlan-id-number;
}
```

**Hierarchy Level** [edit [interfaces](#)]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description**



**NOTE:** The `vlan-id` statement and Fibre Channel interfaces are not supported on OCX Series switches.

Group interfaces that share a common configuration profile.



**NOTE:** The interface range definition is supported only for Gigabit Ethernet, 10-Gigabit Ethernet, and Fibre Channel interfaces.

**Options** *interface-range-name*—Name of the interface range.



**NOTE:** You can use regular expressions and wildcards to specify the interfaces in the member range configuration. Do not use wildcards for interface types.

The remaining statements are explained separately.

|                                 |                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.interface-control—To add this statement to the configuration. |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|

**Related Documentation**

- [Understanding Interface Ranges on page 11](#)
- [Interfaces Overview on page 3](#)
- *Interfaces Overview*
- [Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45](#)
- *Configuring Gigabit and 10-Gigabit Ethernet Interfaces*
- *Junos OS Network Interfaces Library for Routing Devices*

## interfaces

**Syntax** The following statements and their associated substatements are not supported on OCX Series switches: **auto-negotiation**, **speed**, **ethernet-switching**, **fcoe-lag**, **fibre-channel**, **fibrechannel-options**, **mc-ae**, **vlan**, **vlan-id**, and **vlan-tagging**.

```

interfaces {
 aex {
 disable;
 aggregated-ether-options {
 configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
 }
 (fcoe-lag | no-fcoe-lag);
 (flow-control | no-flow-control);
 lacp mode {
 admin-key key;
 force-up;
 periodic interval;
 system-id mac-address;
 }
 link-speed speed;
 local-bias (edit interfaces ae);
 loopback;
 no-loopback;
 minimum-links number;
 }
 mc-ae {
 chassis-id chassis-id;
 mc-ae-id mc-ae-id;
 mode (active-active);
 status-control (active | standby);
 }
 description text;
 gratuitous-arp-reply | no-gratuitous-arp-reply
 hold-time down milliseconds up milliseconds;
 mtu bytes;
 no-gratuitous-arp-request;
 short-reach-mode (enable | disable);
 traceoptions;
 (traps | no traps);
 unit logical-unit-number {
 disable;
 description text;
 family {
 ethernet-switching {
 filter input filter-name;
 filter output filter-name;
 native-vlan-id vlan-id;
 port-mode mode;
 reflective-relay;
 vlan {
 members [(all | names | vlan-ids)];
 }
 }
 }
 }
 }
}

```

```

 }
 }
 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 (traps | no traps);
 vlan-id vlan-id-number;
}
vlan-tagging;
}
interface-range interface-range-name {
 disable;
 description text;
 ether-options {
 802.3ad aex {
 lacp {
 force-up;
 }
 }
 }
 (auto-negotiation | no-auto-negotiation);
 configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
 }
 (flow-control | no-flow-control);
 link-mode mode;
 speed (auto-negotiation | speed);
}
hold-time milliseconds down milliseconds;
member interface-name;
member-range starting-interface-name to ending-interface-name;
mtu bytes;
unit logical-unit-number {
 disable;
 description text;
 family family-name {...}
 (traps | no traps);
 vlan-id vlan-id-number;
}
}
lo0 {
 disable;
 description text;
 hold-time milliseconds down milliseconds;
 traceoptions;
 (traps | no traps);
 unit logical-unit-number {
 disable;
 description text;
 family {

```



```

 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 (traps | no traps);
}
}
mex {
 disable;
 description text;
 hold-time milliseconds down milliseconds;
 (gratuitous-arp-reply | no-gratuitous-arp-reply);
 no-gratuitous-arp-request;
 traceoptions;
 traps;
 unit logical-unit-number {
 disable;
 description text;
 family {
 ethernet-switching {
 filter input filter-name;
 filter output filter-name;
 native-vlan-id vlan-id;
 port-mode mode;
 reflective-relay;
 vlan {
 members [(all | names | vlan-ids)];
 }
 }
 }
 inet {
 address address {
 primary;
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 }
 }
 traps;
 vlan-id vlan-id-number;
}
}
vlan-tagging;
vlan {
 disable;
 description text;
 (gratuitous-arp-reply | no-gratuitous-arp-reply);
 hold-time milliseconds down milliseconds;
 mtu bytes;
 no-gratuitous-arp-request;
 traceoptions;
 (traps | no traps);
}

```

```

unit logical-unit-number {
 description text;
 disable;
 family {
 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 (traps | no traps);
 }
}
fc-0/0/port {
 fibrechannel-options {
 bb-sc-n;
 (loopback | no-loopback);
 speed (auto-negotiation | 2g | 4g | 8g);
 }
 unit logical-unit-number {
 disable;
 description text;
 family {
 fibre-channel {
 port-mode np-port;
 }
 }
 (traps | no traps);
 }
}
ge-0/0/port {
 disable;
 description text;
 ether-options {
 802.3ad aex {
 lacp {
 force-up;
 primary;
 }
 }
 }
 (auto-negotiation | no-auto-negotiation);
 configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
 }
 (flow-control | no-flow-control);
 link-mode mode;
 loopback;
 no-loopback;
 speed (auto-negotiation | speed);
}
gratuitous-arp-reply| no-gratuitous-arp-reply);
hold-time milliseconds down milliseconds;
mtu bytes;
no-gratuitous-arp-request;

```

```

traceoptions;
(traps | no traps);
unit logical-unit-number {
 description text;
 disable;
 family {
 ethernet-switching {
 filter input filter-name;
 filter output filter-name;
 native-vlan-id vlan-id;
 port-mode mode;
 reflective-relay;
 vlan {
 members [(all | names | vlan-ids)];
 }
 }
 }
 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 (traps | no traps);
 vlan-id vlan-id-number;
}
vlan-tagging;
}
vrrp-group group-id {
 (accept-data | no-accept-data);
 advertise-interval seconds;
 authentication-key key;
 authentication-type authentication;
 fast-interval milliseconds;
 (preempt | no-preempt) {
 hold-time seconds;
 }
}
priority number;
track {
 interface interface-name {
 bandwidth-threshold bits-per-second priority-cost priority;
 priority-cost priority;
 }
 priority-hold-time seconds;
 route prefix/prefix-length routing-instance instance-name priority-cost priority;
}
}
virtual-address [addresses];
}
xe-0/0/port {
 disable;
 description text;
 ether-options {
 802.3ad aex {

```

```

 lacp {
 force-up;
 (primary | backup);
 }
}
configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
}
(flow-control | no-flow-control);
loopback;
no-loopback;
}
(gratuitous-arp-reply | no-gratuitous-arp-reply)
hold-time milliseconds down milliseconds;
mtu bytes;
no-gratuitous-arp-request;
traceoptions;
(traps | no traps);
unit logical-unit-number {
 disable;
 description text;
 family {
 ethernet-switching {
 filter input filter-name;
 filter output filter-name;
 native-vlan-id vlan-id;
 port-mode mode;
 reflective-relay;
 vlan {
 members [(all | names | vlan-ids)];
 }
 }
 fibre-channel {
 port-mode (f-port | np-port);
 }
 }
 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 (traps | no traps);
 vlan-id vlan-id-number;
}
vlan-tagging;
}
}

```

Hierarchy Level [edit]

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | <p>Configure the interfaces on the QFX Series and OCX Series.</p> <p>The following statements and their associated substatements are not supported on OCX Series switches: <b>auto-negotiation</b>, <b>ethernet-switching</b>, <b>fcoe-lag</b>, <b>fibre-channel</b>, <b>fibrechannel-options</b>, <b>mc-ae</b>, <b>speed</b>, <b>vlan</b>, <b>vlan-id</b>, and <b>vlan-tagging</b></p> <p>Most standard Junos OS configuration statements are available in the Junos OS for a switch. This topic lists Junos OS statements that you commonly use when configuring a switch as well as statements added to support switches only.</p> |
| <b>Options</b>                  | <p><b>aex</b>—Configure an aggregated Ethernet interface.</p> <p><b>xe-0/0/</b><i>port</i><b>/</b>—Configure a 10-Gigabit Ethernet interface.</p> <p><b>ge-0/0/</b><i>port</i><b>/</b>—Configure a Gigabit Ethernet interface.</p> <p><b>fc-0/0/</b><i>port</i><b>/</b>—Configure a Fibre Channel interface.</p> <p><b>meX</b>/—Configure a management interface.</p> <p><b>mc-ae</b>—Configure a multichassis aggregated Ethernet (MC-AE) interface.</p> <p>The remaining statements are explained separately.</p>                                                                                                                   |
| <b>Required Privilege Level</b> | <p><b>interface</b>—To view this statement in the configuration.</p> <p><b>interface-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Interfaces Overview on page 3</a></li><li>• <a href="#">Understanding Interface Ranges on page 11</a></li><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces</a></li><li>• <a href="#">Configuring Link Aggregation on page 101</a></li><li>• <a href="#">Configuring a Layer 3 Logical Interface on page 92</a></li></ul>                                                                                                                                      |

## link-down

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-down (red   yellow   ignore);                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit chassis <b>alarm ethernet</b> ],<br>[edit chassis <b>alarm fibre-channel</b> ],<br>[edit chassis interconnect-device <i>name</i> <b>alarm ethernet</b> ],<br>[edit chassis node-group <i>name</i> <b>alarm fibre-channel</b> ]                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.3 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Specify either red, yellow, or ignore to display when the link is down.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <p><b>red</b>—Indicates that one or more hardware components have failed or exceeded temperature thresholds, or an alarm condition configured on an interface has triggered a critical warning.</p> <p><b>yellow</b>—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.</p> <p><b>ignore</b>—Suppresses or ignores the alarm.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                        |

## link-mode

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>link-mode mode;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | Set the device's link-connection characteristic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Default</b>                  | The <b>full-duplex</b> mode is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <p><b>mode</b> —Link characteristic:</p> <ul style="list-style-type: none"> <li>• <b>full-duplex</b>—Connection is full duplex.</li> <li>• <b>half-duplex</b>—Connection is half duplex.</li> <li>• <b>automatic</b>—Link mode is negotiated.</li> </ul> <p>If <b>no-auto-negotiation</b> is specified in the <b>ether-options</b> option, you can select only <b>full-duplex</b> or <b>half-duplex</b>. If <b>auto-negotiation</b> is specified in the <b>ether-options</b> option, you can select any mode.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> <li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>                                                                                                                                                                                                                          |

## link-speed

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-speed <i>speed</i> ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit interfaces aex <a href="#">aggregated-ether-options</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | For aggregated Ethernet interfaces only, set the required link speed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <p><b>speed</b>—For aggregated Ethernet links, you can specify the speed in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p>On QFX5100 and EX4600 standalone switches and on a QFX5100 Virtual Chassis and EX4600 Virtual Chassis, you can configure a mixed rate of link speeds for the aggregated Ethernet bundle. Only link speeds of 40G and 10G are supported. Load balancing will not work if you configure link speeds that are not supported.</p> <p>Aggregated Ethernet links on the QFX Series can have one of the following speed values:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p> <b>NOTE:</b> OCX Series switches only support 10g and 40g interfaces. Mixed rate aggregated Ethernet interfaces are not support on the OCX Series.</p> </div> <ul style="list-style-type: none"> <li>• <b>100g</b>—Links are 100 Gbps.</li> <li>• <b>100m</b>—Links are 100 Mbps.</li> <li>• <b>10g</b>—Links are 10 Gbps.</li> <li>• <b>1g</b>—Links are 1 Gbps.</li> <li>• <b>40g</b>—Links are 40 Gbps.</li> <li>• <b>50g</b>—Links are 50 Gbps.</li> <li>• <b>80g</b>—Links are 80 Gbps.</li> <li>• <b>8g</b>—Links are 8 Gbps.</li> <li>• <b>0c192</b>—Links are OC-192.</li> <li>• <b>mixed</b>—Links are 10 Gbps and 40Gbps.</li> </ul> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Link Aggregation on page 101</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



## loopback (Aggregated Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet)

|                                 |                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (loopback   no-loopback);                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> <b>aggregated-ether-options</b> ],<br>[edit interfaces <i>interface-name</i> <b>ether-options</b> ]    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>              | For aggregated Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces, enable or disable loopback mode.                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet Loopback Capability on page 50</a></li> </ul>                       |

## management-ethernet (Alarm)

|                            |                                                                                                                                                       |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | management-ethernet {<br><b>link-down</b> (red   yellow   ignore);<br>}                                                                               |
| <b>Hierarchy Level</b>     | [edit chassis <b>alarm</b> ],<br>[edit chassis interconnect-device <i>name</i> <b>alarm</b> ],<br>[edit chassis node-group <i>name</i> <b>alarm</b> ] |
| <b>Release Information</b> | Statement introduced in Junos OS Release 12.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.         |
| <b>Description</b>         | Configure alarms for a management Ethernet interface.                                                                                                 |



**NOTE:** If you configure a yellow alarm on the Interconnect device, it will be handled as a red alarm.

|                                 |                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Options</b>                  | The remaining statement is explained separately.—                                                                          |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Understanding Alarms</i></li> <li>• <i>Interface Alarm Messages</i></li> </ul> |

## member

---



|                                 |                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>member <i>interface-name</i>;</code>                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces interface-range</a> <i>interface-range-name</i> ]                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                     |
| <b>Description</b>              | Specify the name of the member interface belonging to an interface range on the QFX Series switch.                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <i>interface-name</i> —Name of the interface.                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li><li>• <a href="#">Interfaces Overview on page 3</a></li><li>• <i>Interfaces Overview</i></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul> |

## member-range

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>member-range <i>starting-interface-name ending-interface-name</i>;</code>                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-range interface-range-name</i> ]                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Specify the names of the first and last members of a sequence of interfaces belonging to an interface range.                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <i>starting interface-name ending interface-name</i> —Name of the first member and the name of the last member in the interface sequence.                                                                                                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Understanding Interface Ranges on page 11</a></li> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> <li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li> <li>• <a href="#">Interfaces Overview on page 3</a></li> <li>• <i>Interfaces Overview</i></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul> |

## mtu

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>mtu bytes;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>     | [edit <b>interfaces</b> <i>interface-name</i> ],<br>[edit <b>interfaces</b> <i>interface-range</i> <i>interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b> | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>         | <p>Specify the maximum transmission unit (MTU) size for the media. Changing the media MTU size causes an interface to be deleted and added again. On QFX3500, QFX3600, QFX5100, and OCX Series switches, either standalone or as part of the QFabric system, the maximum MTU value on an untagged packet transiting through an ingress Gigabit Ethernet interface must be no more than the currently configured MTU value plus four, whereas the maximum MTU value on a tagged packet transiting through an ingress Gigabit Ethernet interface must be no more than the currently configured MTU value plus eight. The maximum MTU value on an untagged or tagged packet transiting through an ingress 10-Gigabit Ethernet interface must be no more than the currently configured MTU value plus eight.</p> <p>Keep the following points in mind if you are configuring MTU size for jumbo frames on these special types of interfaces:</p> <ul style="list-style-type: none"> <li>• <b>For LAG interfaces</b>—Configuring the jumbo MTU size on a link aggregation group (LAG) interface (<b>aex</b>) automatically configures the jumbo MTU size on the member links.</li> <li>• <b>For RVIs</b>—Jumbo frames of up to 9216 bytes are supported on the routed VLAN interface (RVI), which is named <b>vlan</b>. The RVI functions as a logical router. To route jumbo data packets on the RVI, you must configure the jumbo MTU size on the member physical interfaces of the RVI and not on the RVI itself (the <b>vlan</b> interface). However, for jumbo control packets—for example, to ping the RVI with a packet size of 6000 bytes or more—you must explicitly configure the jumbo MTU size on the interface named <b>vlan</b> (the RVI). On a QFX5100 switch jumbo frames on the RVI are configured on the basis of the interface MTU.</li> </ul> <div style="margin-top: 20px;"> <div style="display: flex; align-items: center;">  <div> <p><b>NOTE:</b> RVIs are not supported on OCX Series switches.</p> </div> </div> <div style="margin-top: 20px;"> <div style="display: flex; align-items: center;">  <div> <p><b>CAUTION:</b> Setting or deleting the jumbo MTU size on the RVI (the <b>vlan</b> interface) while the switch is transmitting packets might result in dropped packets.</p> </div> </div> </div> </div> |
| <b>Options</b>             | <p><b>bytes</b> —MTU size.</p> <p><b>Range:</b> 64 through 9216 bytes</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Default:** 1514 bytes

|                                 |                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul> |

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## no-gratuitous-arp-request

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|                                 |                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-gratuitous-arp-request;                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces interface-name</a> ],<br>[edit <a href="#">interfaces interface-range interface-name</a> ]                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                                                                                                     |
| <b>Description</b>              | Configure the switch not to respond to gratuitous ARP requests. You can disable responses to gratuitous ARP requests on both Layer 2 Ethernet switching interfaces and routed VLAN interfaces (RVIs). |
| <b>Default</b>                  | Gratuitous ARP responses are enabled on all Ethernet switching interfaces and RVIs.                                                                                                                   |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring IRB Interfaces</i></li></ul>                                                                                                                   |

## pic

**Syntax** `pic pic-number {  
     tunnel-port port-number tunnel-services;  
     port port-number {  
         channel-speed (speed|disable-auto-speed-detection) ;  
     }  
     port-range port-range-low port-range-high {  
         channel-speed (speed|disable-auto-speed-detection) ;  
     }  
 }`

**Hierarchy Level** [edit chassis fpc *slot*]

**Release Information** Option **channel-speed** introduced in Junos OS Release 13.2 for the QFX Series.



**NOTE:** This statement is not supported on the OCX Series.

**Description** (QFX3500, QFX3600, and QFX5100 standalone switches running Enhanced Layer 2 Software only)—Configure a specific port or a range of ports to operate as 10-Gigabit Ethernet ports or 40-Gigabit Ethernet ports.

**Options** **pic *pic-number***—(QFX3500 standalone switch only) Number of the physical interface card (PIC) on which you want to configure port types. Specify **1** to configure 10-Gigabit Ethernet or 40-Gigabit Ethernet type ports.  
 (QFX3600 standalone switch only) Number of the physical interface card (PIC) on which you want to configure port types. Specify **0** to configure 10-Gigabit Ethernet or 40-Gigabit Ethernet type ports.

**port *physical-port-number***—Port number on which you want to configure the port type.

**port-range-low**—Lowest-numbered port in the range of ports.


**port-range-high**—Highest-numbered port in the range of ports.

**channel-speed (*speed* |disable-auto-speed-detection)** —Configure *10g* for 10-Gigabit Ethernet type ports, and configure *disable-auto-speed-detection* to disable auto-channelization.

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

**Related Documentation** • [Channelizing Interfaces on page 55](#)

## rx-buffers

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | rx-buffers (on   off);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> <a href="#">configured-flow-control</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Enable or disable an interface to generate and send Ethernet PAUSE messages. If you enable the receive buffers to generate and send PAUSE messages, when the receive buffers reach a certain level of fullness, the interface sends a PAUSE message to the connected peer. If the connected peer is properly configured, it stops transmitting frames to the interface on the entire link. When the interface receive buffer empties below a certain threshold, the interface sends a message to the connected peer to resume sending frames.</p> <p>Ethernet PAUSE prevents buffers from overflowing and dropping packets during periods of network congestion. If the other devices in the network are also configured to support PAUSE, PAUSE supports lossless operation. Use the <b>rx-buffers</b> statement with the <b>tx-buffers</b> statement to configure asymmetric Ethernet PAUSE on an interface. (Use the <b>flow-control</b> statement to enable symmetric PAUSE and the <b>no-flow-control</b> statement to disable symmetric PAUSE on an interface. Symmetric flow control and asymmetric flow control are mutually exclusive features. If you attempt to configure both, the switch returns a commit error.)</p> |
|                                 | <div>  <p><b>NOTE:</b> Ethernet PAUSE temporarily stops transmitting all traffic on a link when the buffers fill to a certain threshold. To temporarily pause traffic on individual “lanes” of traffic (each lane contains the traffic associated with a particular IEEE 802.1p code point, so there can be eight lanes of traffic on a link), use priority-based flow control (PFC).</p> <p>Ethernet PAUSE and PFC are mutually exclusive features, so you cannot configure both of them on the same interface. If you attempt to configure both Ethernet PAUSE and PFC on an interface, the switch returns a commit error.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Default</b>                  | Flow control is disabled. You must explicitly configure Ethernet PAUSE flow control on interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <b>on   off</b> —Enable or disable an interface to generate and send Ethernet PAUSE messages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">flow-control on page 195</a></li> <li>• <a href="#">tx-buffers on page 231</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

- *Configuring CoS Asymmetric Ethernet PAUSE Flow Control*
- *Enabling and Disabling CoS Symmetric Ethernet PAUSE Flow Control*
- *Understanding CoS Flow Control (Ethernet PAUSE and PFC)*

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## short-reach-mode

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|                                 |                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | short-reach-mode (enable   disable);                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit chassis fpc <i>fpc-slot</i> pic <i>pic-slot</i> ],<br>[edit chassis fpc <i>fpc-slot</i> pic <i>pic-slot</i> port-range <i>port-range-low</i> <i>port-range-high</i> ]                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 14.1X53-D30 for the QFX Series.                                                                                                                                                                                  |
| <b>Description</b>              | Configure short-reach mode for individual as well as a range of copper-based 10-Gigabit Ethernet interfaces using short cable lengths (less than 10m) on the QFX5100-48T switch. Short-reach mode reduces power consumption up to 5W on these interfaces. |
| <b>Default</b>                  | This feature is disabled by default.                                                                                                                                                                                                                      |
| <b>Options</b>                  | The following options are available: <ul style="list-style-type: none"><li>• <b>enable</b></li><li>• <b>disable</b></li></ul>                                                                                                                             |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Short Reach Mode on page 50</a></li></ul>                                                                                                                                                 |





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## source

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|                                 |                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source <i>source-address</i>;</code>                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.1 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>              | Specify the source address of the tunnel.                                                                                                                                                                                                                                   |
| <b>Default</b>                  | If you do not specify a source address, the tunnel uses the unit's primary address as the source address of the tunnel.                                                                                                                                                     |
| <b>Options</b>                  | <b><i>source-address</i></b> —Address of the local side of the tunnel. This is the address that is placed in the outer IP header's source field.                                                                                                                            |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)</i></li></ul>                                                                                                                                                |

## speed


|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | speed (10g   1g   100m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Use this statement to set the speed of an interface. On 10-Gigabit Ethernet SFP interfaces, autonegotiation is enabled by default and auto-detects the speed to be either 1Gbps or 10Gbps. On QFX5100-48S, QFX5100-96S, and QFX5100-24Q devices using 10-Gigabit Ethernet SFP interfaces, the speed is set to 10 Gbps by default and cannot be configured to operate in a different speed. On QFX5100-48S and QFX5100-96S devices using 1-Gigabit Ethernet SFP interfaces, the speed is set to 1 Gbps by default and cannot be configured to operate in a different speed.                                                             |
|                                 | <div>  <p><b>NOTE:</b> In Junos OS Release 14.1X53-D35 on QFX5100-48T-6Q devices using 10-Gigabit Ethernet Copper interfaces, autonegotiation is disabled by default on the copper ports, and the interfaces operate at a speed of 100M. You can, however, enable auto-negotiation by issuing the <code>set interface <i>name</i> ether-options auto-negotiation</code> command on the interface for which you want to change the interface speed. With autonegotiation enabled, the interface auto-detects the speed in which to operate.</p> </div> |
|                                 | <div>  <p><b>NOTE:</b> Only 10g and 40g interfaces are supported on OCX Series switches.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Default</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <ul style="list-style-type: none"> <li>• <b>10g</b>—10 Gbps</li> <li>• <b>1g</b>—1 Gbps</li> <li>• <b>100m</b>—100 Mbps</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">auto-negotiation on page 169</a></li> <li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li> <li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>                                                                                                                                                                                                                                                                                       |

## targeted-broadcast


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|                                 |                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | targeted-broadcast;                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit <b>interfaces</b> <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> family inet],<br>[edit <b>interfaces</b> <i>interface-range</i> <i>interface-range-name</i> <b>unit</b> <i>logical-unit-number</i> family inet]                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                 |
| <b>Description</b>              | Specify whether the IP packets destined for a Layer 3 broadcast need to be forwarded to both an egress interface and the Routing Engine, or to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface.                           |
| <b>Default</b>                  | When this statement is not included, broadcast packets are sent to the Routing Engine only.                                                                                                                                                                                   |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring IP Directed Broadcast on an EX Series Switch</i></li> <li>• <i>Configuring IP Directed Broadcast (CLI Procedure)</i></li> <li>• <i>Understanding IP Directed Broadcast for EX Series Switches</i></li> </ul> |

## traceoptions (Individual Interfaces)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>traceoptions {     flag <i>flag</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | <p>Define tracing operations for individual interfaces.</p> <p>To specify more than one tracing operation, include multiple <b>flag</b> statements.</p> <p>The <b>traceoptions</b> statement for interfaces does not support a trace file. The logging is done by the kernel, so the tracing information is placed in the system <b>syslog</b> file in the directory <b>/var/log</b>.</p>                                                                                                                                                            |
|                                 | <div>  <p><b>NOTE:</b> The <b>traceoptions</b> statement is not supported on the QFX3000 QFabric system.</p> </div>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Default</b>                  | If you do not include this statement, no interface-specific tracing operations are performed.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b>flag</b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements. The following are the interface-specific tracing options.</p> <ul style="list-style-type: none"> <li>• <b>all</b>—All interface tracing operations</li> <li>• <b>event</b>—Interface events</li> <li>• <b>ipc</b>—Interface interprocess communication (IPC) messages</li> <li>• <b>media</b>—Interface media changes</li> <li>• <b>q921</b>—ISDN Q.921 frames</li> <li>• <b>q931</b>—ISDN Q.931 frames</li> </ul> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Tracing Operations of an Individual Router or Switch Interface</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |

## tx-buffers

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | tx-buffers (on   off);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> <a href="#">configured-flow-control</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | <p>Enable or disable an interface to respond to received Ethernet PAUSE messages. If you enable the transmit buffers to respond to PAUSE messages, when the interface receives a PAUSE message from the connected peer, the interface stops transmitting frames on the entire link. When the receive buffer on the connected peer empties below a certain threshold, the peer interface sends a message to the paused interface to resume sending frames.</p> <p>Ethernet PAUSE prevents buffers from overflowing and dropping packets during periods of network congestion. If the other devices in the network are also configured to support PAUSE, PAUSE supports lossless operation. Use the <b>tx-buffers</b> statement with the <b>rx-buffers</b> statement to configure asymmetric Ethernet PAUSE on an interface. (Use the <b>flow-control</b> statement to enable symmetric PAUSE and the <b>no-flow-control</b> statement to disable symmetric PAUSE on an interface. Symmetric flow control and asymmetric flow control are mutually exclusive features. If you attempt to configure both, the switch returns a commit error.)</p> |
|                                 | <p> <b>NOTE:</b> Ethernet PAUSE temporarily stops transmitting all traffic on a link when the buffers fill to a certain threshold. To temporarily pause traffic on individual “lanes” of traffic (each lane contains the traffic associated with a particular IEEE 802.1p code point, so there can be eight lanes of traffic on a link), use priority-based flow control (PFC).</p> <p>Ethernet PAUSE and PFC are mutually exclusive features, so you cannot configure both of them on the same interface. If you attempt to configure both Ethernet PAUSE and PFC on an interface, the switch returns a commit error.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Default</b>                  | Flow control is disabled. You must explicitly configure Ethernet PAUSE flow control on interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | on   off—Enable or disable an interface to respond to an Ethernet PAUSE message.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">flow-control on page 195</a></li> <li>• <a href="#">rx-buffers on page 225</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

- *Configuring CoS Asymmetric Ethernet PAUSE Flow Control*
- *Enabling and Disabling CoS Symmetric Ethernet PAUSE Flow Control*
- *Understanding CoS Flow Control (Ethernet PAUSE and PFC)*

## unit

**Syntax** The **ethernet-switching** and **fibre-channel** statements and all of their substatements are not supported on OCX Series switches.

```
unit logical-unit-number {
 family {
 ethernet-switching {
 filter input filter-name;
 filter output filter-name;
 native-vlan-id vlan-id;
 port-mode mode;
 vlan {
 members [(all | names | vlan-ids)];
 }
 }
 fibre-channel {
 port-mode (f-port | np-port);
 }
 inet {
 address address {
 primary;
 }
 filter input filter-name;
 filter output filter-name;
 primary;
 targeted-broadcast;
 }
 }
}
```

**Hierarchy Level** [edit **interfaces** *interface-name*],  
[edit **interfaces** **interface-range** *interface-range-name*]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description**



**NOTE:** The **ethernet-switching** and **fibre-channel** statements and all of their substatements are not supported on OCX Series switches.

Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

**Default** You must configure a logical interface to be able to use the physical device.

**Options** ***logical-unit-number***—Number of the logical unit.

**Range:** 0 through 16,384


The remaining statements are explained separately.

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <i>Configuring Gigabit and 10-Gigabit Ethernet Interfaces</i></li><li>• <a href="#">Configuring Link Aggregation on page 101</a></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul> |

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## vlan-id

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|                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                             | vlan-id <i>vlan-id-number</i> ;                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>                                                                                                                                                                                                    | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> ]                                                                                                                                                                                                                                     |
| <b>Release Information</b>                                                                                                                                                                                                | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                                                                                                                                                                                                                                            |
| <b>Description</b>                                                                                                                                                                                                        | For 10-Gigabit Ethernet and aggregated Ethernet interfaces only, bind an 802.1Q VLAN tag ID to a logical interface.                                                                                                                                                                                                                          |
| <div> <b>NOTE:</b> The VLAN tag ID cannot be configured on logical interface unit 0. The logical unit number must be 1 or higher.</div> |                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                                                                                                                                                                                                            | <i>vlan-id-number</i> —Valid VLAN identifier.<br><b>Range:</b> 1 through 4094                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b>                                                                                                                                                                                           | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                      |
| <b>Related Documentation</b>                                                                                                                                                                                              | <ul style="list-style-type: none"><li>• <a href="#">vlan-tagging on page 235</a></li><li>• <a href="#">Configuring Gigabit and 10-Gigabit Ethernet Interfaces on page 45</a></li><li>• <a href="#">Configuring a Layer 3 Logical Interface on page 92</a></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul> |



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## vlan-tagging

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|                                 |                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | vlan-tagging;                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> ]<br>[edit <a href="#">interfaces</a> <a href="#">interface-range</a> <i>interface-range-name</i> ]         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.3 for the QFX Series.                                                                                                  |
| <b>Description</b>              | Enable VLAN tagging. The platform receives and forwards single-tag frames with 802.1Q VLAN tags.                                                                   |
| <b>Default</b>                  | VLAN tagging is disabled by default.                                                                                                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">vlan-id on page 234</a></li><li>• <a href="#">Configuring a Layer 3 Logical Interface on page 92</a></li></ul> |



## CHAPTER 13

# Ethernet OAM Link Fault Management Configuration Statements

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- [syslog \(OAM LFM\) on page 255](#)
- [traceoptions \(OAM LFM\) on page 256](#)

## action (OAM LFM)

---

|                                 |                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>action {<br/>    syslog;<br/>    link-down;<br/>}</pre>                                                                                                           |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management</a> ]                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                   |
| <b>Description</b>              | <p>Define the action or actions to be taken when the OAM link fault management (LFM) fault event occurs.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                            |

## action-profile

---

**Syntax** `action-profile profile-name;`  
     `action {`  
         `syslog;`  
         `link-down;`  
     `}`  
     `event {`  
         `link-adjacency-loss;`  
         `link-event-rate {`  
             `frame-error count;`  
             `frame-period count;`  
             `frame-period-summary count;`  
             `symbol-period count;`  
         `}`  
     `}`

**Hierarchy Level** [edit protocols [oam ethernet link-fault-management](#)]

**Release Information** Statement introduced in Junos OS Release 9.4 for EX Series switches.

**Description** Configure an Ethernet OAM link fault management (LFM) action profile by specifying a profile name.

The remaining statements are explained separately.

**Options** *profile-name*—Name of the action profile.

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

**Related Documentation**

- [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)

## allow-remote-loopback

---

|                                 |                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | allow-remote-loopback;                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> ]                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                           |
| <b>Description</b>              | Advertise that the interface is capable of getting into loopback mode. Enable remote loopback in Ethernet OAM link fault management (LFM) on all Ethernet interfaces or the specified interface on the EX Series switch.                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul> |

## ethernet (OAM LFM)

```

Syntax ethernet {
 connectivity-fault-management {
 action-profile profile-name {
 action {
 interface-down;
 }
 default-actions {
 interface-down;
 }
 event {
 adjacency-loss;
 }
 }
 }
 esp-traceoptions {
 file filename <files number> <no-stamp> <replace> <size size> <world-readable |
 no-world-readable>;
 flag (all | error | esp | interface | krt | lib | normal | task | timer);
 }
 linktrace {
 age (30m | 10m | 1m | 30s | 10s);
 path-database-size path-database-size;
 }
 maintenance-domain domain-name {
 level number;
 mip-half-function (none | default | explicit);
 name-format (character-string | none | dns | mac+2oct);
 maintenance-association ma-name {
 continuity-check {
 hold-interval minutes;
 interface-status-tlv;
 interval (10m | 10s | 1m | 1s | 100ms);
 loss-threshold number;
 port-status-tlv;
 }
 mep mep-id {
 auto-discovery;
 direction down;
 interface interface-name;
 priority
 remote-mep mep-id {
 action-profile profile-name;
 sla-iterator-profile profile-name {
 data-tlv-size size;
 iteration-count count-value;
 priority priority-value;
 }
 }
 }
 }
 short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
 }
 }
 performance-monitoring {

```

```

sla-iterator-profiles {
 profile-name {
 calculation-weight {
 delay delay-value;
 delay-variation delay-variation-value;
 }
 cycle-time cycle-time-value;
 iteration-period iteration-period-value;
 measurement-type two-way-delay;
 passive;
 }
}
}
traceoptions {
 file filename <files number> <match regex> <size size> <world-readable |
 no-world-readable>;
 flag flag ;
 no-remote-trace;
}
}
link-fault-management {
 action-profile profile-name;
 action {
 syslog;
 link-down;
 }
 event {
 link-adjacency-loss;
 link-event-rate {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 }
}
interface interface-name {
 link-discovery (active | passive);
 pdu-interval interval;
 pdu-threshold threshold-value;
 remote-loopback;
 event-thresholds {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 negotiation-options {
 allow-remote-loopback;
 no-allow-link-events;
 }
}
}
traceoptions {
 file filename <files number> <match regex> <size size> <world-readable |
 no-world-readable>;
 flag flag ;
 no-remote-trace;
}

```



```

 }
 }
}

```

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.<br><a href="#">connectivity-fault-management</a> introduced in Junos OS Release 10.2 for EX Series switches.                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Provide IEEE 802.3ah Operation, Administration, and Maintenance (OAM) support for Ethernet interfaces on EX Series switches or configure connectivity fault management (CFM) for IEEE 802.1ag Operation, Administration, and Management (OAM) support on the switches.<br><br>The remaining statements are explained separately.                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li> <li>• <a href="#">Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches</a></li> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> <li>• <a href="#">Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure)</a></li> </ul> |

## event-thresholds

|                                 |                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> event-thresholds {   <a href="#">frame-error</a> count;   <a href="#">frame-period</a> count;   <a href="#">frame-period-summary</a> count;   <a href="#">symbol-period</a> count; } </pre> |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> ]                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                              |
| <b>Description</b>              | Configure threshold limit values for link events in periodic OAM PDUs.<br><br>The remaining statements are explained separately.                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                                     |

## event (OAM LFM)

---

|                                 |                                                                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>event {<br/>  link-adjacency-loss;<br/>  link-event-rate {<br/>    frame-error count;<br/>    frame-period count;<br/>    frame-period-summary count;<br/>    symbol-period count;<br/>  }<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile</a> <i>profile-name</i> ]                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                        |
| <b>Description</b>              | <p>Configure link events in an action profile for Ethernet OAM link fault management (LFM).</p> <p>The remaining statements are explained separately.</p>                                                   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                                                 |

## frame-error

---

|                                 |                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>frame-error count;</pre>                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management event link-event-rate</a> ],<br>[edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> <a href="#">event-thresholds</a> ]                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                         |
| <b>Description</b>              | <p>Configure the threshold value for sending frame error events or taking the action specified in the action profile.</p> <p>Frame errors occur on the underlying physical layer. The threshold is reached when the number of frame errors reaches the configured value.</p> |
| <b>Options</b>                  | <p><i>count</i>—Threshold count in seconds for frame error events.</p> <p><b>Range:</b> 1 through 100 seconds</p> <p><b>Default:</b> 1 second</p>                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                                                                                                                  |

## frame-period

---

|                                 |                                                                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>frame-period count;</code>                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management event link-event-rate</a> ],<br>[edit protocols <a href="#">oam ethernet link-fault-management interface interface-name event-thresholds</a> ]                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                            |
| <b>Description</b>              | Configure the number of frame errors within the last N frames that has exceeded a threshold.<br><br>Frame errors occur on the underlying physical layer. The threshold is reached when the number of frame errors reaches the configured value. |
| <b>Options</b>                  | <i>count</i> —Threshold count in seconds for frame error events.<br><b>Range:</b> 1 through 100 seconds                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                                                                                   |

## frame-period-summary

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>frame-period-summary count;</code>                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management event link-event-rate</a> ],<br>[edit protocols <a href="#">oam ethernet link-fault-management interface interface-name event-thresholds</a> ]                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Configure the threshold value for sending frame period summary error events or taking the action specified in the action profile.<br><br>An errored frame second is any 1-second period that has at least one errored frame. This event is generated if the number of errored frame seconds is equal to or greater than the specified threshold for that period. |
| <b>Options</b>                  | <i>count</i> —Threshold count in seconds for frame period summary error events.<br><b>Range:</b> 1 through 100 seconds                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                                                                                                                                                                                                    |

## oam

```

Syntax oam {
 ethernet {
 connectivity-fault-management {
 action-profile profile-name {
 action {
 interface-down;
 }
 default-actions {
 interface-down;
 }
 event {
 adjacency-loss;
 }
 }
 }
 linktrace {
 age (30m | 10m | 1m | 30s | 10s);
 path-database-size path-database-size;
 }
 maintenance-domain domain-name {
 level number;
 mip-half-function (none | default | explicit);
 name-format (character-string | none | dns | mac+2oct);
 maintenance-association ma-name {
 continuity-check {
 hold-interval minutes;
 interface-status-tlv;
 interval (10m | 10s | 1m | 1s | 100ms);
 loss-threshold number;
 port-status-tlv;
 }
 mep mep-id {
 auto-discovery;
 direction down;
 interface interface-name;
 remote-mep mep-id {
 action-profile profile-name;
 }
 }
 }
 }
 }
 performance-monitoring {
 sla-iterator-profiles {
 profile-name {
 calculation-weight {
 delay delay-value;
 delay-variation delay-variation-value;
 }
 cycle-time cycle-time-value;
 iteration-period iteration-period-value;
 measurement-type two-way-delay;
 passive;
 }
 }
 }
 }

```

```

 }
 }
}
link-fault-management {
 action-profile profile-name;
 action {
 syslog;
 link-down;
 }
 event {
 link-adjacency-loss;
 link-event-rate {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 }
}
interface interface-name {
 link-discovery (active | passive);
 pdu-interval interval;
 pdu-threshold threshold-value;
 remote-loopback;
 event-thresholds {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 negotiation-options {
 allow-remote-loopback;
 no-allow-link-events;
 }
}
}
}
}

```

**Hierarchy Level** [edit protocols]

**Release Information** Statement introduced in Junos OS Release 9.4 for EX Series switches.  
**connectivity-fault-management** introduced in Junos OS Release 10.2 for EX Series switches.

**Description** Provide IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support for Ethernet interfaces on EX Series switches or configure connectivity fault management (CFM) for IEEE 802.lag Operation, Administration, and Management (OAM) support on the switches.

The remaining statements are explained separately.

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

- Related Documentation**
- [Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72](#)
  - [Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches](#)
  - [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)
  - [Configuring Ethernet OAM Connectivity Fault Management \(CLI Procedure\)](#)

## interface (OAM LFM)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> interface <i>interface-name</i> {   link-discovery (active   passive);   pdu-interval <i>interval</i>;   pdu-threshold <i>threshold-value</i>;   remote-loopback;   event-thresholds {     frame-error <i>count</i>;     frame-period <i>count</i>;     frame-period-summary <i>count</i>;     symbol-period <i>count</i>;   }   negotiation-options {     allow-remote-loopback;     no-allow-link-events;   } } </pre> |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management</a> ]                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | <p>Configure Ethernet OAM link fault management (LFM) for all interfaces or for specific interfaces.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <i>interface-name</i> —Name of the interface to be enabled for IEEE 802.3ah OAM link fault management (LFM) support.                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                                                                                                                                              |

## link-adjacency-loss

---

|                                 |                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-adjacency-loss;                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile event</a> ]                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                              |
| <b>Description</b>              | Configure <b>loss of adjacency</b> event with the IEEE 802.3ah link fault management (LFM) peer. When included, the loss of adjacency event triggers the action specified under the <a href="#">action</a> statement.                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul> |

## link-discovery

---

|                                 |                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-discovery (active   passive);                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface interface-name</a> ]                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Specify the discovery mode used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support. The discovery process is triggered automatically when OAM 802.3ah functionality is enabled on an interface. Link monitoring is done when the interface sends periodic OAM PDUs.         |
| <b>Options</b>                  | <p><i>active</i>—In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality.</p> <p><i>passive</i>—In passive mode, the peer initiates the discovery process.</p> <p>Once the discovery process is initiated, both sides participate in discovery.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                                                                                                                                                                  |

## link-down

---

|                                 |                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-down;                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile action</a> ]                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                        |
| <b>Description</b>              | Mark the interface as down for transit traffic.                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul> |

## link-event-rate

---

|                                 |                                                                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | link-event-rate {<br><a href="#">frame-error</a> <i>count</i> ;<br><a href="#">frame-period</a> <i>count</i> ;<br><a href="#">frame-period-summary</a> <i>count</i> ;<br><a href="#">symbol-period</a> <i>count</i> ;<br>} |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile event</a> ]                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                       |
| <b>Description</b>              | Configure the number of link fault management (LFM) events per second.<br><br>The remaining statements are explained separately.                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                                                                |



## link-fault-management

```
Syntax link-fault-management {
 action-profile profile-name;
 action {
 syslog;
 link-down;
 }
 event {
 link-adjacency-loss;
 link-event-rate {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 }
 interface interface-name {
 link-discovery (active | passive);
 pdu-interval interval;
 pdu-threshold threshold-value;
 remote-loopback;
 event-thresholds {
 frame-error count;
 frame-period count;
 frame-period-summary count;
 symbol-period count;
 }
 negotiation-options {
 allow-remote-loopback;
 no-allow-link-events;
 }
 }
 }
```

**Hierarchy Level** [edit protocols [oam](#) [ethernet](#)]

**Release Information** Statement introduced in Junos OS Release 9.4 for EX Series switches.

**Description** Configure Ethernet OAM link fault management (LFM) for all interfaces or for specific interfaces.

The remaining statements are explained separately.

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

**Related Documentation**

- [Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72](#)
- [Configuring Ethernet OAM Link Fault Management \(CLI Procedure\) on page 70](#)

## negotiation-options

---

|                                 |                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>negotiation-options {<br/>    allow-remote-loopback;<br/>    no-allow-link-events;<br/>}</pre>                                                                                                             |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam</a> <a href="#">ethernet</a> <a href="#">link-fault-management</a> <a href="#">interface</a> <i>interface-name</i> ]                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                            |
| <b>Description</b>              | <p>Enable and disable IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) features for Ethernet interfaces.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                                                     |

## no-allow-link-events

---

|                                 |                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>no-allow-link-events;</pre>                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam</a> <a href="#">ethernet</a> <a href="#">link-fault-management</a> <a href="#">interface</a> <i>interface-name</i> <a href="#">negotiation-options</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                     |
| <b>Description</b>              | Disable the sending of link event TLVs.                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                              |

## pdu-interval

---

|                                 |                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>pdu-interval <i>interval</i>;</code>                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> ]                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                              |
| <b>Description</b>              | Specify the periodic OAM PDU sending interval for fault detection. It is used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support.                                                                              |
| <b>Options</b>                  | <i>interval</i> —Periodic OAM PDU sending interval.<br><b>Range:</b> 400 through 1000 milliseconds<br><b>Default:</b> 1000 milliseconds                                                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul> |

## pdu-threshold

---

|                                 |                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>pdu-threshold <i>threshold-value</i>;</code>                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> ]                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                               |
| <b>Description</b>              | Configure how many protocol data units (PDUs) are missed before declaring the peer lost in Ethernet OAM link fault management (LFM) for all interfaces or for specific interfaces. |
| <b>Options</b>                  | <i>threshold-value</i> —Number of PDUs missed before declaring the peer lost.<br><b>Range:</b> 3 through 10 PDUs<br><b>Default:</b> 3 PDUs                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul>                                      |

## remote-loopback

---

|                                 |                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | remote-loopback;                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> ]                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                           |
| <b>Description</b>              | Set the data terminal equipment (DTE) in loopback mode. Remove the statement from the configuration to take the DTE out of loopback mode. It is used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support.    |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul> |

## symbol-period

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | symbol-period <i>count</i> ;                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile</a> <i>profile-name</i> ; <a href="#">event link-event-rate</a> ] ,<br>[edit protocols <a href="#">oam ethernet link-fault-management interface</a> <i>interface-name</i> <a href="#">event-thresholds</a> ]                                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Configure the threshold for sending symbol period events or taking the action specified in the action profile.<br><br>Symbol code errors occur on the underlying physical layer. The symbol period threshold is reached when the number of symbol errors reaches the configured value within the period. You cannot configure the default value to a different value. |
| <b>Options</b>                  | <i>count</i> —Threshold count in seconds for symbol period events.<br><b>Range:</b> 1 through 100 seconds                                                                                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul>                                                                                                                                                                                                                           |

## syslog (OAM LFM)

---

|                                 |                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | syslog;                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit protocols <a href="#">oam ethernet link-fault-management action-profile</a> <i>profile-name</i> ; <a href="#">action</a> ]            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4 for EX Series switches.                                                                        |
| <b>Description</b>              | Generate a system log message for the Ethernet Operation, Administration, and Maintenance (OAM) link fault management (LFM) event.          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure)</a> on page 70</li></ul> |

## traceoptions (OAM LFM)

**Syntax** traceoptions {  
     file *filename* <files *number*> <match *regex*> <size *size*> <world-readable |  
         no-world-readable>;  
     flag *flag* ;  
     no-remote-trace;  
 }

**Release Information** Statement introduced in JUNOS Release 10.2 for EX Series switches.

**Description** Configure tracing options the link fault management.

**Options** file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory */var/log*.

files *number*—(Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

**Range:** 2 through 1000

**Default:** 3 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:

- **action-profile**—Trace action profile invocation events.
- **all**—Trace all events.
- **configuration**—Trace configuration events.
- **protocol**—Trace protocol processing events.
- **routing socket**—Trace routing socket events.

match—(Optional) Refine the output to log only those lines that match the given regular expression.

no-world-readable—(Optional) Restrict file access to the user who created the file.

no-remote-trace—(Optional) Disable the remote trace.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **files** option.

**Syntax:** *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**Default:** If you do not include this option, tracing output is appended to an existing trace file.

**world-readable**—(Optional) Enable unrestricted file access.

|                           |                                                             |
|---------------------------|-------------------------------------------------------------|
| <b>Required Privilege</b> | routing—To view this statement in the configuration.        |
| <b>Level</b>              | routing-control—To add this statement to the configuration. |

|                              |                                                                                                                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li><li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li></ul> |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|





# GRE Configuration Statements

- [destination \(Tunnels\) on page 259](#)
- [tunnel on page 260](#)
- [tunnel-port on page 260](#)

## destination (Tunnels)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>destination address;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | For encrypted, PPP-encapsulated, and tunnel interfaces, specify the remote address of the connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <b><i>address</i></b> —Address of the remote side of the connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring the Interface Address on page 40</a></li> <li>• <a href="#">point-to-point</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## tunnel

---

|                                 |                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>tunnel {<br/>    destination destination-address;<br/>    source source-address;<br/>    ttl number; (not supported on QFX and OCX Series switches)<br/>}</pre>                                                   |
| <b>Hierarchy Level</b>          | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>              | Configure a tunnel. You can use the tunnel for unicast and multicast traffic or just for multicast traffic. You can also use tunnels for encrypted traffic.<br><br>The remaining statements are explained separately.  |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)</i></li></ul>                                                                                           |

## tunnel-port

---

|                                 |                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>tunnel-port <i>port-number</i> tunnel-services;</pre>                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit chassis fpc <i>slot</i> pic <i>pic-number</i> ]                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>              | Configure the port number for generic routing encapsulation (GRE) tunneling.                                                                                                                                           |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Generic Routing Encapsulation Tunneling (CLI Procedure)</i></li></ul>                                                                                           |

# IP Directed Broadcast Configuration Statement

- [targeted-broadcast](#) on page 261

## targeted-broadcast

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|                                 |                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | targeted-broadcast;                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> family inet],<br>[edit <a href="#">interfaces</a> <a href="#">interface-range</a> <i>interface-range-name</i> <a href="#">unit</a> <i>logical-unit-number</i> family inet] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                     |
| <b>Description</b>              | Specify whether the IP packets destined for a Layer 3 broadcast need to be forwarded to both an egress interface and the Routing Engine, or to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface.                               |
| <b>Default</b>                  | When this statement is not included, broadcast packets are sent to the Routing Engine only.                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring IP Directed Broadcast on an EX Series Switch</i></li> <li>• <i>Configuring IP Directed Broadcast (CLI Procedure)</i></li> <li>• <i>Understanding IP Directed Broadcast for EX Series Switches</i></li> </ul>     |



## CHAPTER 16

# LAGs and LACP Configuration Statements

- [aggregated-devices on page 264](#)
- [aggregated-ether-options on page 265](#)
- [chassis on page 267](#)
- [802.3ad on page 268](#)
- [device-count on page 269](#)
- [ethernet on page 269](#)
- [force-up on page 270](#)
- [lacp \(802.3ad\) on page 271](#)
- [lacp \(Aggregated Ethernet\) on page 272](#)
- [minimum-links on page 272](#)
- [periodic on page 273](#)

## aggregated-devices

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>aggregated-devices {<br/>    ethernet {<br/>        device-count <i>number</i>;<br/>    }<br/>}</pre>                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit <a href="#">chassis</a> ],<br>[edit <a href="#">chassis</a> node-group <i>name</i> ]                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | Configure properties for aggregated devices on the switch.<br><br>The remaining statements are explained separately.                                                                                                                                                                                                                                                                                              |
| <b>Default</b>                  | Aggregated devices are disabled.                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li><li>• <a href="#">Configuring Link Aggregation on page 101</a></li><li>• <a href="#">Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104</a></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul> |

## aggregated-ether-options

**Syntax** The **fcoe-lag** and **mc-ae** statements are not supported on OCX Series switches.

```
aggregated-ether-options {
 configured-flow-control {
 rx-buffers (on | off);
 tx-buffers (on | off);
 }
 ethernet-switch-profile {
 tag-protocol-id;
 (fcoe-lag | no-fcoe-lag);
 (flow-control | no-flow-control);
 lacp mode {
 admin-key key;
 periodic interval;
 system-id mac-address;
 force-up;
 }
 }
 (link-protection | no-link-protection);
 link-speed speed;
 local-bias (edit interfaces ae);
 local-minimum-links-threshold threshold-value;
 (loopback | no-loopback);
 mc-ae {
 chassis-id chassis-id;
 mc-ae-id mc-ae-id;
 mode (active-active);
 status-control (active | standby);
 }
 minimum-links number;
 rebalance-periodic;
 resilient-hash;
 source-address-filter filter;
 (source-filtering | no-source-filtering);
}
```

**Hierarchy Level** [edit [interfaces](#) aex]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
 Statements **fcoe-lag** and **no-fcoe-lag** introduced in Junos OS Release 13.2X52-D10 for the QFX Series.  
 Statements **force-up**, **lacp**, and **resilient-hash** introduced in Junos OS Release 14.1X53-D10 for the QFX Series.  
 Statement **local-minimum-links-threshold** introduced in Junos OS Release 14.1X53-D40 for the QFX Series.  
 Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Configure properties specific to a specific aggregated Ethernet interface.



**NOTE:** The `fcoe-lag` and `mc-ae` statements are not supported on OCX Series switches.

The statements are explained separately.

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b>                  | Options are not enabled.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li> <li>• <a href="#">Configuring Aggregated Ethernet LACP on page 100</a></li> <li>• <a href="#">Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108</a></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul> |



## chassis

```

Syntax chassis {
 routing-engine {
 redundancy {
 failover {
 on-disk-failure {
 disk-failure-action (halt | reboot);
 }
 on-loss-of-keepalives;
 }
 graceful-switchover;
 }
 aggregated-devices {
 ethernet {
 device-count number;
 }
 alarm {
 interface-type {
 alarm-name (red | yellow | ignore);
 }
 }
 }
 forwarding-options profile-name {
 num-65-127-prefix value
 }
 fpc slot {
 auto-speed-detection disable
 pic pic-number{
 port port-number{
 tunnel-port port-number tunnel-services;
 channel-speed speed;
 }
 port-range port-range-low port-range-high {
 channel-speed speed;
 }
 }
 }
 maximum-ecmp next-hops;
 }

```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Configure chassis-specific properties for the switch.  
  
The remaining statements are explained separately.

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

**Related Documentation**

- [Configuring Link Aggregation on page 101](#)

---

## 802.3ad

---

**Syntax**

```
802.3ad aex;
 lacp {
 force-up;
 (primary | backup);
 }
 port-priority;
}
```

**Hierarchy Level** [edit [interfaces](#) *interface-name* [ether-options](#)]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Specify the aggregated Ethernet logical interface number.



**NOTE:** The port-priority statement is not supported on QFabric systems.

---

**Options** **aex**—Aggregated Ethernet logical interface number.

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

**Related Documentation**

- [Configuring Link Aggregation on page 101](#)
- [Configuring Aggregated Ethernet LACP on page 100](#)
- [Understanding Aggregated Ethernet Interfaces and LACP on page 97](#)
- [Troubleshooting an Aggregated Ethernet Interface on page 114](#)
- *Junos OS Network Interfaces Library for Routing Devices*

## device-count

---

|                                 |                                                                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>device-count <i>number</i>;</code>                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <code>chassis aggregated-devices ethernet</code> ],<br>[edit <code>chassis node-group <i>name</i> aggregated-devices ethernet</code> ]                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                    |
| <b>Description</b>              | Configure the number of aggregated Ethernet logical devices available to the switch.                                                                                                                                                             |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Link Aggregation on page 101</a></li> <li>• <a href="#">Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104</a></li> </ul> |

## ethernet

---

|                                 |                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>ethernet {<br/>    <code>device-count <i>number</i>;</code><br/>}</code>                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <code>chassis aggregated-devices</code> ],<br>[edit <code>chassis node-group aggregated-devices</code> ]                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                          |
| <b>Description</b>              | Configure properties for aggregated Ethernet devices on the switch.<br><br>The remaining statement is explained separately.                                                            |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Link Aggregation on page 101</a></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul> |

## force-up

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | force-up;                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">ether-options</a> 802.3ad lacp;<br>[edit <a href="#">interfaces</a> <i>interface-name</i> <a href="#">aggregated-ether-options</a> lacp;                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Configure the state of the interface as up when the peer has limited LACP capability. You can also configure the peer interface (in MC-LAG) to remain up even with limited LACP capability.                                                                                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li><li>• <a href="#">Configuring Aggregated Ethernet LACP on page 100</a></li><li>• <a href="#">Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108</a></li><li>• <a href="#">Junos OS Network Interfaces Library for Routing Devices</a></li><li>• </li></ul> |

## lacp (802.3ad)

**Syntax** `lacp {  
    force-up;  
    (primary | backup);  
    port-priority;  
}`

**Hierarchy Level** [edit [interfaces interface-name ether-options 802.3ad](#)]

**Release Information** Statement introduced in Junos OS Release 11.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Configure the Link Aggregation Control Protocol (LACP) parameters for interfaces. The remaining statement is explained separately.



**NOTE:** The port-priority statement is not supported on QFabric systems.

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

**Related Documentation**

- [Configuring Link Aggregation on page 101](#)
- [Configuring Aggregated Ethernet LACP on page 100](#)
- [Understanding Aggregated Ethernet Interfaces and LACP on page 97](#)

## lACP (Aggregated Ethernet)

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|                                 |                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>lACP (active   passive) {<br/>    admin-key <i>key</i>;<br/>    periodic <i>interval</i><br/>    system-ID <i>mac-address</i>;<br/>    force-up;<br/>}</code>                                                                                                              |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces interface-name</a> <a href="#">aggregated-ether-options</a> ]                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                    |
| <b>Description</b>              | Configure the Link Aggregation Control Protocol (LACP) parameters for interfaces. The remaining statement is explained separately.                                                                                                                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Link Aggregation on page 101</a></li><li>• <a href="#">Configuring Aggregated Ethernet LACP on page 100</a></li><li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li></ul> |

## minimum-links

---

|                                 |                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-links <i>number</i>;</code>                                                                               |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces aex</a> <a href="#">aggregated-ether-options</a> ]                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.                                                       |
| <b>Description</b>              | For an aggregated Ethernet interface, set the minimum number of links that must be up for the bundle to be labeled up.  |
| <b>Options</b>                  | <i>number</i> —Number of links.<br><b>Range:</b> 1 through 8<br><b>Default:</b> 1                                       |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration. |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Link Aggregation on page 101</a></li></ul>              |

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## periodic

---

|                                 |                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>periodic (fast   slow);</code>                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit <a href="#">interfaces</a> <code>aex</code> <a href="#">aggregated-ether-options</a> <code>lACP</code> ]                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                           |
| <b>Description</b>              | Configure the interval for periodic transmission of LACP packets.                                                                                                                                                                                                       |
| <b>Default</b>                  | <code>fast</code>                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <b><i>interval</i></b> —Interval at which to periodically transmit LACP packets: <ul style="list-style-type: none"><li>• <b><i>fast</i></b>—Receive packets every second. This is the default.</li><li>• <b><i>slow</i></b>—Receive packets every 30 seconds.</li></ul> |
| <b>Required Privilege Level</b> | <code>interface</code> —To view this statement in the configuration.<br><code>interface-control</code> —To add this statement to the configuration.                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>                                                             |





## CHAPTER 17

# LAG Local Link Options Configuration Statements

- `local-bias` (edit interfaces ae) on page 276
- `local-minimum-links-threshold` on page 277

## local-bias (edit interfaces ae)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>local-bias</code><br><code>&lt;disable&gt;;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit interfaces aex aggregated-ether-options]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.2X51-D20 for EX Series switches and QFX Series devices.<br><b>disable</b> option introduced in Junos OS Release 14.1X53-D25.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | <p>Enable or disable local link bias for individual aggregated Ethernet interfaces.</p> <p>Local link bias can be enabled or disabled globally for the entire Virtual Chassis or VCF using the <b>set forwarding-options local-bias</b> statement or <b>set forwarding-options local-bias disable</b> statement, or per LAG bundle using the <b>set interfaces aex aggregated-ether-options local-bias (edit interfaces ae)</b> statement or <b>set interfaces aex aggregated-ether-options local-bias (edit interfaces ae) disable</b> statement.</p> <p>When local link bias is set at both the global and per LAG bundle levels, the per LAG bundle configuration takes precedence. For instance, if local link bias is enabled globally on the Virtual Chassis or VCF using the <b>set forwarding-options local-bias</b> statement but disabled on a LAG bundle named <b>ae1</b> using the <b>set interfaces ae1 aggregated-ether-options local-bias (edit interfaces ae) disable</b> statement, local link bias is disabled on the LAG bundle named <b>ae1</b>.</p> <p>Local link bias conserves bandwidth on Virtual Chassis ports (VCPs) by using local links to forward unicast traffic exiting a Virtual Chassis or Virtual Chassis Fabric (VCF) that has a link aggregation group (LAG) bundle composed of member links on different member switches in the same Virtual Chassis or VCF. A local link is a member link in the LAG bundle that is on the member switch that received the traffic.</p> <p>You should enable local link bias if you want to conserve VCP bandwidth by always forwarding egress unicast traffic on a LAG bundle out of a local link. You should not enable local link bias if you want egress traffic load-balanced as it exits the Virtual Chassis or VCF.</p> |
| <b>Default</b>                  | Local link bias is disabled by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <b>none</b> —Enable local link bias for the aggregated Ethernet interface.<br><b>disable</b> —(Optional) Disable local link bias for the aggregated Ethernet interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | <b>system</b> —To view this statement in the configuration.<br><b>system-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Local Link Bias (CLI Procedure) on page 120</a></li><li>• <a href="#">Understanding Local Link Bias on page 119</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## local-minimum-links-threshold

|                            |                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>local-minimum-links-threshold <i>threshold-value</i></code>                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>     | [edit interfaces <i>aex</i> aggregated-ether-options]                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b> | Statement introduced in Junos OS Release 14.1X53-D40 for QFX5100 switches.                                                                                                                                                                                                                                                                            |
| <b>Description</b>         | For an aggregated Ethernet interface (LAG bundle) with member links spanning multiple chassis (member switches) in a Virtual Chassis or Virtual Chassis Fabric (VCF), set a threshold for the percentage of member links local to any particular chassis that must be up for that chassis to continue to be active in the aggregated Ethernet bundle. |



**NOTE:** This statement is available only on member switches in a non-mixed mode QFX5100 Virtual Chassis or VCF.

You configure a threshold for a particular aggregated Ethernet interface (*aex*). When set, the threshold applies locally to any chassis with links in the specified LAG bundle. The threshold value represents a percentage of active local member links out of the total number of local member links for the chassis. When one or more member links on a chassis go down, the system compares the percentage of local member links that are “up” to the threshold. If the percentage of local member links that are “up” is less than the threshold, any remaining active local links are forced down as well, to prevent forwarding traffic for the aggregated Ethernet interface through any member links on that chassis. If the percentage of “up” links is greater than or equal to the threshold, the status of the active links remains unchanged and they can forward LAG traffic.

For example, consider a case where the threshold is set to 52, and one local LAG member link goes down on one switch in a Virtual Chassis Fabric that has a total of four local LAG member links. In this case, 75 percent of the links are still up (greater than the threshold, 52 percent), so the remaining local member links stay up. However, if two local member links go down, only 50 percent of the links are up, so the local minimum links feature forces the remaining two active local member links down as well.

This feature also adjusts local member link status accordingly when failed links come up again, if you reconfigure the threshold value, or if you add or remove local member links in the LAG bundle.

The local minimum links feature helps avoid traffic loss due to asymmetric bandwidth on the forwarding paths across a chassis when some local aggregated Ethernet member links fail and some remain active. Enable this feature only if you want to closely manage ingress and egress traffic forwarding paths on aggregated Ethernet interfaces, especially where local link bias is also enabled.

**Default** The local minimum links feature is disabled by default.

**Options**    *threshold-value*—Percentage of member links in an aggregated Ethernet bundle local to a chassis that must be up for any local member links on that chassis to be active in the aggregated Ethernet bundle.

**Range:** 1 through 100 (decimal)

**Default:** none—This option is not enabled by default.

**Required Privilege**    interface—To view this statement in the configuration.

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

**Related Documentation**    • [Understanding Local Minimum Links on page 123](#)

## CHAPTER 18

# Redundant Trunk Groups Configuration Statements

- [group \(Redundant Trunk Groups\) on page 280](#)
- [interface \(Redundant Trunk Groups\) on page 281](#)
- [preempt-cutover-timer on page 282](#)
- [redundant-trunk-group on page 283](#)

## group (Redundant Trunk Groups)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>group name {<br/>    interface interface-name &lt;primary&gt;;<br/>    interface interface-name;<br/>    preempt-cutover-timer seconds;<br/>}</pre>                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | <ul style="list-style-type: none"><li>• For platforms with ELS:<br/>[edit switch-options <b>redundant-trunk-group</b>]</li><li>• For platforms without ELS:<br/>[edit ethernet-switching-options <b>redundant-trunk-group</b>]</li></ul>                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Hierarchy level [edit switch-options] introduced in Junos OS Release 13.2X50-D10 (ELS). (See <i>Getting Started with Enhanced Layer 2 Software</i> for information about ELS.)</p> <p>Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.</p>                                                                                                                                   |
| <b>Description</b>              | Create a redundant trunk group.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <p><b>name</b>—The name of the redundant trunk group.</p> <ul style="list-style-type: none"><li>• For platforms with ELS:<br/>The group name must be a string “rtg<math>n</math>” where <math>n</math> is a number from 0 through 15, such as “rtg2” or “rtg10”.</li><li>• For platforms without ELS:<br/>The group name must start with a letter and can consist of letters, numbers, dashes, and underscores.</li></ul> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p>system—To view this statement in the configuration.</p> <p>system—control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Configuring Redundant Trunk Links for Faster Recovery</i></li><li>• <a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery on page 131</a></li><li>• <a href="#">Understanding Redundant Trunk Links on page 129</a></li></ul>                                                                                                                                                                              |

## interface (Redundant Trunk Groups)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>interface <i>interface-name</i> &lt;primary&gt;; interface <i>interface-name</i>;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | <p>For platforms with ELS:</p> <pre>[edit switch-options <b>redundant-trunk-group</b> <i>group name</i>]</pre> <p>For platforms without ELS:</p> <pre>[edit ethernet-switching-options <b>redundant-trunk-group</b> <i>group name</i>]</pre>                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Hierarchy level <b>[edit switch-options]</b> introduced in Junos OS Release 13.2X50-D10 (ELS). (See <i>Getting Started with Enhanced Layer 2 Software</i> for information about ELS.)</p> <p>Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.</p>                                                                                                                                                                                                                                                        |
| <b>Description</b>              | <p>Configure a primary link and secondary link on trunk ports. If the primary link fails, the secondary link automatically takes over as the primary link without waiting for normal STP convergence.</p>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <p><b>interface <i>interface-name</i></b>—A logical interface or an aggregated interface containing multiple ports.</p> <p><b>primary</b>—(Optional) Specify one of the interfaces in the redundant group as the primary link. The interface without this option is the secondary link in the redundant group. If a link is not specified as <b>primary</b>, the software compares the two links and selects the link with the highest port number as the active link. For example, if the two interfaces are <b>ge-0/1/0</b> and <b>ge-0/1/1</b>, the software assigns <b>ge-0/1/1</b> as the active link.</p> |
| <b>Required Privilege Level</b> | <p>system—To view this statement in the configuration.</p> <p>system—control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring Redundant Trunk Links for Faster Recovery</i></li> <li>• <a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery on page 131</a></li> <li>• <a href="#">Understanding Redundant Trunk Links on page 129</a></li> </ul>                                                                                                                                                                                                                                                                                                      |

## preempt-cutover-timer

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|                                 |                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>preempt-cutover-timer seconds;</code>                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | <ul style="list-style-type: none"><li>For platforms with ELS:<br/>[edit switch-options <b>redundant-trunk-group</b> group name]</li><li>For platforms without ELS:<br/>[edit ethernet-switching-options <b>redundant-trunk-group</b> group name]</li></ul>                                                                                                |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 11.1 for EX Series switches.</p> <p>Hierarchy level <b>[edit switch-options]</b> introduced in Junos OS Release 13.2X50-D10 (ELS). (See <i>Getting Started with Enhanced Layer 2 Software</i> for information about ELS.)</p> <p>Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.</p> |
| <b>Description</b>              | Change the length of time that a re-enabled primary link waits to take over from an active secondary link in a redundant trunk group.                                                                                                                                                                                                                     |
| <b>Default</b>                  | If you do not change the time with the <b>preempt-cutover-timer</b> statement, a re-enabled primary link takes over from the active secondary link after 1 second.                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b>seconds</b>—Number of seconds that the primary link waits to take over from the active secondary link.</p> <p><b>Range:</b> 1 through 600 seconds</p>                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | <p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li><i>Example: Configuring Redundant Trunk Links for Faster Recovery</i></li><li><a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery on page 131</a></li><li><a href="#">Understanding Redundant Trunk Links on page 129</a></li></ul>                                                          |



## redundant-trunk-group

|                                 |                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> redundant-trunk-group {   group name {     interface interface-name &lt;primary&gt;;     interface interface-name;     preempt-cutover-timer seconds;   } } </pre>                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | <ul style="list-style-type: none"> <li>For platforms with ELS:<br/>[edit switch-options]</li> <li>For platforms without ELS:<br/>[edit ethernet-switching-options]</li> </ul>                                                                                                                                                                            |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Hierarchy level <b>[edit switch-options]</b> introduced in Junos OS Release 13.2X50-D10 (ELS). (See <i>Getting Started with Enhanced Layer 2 Software</i> for information about ELS.)</p> <p>Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.</p> |
| <b>Description</b>              | <p>Configure a primary link and secondary link on trunk ports. If the primary link fails, the secondary link automatically takes over without waiting for normal spanning-tree protocol convergence.</p> <p>The remaining statements are explained separately.</p>                                                                                       |
| <b>Required Privilege Level</b> | <p>system—To view this statement in the configuration.</p> <p>system—control—To add this statement to the configuration.</p>                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Example: Configuring Redundant Trunk Links for Faster Recovery</i></li> <li><a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery on page 131</a></li> <li><a href="#">Understanding Redundant Trunk Links on page 129</a></li> </ul>                                                     |



## CHAPTER 19

# Resilient Hashing Configuration Statements

- [ecmp-resilient-hash](#) on page 285
- [enhanced-hash-key](#) on page 286
- [hash-mode](#) on page 288
- [inet \(enhanced-hash-key\)](#) on page 290
- [inet6 \(enhanced-hash-key\)](#) on page 292
- [resilient-hash](#) on page 293

### [ecmp-resilient-hash](#)

---

|                                 |                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>ecmp-resilient-hash;</code>                                                                                                 |
| <b>Hierarchy Level</b>          | [edit forwarding-options enhanced-hash-key]                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 14.1X53-D10 for the QFX Series.                                                          |
| <b>Description</b>              | Enable resilient hashing for ECMP groups, to minimize remapping of destination paths.                                             |
| <b>Required Privilege Level</b> | system—To view this statement in the configuration.<br>system-control—To add this statement to the configuration.                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Resilient Hashing for Trunk/ECMP Groups</a> on page 148</li></ul> |

## enhanced-hash-key

```
Syntax enhanced-hash-key {
 ecmp-resilient-hash;
 fabric-load-balance {
 flowlet {
 inactivity-interval interval;
 }
 per-packet;
 }
 hash-mode {
 layer2-header;
 layer2-payload;
 }
 inet {
 no-ipv4-destination-address;
 no-ipv4-source-address;
 no-l4-destination-port;
 no-l4-source-port;
 no-protocol;
 vlan-id;
 }
 inet6 {
 no-ipv6-destination-address;
 no-ipv6-source-address;
 no-l4-destination-port;
 no-l4-source-port;
 no-next-header;
 vlan-id;
 }
 layer2 {
 no-destination-mac-address;
 no-ether-type;
 no-source-mac-address;
 vlan-id;
 }
}
```

**Hierarchy Level** [edit forwarding-options]

**Release Information** Statement introduced in Junos OS Release 13.2X51-D15 for EX Series switches.  
Statement introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.  
The **fabric-load-balance** statement introduced in Junos OS Release 14.1X53-D10.

**Description** Configure the hashing key used to hash link aggregation group (LAG) and equal-cost multipath (ECMP) traffic, or enable adaptive load balancing (ALB) in a Virtual Chassis Fabric (VCF).

The hashing algorithm is used to make traffic-forwarding decisions for traffic entering a LAG bundle or for traffic exiting a switch when ECMP is enabled.

For LAG bundles, the hashing algorithm determines how traffic entering a LAG bundle is placed onto the bundle's member links. The hashing algorithm tries to manage bandwidth by evenly load-balancing all incoming traffic across the member links in the bundle.

When ECMP is enabled, the hashing algorithm determines how incoming traffic is forwarded to the next-hop device.

The remaining statements are explained separately.

|                           |                                                               |
|---------------------------|---------------------------------------------------------------|
| <b>Required Privilege</b> | interface—To view this statement in the configuration.        |
| <b>Level</b>              | interface-control—To add this statement to the configuration. |

|                              |                                                                                                                                                                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <a href="#">Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic (CLI Procedure) on page 146</a></li><li>• <a href="#">Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139</a></li></ul> |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## hash-mode

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>hash-mode {<br/>    layer2-header;<br/>    layer2-payload;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit forwarding-options <a href="#">enhanced-hash-key</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.2X51-D15 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | <p>Select the mode for the hashing algorithm.</p> <p>The hashing algorithm is used to make traffic-forwarding decisions for traffic entering a LAG bundle or for traffic exiting a switch when ECMP is enabled.</p> <p>For LAG bundles, the hashing algorithm determines how traffic entering a LAG bundle is placed onto the bundle's member links. The hashing algorithm tries to manage bandwidth by evenly load-balancing all incoming traffic across the member links in the bundle.</p> <p>When ECMP is enabled, the hashing algorithm determines how incoming traffic is forwarded to the next-hop device.</p> <p>The hash mode that is set using this statement determines which fields are inspected by the hashing algorithm. You must set the hash mode to <b>layer2-payload</b> if you want the hashing algorithm to inspect fields in the Layer 2 payload when making hashing decisions. You must set the hash mode to <b>layer2-header</b> if you want the hashing algorithm to inspect fields in the Layer 2 header when making hashing decisions.</p> <p>If the hash mode is set to <b>layer2-payload</b>, you can set the fields used by the hashing algorithm to hash IPv4 traffic using the <b>set forwarding-options enhanced-hash-key inet</b> statement. You can set the fields used by the hashing algorithm to hash IPv6 traffic using the <b>set forwarding-options enhanced-hash-key inet6</b> statement.</p> <p>If the hash mode is set to <b>layer2-header</b>, you can set the fields that the hashing algorithm inspects in the Layer 2 header using the <b>set forwarding-options enhanced-hash-key layer2</b> statement.</p> |
| <b>Default</b>                  | layer2-payload                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <p><b>layer2-payload</b>—Set the hashing algorithm to use fields in the Layer 2 payload to make hashing decisions.</p> <p><b>layer2-header</b>—Set the hashing algorithm to use fields in the Layer 2 header to make hashing decisions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Related  
Documentation**

- [Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic \(CLI Procedure\) on page 146](#)
- [Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139](#)
- [enhanced-hash-key on page 286](#)
- [inet on page 290](#)
- [inet6 on page 292](#)
- [layer2](#)

## inet (enhanced-hash-key)

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|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>inet {<br/>    no-ipv4-destination-address;<br/>    no-ipv4-source-address;<br/>    no-l4-destination-port;<br/>    no-l4-source-port;<br/>    no-protocol;<br/>    vlan-id;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>     | [edit forwarding-options <a href="#">enhanced-hash-key</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b> | Statement introduced in Junos OS Release 13.2X51-D15 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>         | <p>Select the payload fields in IPv4 traffic used by the hashing algorithm to make hashing decisions.</p> <p>When IPv4 traffic enters a LAG and the hash mode is set to Layer 2 payload, the hashing algorithm checks the fields configured using the <b>inet</b> statement and uses the information in the fields to decide how to place traffic onto the LAG bundle's member links or how to forward traffic to the next hop device when ECMP is enabled.</p> <p>The hashing algorithm, when used to hash LAG bundle traffic, always tries to manage bandwidth by evenly load-balancing all incoming traffic across the member links in the bundle.</p> <p>The hashing algorithm only inspects the IPv4 fields in the payload to make hashing decisions when the hash mode is set to <b>layer2-payload</b>. The hash mode is set to Layer 2 payload by default. You can set the hash mode to Layer 2 payload using the <b>set forwarding-options enhanced-hash-key hash-mode layer2-payload</b> statement.</p> |
| <b>Default</b>             | <p>The following fields are used by the hashing algorithm to make hashing decisions for IPv4 traffic:</p> <ul style="list-style-type: none"><li>• IP destination address</li><li>• IP source address</li><li>• Layer 4 destination port</li><li>• Layer 4 source port</li><li>• Protocol</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>             | <p><b>no-ipv4-destination-address</b>—Exclude the IPv4 destination address field from the hashing algorithm.</p> <p><b>no-ipv4-source-address</b>—Exclude the IPv4 source address field from the hashing algorithm.</p> <p><b>no-l4-destination-port</b>—Exclude the Layer 4 destination port field from the hashing algorithm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



**no-l4-source-port**—Exclude the Layer 4 source port field from the hashing algorithm.

**no-protocol**—Exclude the protocol field from the hashing algorithm.

**vlan-id**—Include the VLAN ID field in the hashing algorithm.

|                                 |                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration. |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <a href="#">Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic (CLI Procedure) on page 146</a></li><li>• <a href="#">Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139</a></li><li>• <a href="#">enhanced-hash-key on page 286</a></li><li>• <a href="#">hash-mode on page 288</a></li><li>• <a href="#">inet6 on page 292</a></li></ul> |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## inet6 (enhanced-hash-key)

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|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>inet6 {<br/>    no-ipv6-destination-address;<br/>    no-ipv6-source-address;<br/>    no-l4-destination-port;<br/>    no-l4-source-port;<br/>    no-next-header;<br/>    vlan-id;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>     | [edit forwarding-options <a href="#">enhanced-hash-key</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b> | Statement introduced in Junos OS Release 13.2X51-D15 for EX Series switches.<br>Statement introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>         | <p>Select the payload fields in an IPv6 packet used by the hashing algorithm to make hashing decisions.</p> <p>When IPv6 traffic enters a LAG and the hash mode is set to Layer 2 payload, the hashing algorithm checks the fields configured using this statement and uses the information in the fields to decide how to place traffic onto the LAG bundle's member links or to forward traffic to the next hop device when ECMP is enabled.</p> <p>The hashing algorithm, when used to hash LAG traffic, always tries to manage bandwidth by evenly load-balancing all incoming traffic across the member links in the bundle.</p> <p>The hashing algorithm only inspects the IPv6 fields in the payload to make hashing decisions when the hash mode is set to Layer 2 payload. The hash mode is set to Layer 2 payload by default. You can set the hash mode to Layer 2 payload using the <b>set forwarding-options enhanced-hash-key hash-mode layer2-payload</b> statement.</p> |
| <b>Default</b>             | <p>The data in the following fields are used by the hashing algorithm to make hashing decisions for IPv6 traffic:</p> <ul style="list-style-type: none"><li>• IP destination address</li><li>• IP source address</li><li>• Layer 4 destination port</li><li>• Layer 4 source port</li><li>• Next header</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>             | <p><b>no-ipv6-destination-address</b>—Exclude the IPv6 destination address field from the hashing algorithm.</p> <p><b>no-ipv6-source-address</b>—Exclude the IPv6 source address field from the hashing algorithm.</p> <p><b>no-l4-destination-port</b>—Exclude the Layer 4 destination port field from the hashing algorithm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**no-l4-source-port**—Exclude the Layer 4 source port field from the hashing algorithm.

**no-next-header**—Exclude the Next Header field from the hashing algorithm.

**vlan-id**—Include the VLAN ID field in the hashing algorithm.

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

**Related Documentation**

- [Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic \(CLI Procedure\) on page 146](#)
- [Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139](#)
- [enhanced-hash-key on page 286](#)
- [hash-mode on page 288](#)
- [inet on page 290](#)

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## resilient-hash

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**Syntax** resilient-hash;

**Hierarchy Level** [edit interfaces aex aggregated-ether-options]]

**Release Information** Statement introduced in Junos OS Release 14.1X53-D10 for the QFX Series.

**Description** Enable resilient hashing for a LAG, to minimize remapping of destination paths.

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

**Related Documentation**

- [Configuring Resilient Hashing for Trunk/ECMP Groups on page 148](#)



## CHAPTER 20

# Uplink Failure Detection Configuration Statements

- [group](#) on page 295
- [link-to-disable](#) on page 296
- [link-to-monitor](#) on page 296
- [uplink-failure-detection](#) on page 297

### group

---

**Syntax** `group group-name {  
    link-to-monitor interface-name;  
    link-to-disable interface-name;  
}`

**Hierarchy Level** [edit protocols uplink-failure-detection]

**Release Information** Statement introduced in Junos OS Release 12.1 for the QFX Series.

**Description** Configure a group of uplink and downlink interfaces for uplink failure detection.

**Options** *group-name*—Name of the uplink failure detection group.

The remaining statements are explained separately.

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

**Related Documentation**

- [Overview of Uplink Failure Detection](#) on page 153
- [Configuring Interfaces for Uplink Failure Detection](#) on page 155
- [Example: Configuring Interfaces for Uplink Failure Detection](#) on page 156

## link-to-disable

---

|                                 |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>link-to-disable <i>interface-name</i>;</code>                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | <code>[edit protocols uplink-failure-detection group <i>group-name</i>]</code>                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure the downlink interfaces to be disabled when the switch detects an uplink failure. The switch can monitor a maximum of eight downlink interfaces in a group.                                                                                                                                           |
| <b>Options</b>                  | <i>interface-name</i> —Name of the downlink interface in an uplink failure detection group. The interface can be a physical interface or a logical interface.                                                                                                                                                   |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Overview of Uplink Failure Detection on page 153</a></li><li>• <a href="#">Configuring Interfaces for Uplink Failure Detection on page 155</a></li><li>• <a href="#">Example: Configuring Interfaces for Uplink Failure Detection on page 156</a></li></ul> |

## link-to-monitor

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|                                 |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>link-to-monitor <i>interface-name</i>;</code>                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | <code>[edit protocols uplink-failure-detection group <i>group-name</i>]</code>                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure the uplink interfaces to be monitored for uplink failure detection. The switch can monitor a maximum of eight uplink interfaces in a group.                                                                                                                                                           |
| <b>Options</b>                  | <i>interface-name</i> —Name of the uplink interface in an uplink failure detection group. The interface can be a physical interface or a logical interface.                                                                                                                                                     |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Overview of Uplink Failure Detection on page 153</a></li><li>• <a href="#">Configuring Interfaces for Uplink Failure Detection on page 155</a></li><li>• <a href="#">Example: Configuring Interfaces for Uplink Failure Detection on page 156</a></li></ul> |

## uplink-failure-detection

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|                                 |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>uplink-failure-detection {<br/>  group <i>group-name</i> {<br/>    link-to-monitor <i>interface-name</i>;<br/>    link-to-disable <i>interface-name</i>;<br/>  }<br/>}</pre>                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit protocols]                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                                                                                                                               |
| <b>Description</b>              | <p>Configure uplink and downlink interfaces in a group to monitor uplink failures and to propagate uplink failure information to the downlink interfaces.</p> <p>The remaining statements are explained separately.</p>                                                                                         |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Overview of Uplink Failure Detection on page 153</a></li><li>• <a href="#">Configuring Interfaces for Uplink Failure Detection on page 155</a></li><li>• <a href="#">Example: Configuring Interfaces for Uplink Failure Detection on page 156</a></li></ul> |





## CHAPTER 21

# Interfaces Operational Commands

- `monitor interface`
- `show interfaces diagnostics optics`
- `show interfaces ge`
- `show interfaces (GRE)`
- `show interfaces irb`
- `show interfaces queue`
- `show interfaces xe`

## monitor interface

**Syntax** `monitor interface`  
`<interface-name> | traffic <detail>`

**Release Information** Command introduced before Junos OS Release 7.4.  
 Command introduced in Junos OS Release 9.0 for EX Series switches.  
 Command introduced in Junos OS Release 11.1 for the QFX Series.  
 Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Display real-time statistics about interfaces, updating the statistics every second. Check for and display common interface failures, such as SONET/SDH and T3 alarms, loopbacks detected, and increases in framing errors.



**NOTE:** This command is not supported on the QFX3000 QFabric system.

**Options** **none**—Display real-time statistics for all interfaces.

**detail**—(Optional) With traffic option only, display detailed output.

**interface-name**—(Optional) Display real-time statistics for the specified interface. In a TX Matrix or TX Matrix Plus router, display real-time statistics for the physical interfaces on the specified line-card chassis (LCC) only.

**traffic**—(Optional) Display traffic data for all active interfaces. In a TX Matrix or TX Matrix Plus router, display real-time statistics for the physical interfaces on the specified LCC only.

**Additional Information** The output of this command shows how much each field has changed since you started the command or since you cleared the counters by pressing the **c** key. For a description of the statistical information provided in the output of this command, see the **show interfaces extensive** command for a particular interface type in the [CLI Explorer](#). To control the output of the **monitor interface** command while it is running, use the keys listed in [Table 28 on page 300](#). The keys are not case-sensitive.

**Table 28: Output Control Keys for the monitor interface Command**

| Key | Action                                                                                                                                                                                                                     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c   | Clears (returns to zero) the delta counters since <b>monitor interface</b> was started. This does not clear the accumulative counter. To clear the accumulative counter, use the <b>clear interfaces interval</b> command. |
| f   | Freezes the display, halting the display of updated statistics and delta counters.                                                                                                                                         |
| i   | Displays information about a different interface. The command prompts you for the name of a specific interface.                                                                                                            |

**Table 28: Output Control Keys for the monitor interface Command** (*continued*)

| Key      | Action                                                                                                                                                                                         |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n        | Displays information about the next interface. The <b>monitor interface</b> command displays the physical or logical interfaces in the same order as the <b>show interfaces terse</b> command. |
| q or Esc | Quits the command and returns to the command prompt.                                                                                                                                           |
| t        | Thaws the display, resuming the update of the statistics and delta counters.                                                                                                                   |

To control the output of the **monitor interface traffic** command while it is running, use the keys listed in [Table 29 on page 301](#). The keys are not case-sensitive.

**Table 29: Output Control Keys for the monitor interface traffic Command**

| Key      | Action                                                                                                               |
|----------|----------------------------------------------------------------------------------------------------------------------|
| b        | Displays the statistics in units of bits and bits per second (bps).                                                  |
| c        | Clears (return to 0) the delta counters in the <b>Current Delta</b> column. The statistics counters are not cleared. |
| d        | Displays the <b>Current Delta</b> column (instead of the rate column) in Bps or packets per second (pps).            |
| p        | Displays the statistics in units of packets and packets per second (pps).                                            |
| q or Esc | Quits the command and returns to the command prompt.                                                                 |
| r        | Displays the rate column (instead of the <b>Current Delta</b> column) in Bps and pps.                                |

**Required Privilege Level** trace

**List of Sample Output** [monitor interface \(Physical\) on page 303](#)  
[monitor interface \(OTN Interface\) on page 304](#)  
[monitor interface \(MX2020 Routers with MPC6E and OTN MICInterface\) on page 305](#)  
[monitor interface \(Logical\) on page 306](#)  
[monitor interface \(QFX3500 Switch\) on page 306](#)  
[monitor interface traffic on page 307](#)  
[monitor interface traffic \(QFX3500 Switch\) on page 307](#)  
[monitor interface traffic detail \(QFX3500 Switch\) on page 308](#)

**Output Fields** [Table 30 on page 302](#) describes the output fields for the **monitor interface** command. Output fields are listed in the approximate order in which they appear.

Table 30: monitor interface Output Fields

| Field Name               | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Level of Output |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>routerl</b>           | Hostname of the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | All levels      |
| <b>Seconds</b>           | How long the monitor interface command has been running or how long since you last cleared the counters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels      |
| <b>Time</b>              | Current time (UTC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | All levels      |
| <b>Delay x/y/z</b>       | Time difference between when the statistics were displayed and the actual clock time. <ul style="list-style-type: none"> <li>• <b>x</b>—Time taken for the last polling (in milliseconds).</li> <li>• <b>y</b>—Minimum time taken across all pollings (in milliseconds).</li> <li>• <b>z</b>—Maximum time taken across all pollings (in milliseconds).</li> </ul>                                                                                                                                                                                                                                                                                                                        | All levels      |
| <b>Interface</b>         | Short description of the interface, including its name, status, and encapsulation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | All levels      |
| <b>Link</b>              | State of the link: <b>Up</b> , <b>Down</b> , or <b>Test</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels      |
| <b>Current delta</b>     | Cumulative number for the counter in question since the time shown in the Seconds field, which is the time since you started the command or last cleared the counters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All levels      |
| <b>Local Statistics</b>  | (Logical interfaces only) Number and rate of bytes and packets destined to the router or switch through the specified interface. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It usually takes less than 1 second for this counter to stabilize. <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> | All levels      |
| <b>Remote Statistics</b> | (Logical interfaces only) Statistics for traffic transiting the router or switch. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It usually takes less than 1 second for this counter to stabilize. <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>                                                | All levels      |

Table 30: monitor interface Output Fields (*continued*)

| Field Name         | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Level of Output |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Traffic statistics | <p>Total number of bytes and packets received and transmitted on the interface. These statistics are the sum of the local and remote statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It usually takes less than 1 second for this counter to stabilize.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> | All levels      |
| Description        | With the <b>traffic</b> option, displays the interface description configured at the <b>[edit interfaces <i>interface-name</i>]</b> hierarchy level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b>   |

## Sample Output

### monitor interface (Physical)

```

user@host> monitor interface so-0/0/0
router1 Seconds: 19 Time: 15:46:29

Interface: so-0/0/0, Enabled, Link is Up
Encapsulation: PPP, Keepalives, Speed: 0C48
Traffic statistics:
 Input packets: 6045 (0 pps)
 Input bytes: 6290065 (0 bps)
 Output packets: 10376 (0 pps)
 Output bytes: 10365540 (0 bps)
Encapsulation statistics:
 Input keepalives: 1901
 Output keepalives: 1901
 NCP state: Opened
 LCP state: Opened
Error statistics:
 Input errors: 0
 Input drops: 0
 Input framing errors: 0
 Policed discards: 0
 L3 incompletes: 0
 L2 channel errors: 0
 L2 mismatch timeouts: 0
 Carrier transitions: 1
 Output errors: 0
 Output drops: 0
 Aged packets: 0
Active alarms : None
Active defects: None
SONET error counts/seconds:
 LOS count 1
 LOF count 1
 SEF count 1
 ES-S 0
 SES-S 0
SONET statistics:
 BIP-B1 458871

```

```

BIP-B2 460072 [0]
REI-L 465610 [0]
BIP-B3 458978 [0]
REI-P 458773 [0]

```

Received SONET overhead:

```

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

```

Transmitted SONET overhead:

```

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

```

Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

### monitor interface (OTN Interface)

```
user@host> monitor interface ge-7/0/0
```

```

Interface: ge-7/0/0, Enabled, Link is Up
Encapsulation: Ethernet, Speed: 10000mbps
Traffic statistics:
 Input bytes: 0 (0 bps)
 Output bytes: 0 (0 bps)
 Input packets: 0 (0 pps)
 Output packets: 0 (0 pps)
Error statistics:
 Input errors: 0
 Input drops: 0
 Input framing errors: 0
 Policed discards: 0
 L3 incompletes: 0
 L2 channel errors: 0
 L2 mismatch timeouts: 0
 Carrier transitions: 5
 Output errors: 0
 Output drops: 0
 Aged packets: 0
Active alarms : None
Active defects: None
Input MAC/Filter statistics:
 Unicast packets 0
 Broadcast packets 0
 Multicast packets 0
 Oversized frames 0
 Packet reject count 0
 DA rejects 0
 SA rejects 0
Output MAC/Filter Statistics:
 Unicast packets 0
 Broadcast packets 0
 Multicast packets 0
 Packet pad count 0
 Packet error count 0
OTN Link 0
 OTN Alarms: OTU_BDI, OTU_TTIM, ODU_BDI
 OTN Defects: OTU_BDI, OTU_TTIM, ODU_BDI, ODU_TTIM
 OTN OC - Seconds
 LOS 2

```

```

 LOF 9
OTN OTU - FEC Statistics
 Corr err ratio N/A
 Corr bytes 0
 Uncorr words 0
OTN OTU - Counters
 BIP 0
 BBE 0
 ES 0
 SES 0
 UAS 422
OTN ODU - Counters
 BIP 0
 BBE 0
 ES 0
 SES 0
 UAS 422
OTN ODU - Received Overhead APSGCC 0-3: 0

```

### monitor interface (MX2020 Routers with MPC6E and OTN MICInterface)

```

user@host> monitor interface xe-3/0/0
host name Seconds: 67 Time: 23:46:46
 Delay: 0/0/13

Interface: xe-3/0/0, Enabled, Link is Up
Encapsulation: Ethernet, Speed: 10000mbps
Traffic statistics:
 Input bytes: 0 (0 bps)
 Output bytes: 0 (0 bps)
 Input packets: 0 (0 pps)
 Output packets: 0 (0 pps)
Error statistics:
 Input errors: 0
 Input drops: 0
 Input framing errors: 0
 Policed discards: 0
 L3 incompletes: 0
 L2 channel errors: 0
 L2 mismatch timeouts: 0
 Carrier transitions: 3
 Output errors: 0
 Output drops: 0
 Aged packets: 0
OTN Link 0
OTN Alarms:
OTN Defects:
OTN OC - Seconds
 LOS 0
 LOF 0
OTN OTU - FEC Statistics
 Corr err ratio N/A
 Corr bytes 0
 Uncorr words 0
OTN OTU - Counters
 BIP 0
 BBE 0
 ES 0
 SES 0
 UAS 0
OTN ODU - Counters
 BIP 0

```

```

BBE 0 [0]
ES 0 [0]
SES 0 [0]
UAS 0 [0]
OTN ODU - Received Overhead [0]
APSPCC 0-3: 00 00 00 00

```

Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

### monitor interface (Logical)

```

user@host> monitor interface so-1/0/0.0
host name Seconds: 16 Time: 15:33:39
 Delay: 0/0/1

Interface: so-1/0/0.0, Enabled, Link is Down
Flags: Hardware-Down Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:
Input bytes: 0 [0]
Output bytes: 0 [0]
Input packets: 0 [0]
Output packets: 0 [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:
Destination address: 192.168.8.193, Local: 192.168.8.21

Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

### monitor interface (QFX3500 Switch)

```

user@switch> monitor interface ge-0/0/0
Interface: ge-0/0/0, Enabled, Link is Down
Encapsulation: Ethernet, Speed: Unspecified
Traffic 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]
Error statistics:
Input errors: 0 [0]
Input drops: 0 [0]
Input framing errors: 0 [0]
Policed discards: 0 [0]
L3 incompletes: 0 [0]
L2 channel errors: 0 [0]
L2 mismatch timeouts: 0 [0]
Carrier transitions: 0 [0]
Output errors: 0 [0]
Output drops: 0 [0]
Aged packets: 0 [0]
Active alarms : LINK
Active defects: LINK
Input MAC/Filter statistics:
Unicast packets 0 [0]
Broadcast packets 0 Multicast packet [0]

```



Interface warnings:  
 o Outstanding LINK alarm

### monitor interface traffic

```
user@host> monitor interface traffic
host name Seconds: 15 Time: 12:31:09
```

| Interface | Link | Input packets | (pps) | Output packets | (pps) |
|-----------|------|---------------|-------|----------------|-------|
| so-1/0/0  | Down | 0             | (0)   | 0              | (0)   |
| so-1/1/0  | Down | 0             | (0)   | 0              | (0)   |
| so-1/1/1  | Down | 0             | (0)   | 0              | (0)   |
| so-1/1/2  | Down | 0             | (0)   | 0              | (0)   |
| so-1/1/3  | Down | 0             | (0)   | 0              | (0)   |
| t3-1/2/0  | Down | 0             | (0)   | 0              | (0)   |
| t3-1/2/1  | Down | 0             | (0)   | 0              | (0)   |
| t3-1/2/2  | Down | 0             | (0)   | 0              | (0)   |
| t3-1/2/3  | Down | 0             | (0)   | 0              | (0)   |
| so-2/0/0  | Up   | 211035        | (1)   | 36778          | (0)   |
| so-2/0/1  | Up   | 192753        | (1)   | 36782          | (0)   |
| so-2/0/2  | Up   | 211020        | (1)   | 36779          | (0)   |
| so-2/0/3  | Up   | 211029        | (1)   | 36776          | (0)   |
| so-2/1/0  | Up   | 189378        | (1)   | 36349          | (0)   |
| so-2/1/1  | Down | 0             | (0)   | 18747          | (0)   |
| so-2/1/2  | Down | 0             | (0)   | 16078          | (0)   |
| so-2/1/3  | Up   | 0             | (0)   | 80338          | (0)   |
| at-2/3/0  | Up   | 0             | (0)   | 0              | (0)   |
| at-2/3/1  | Down | 0             | (0)   | 0              | (0)   |

Bytes=b, Clear=c, Delta=d, Packets=p, Quit=q or ESC, Rate=r, Up=^U, Down=^D

### monitor interface traffic (QFX3500 Switch)

```
user@switch> monitor interface traffic
switch Seconds: 7 Time: 16:04:37
```

| Interface | Link | Input packets | (pps) | Output packets | (pps) |
|-----------|------|---------------|-------|----------------|-------|
| ge-0/0/0  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/1  | Up   | 392187        | (0)   | 392170         | (0)   |
| ge-0/0/2  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/3  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/4  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/5  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/6  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/7  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/8  | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/9  | Up   | 392184        | (0)   | 392171         | (0)   |
| ge-0/0/10 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/11 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/12 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/13 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/14 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/15 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/16 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/17 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/18 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/19 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/20 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/21 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/22 | Up   | 392172        | (0)   | 392187         | (0)   |
| ge-0/0/23 | Up   | 392185        | (0)   | 392173         | (0)   |

|       |      |   |     |         |     |
|-------|------|---|-----|---------|-----|
| vcp-0 | Down | 0 |     | 0       |     |
| vcp-1 | Down | 0 |     | 0       |     |
| ae0   | Down | 0 | (0) | 0       | (0) |
| bme0  | Up   | 0 |     | 1568706 |     |

#### monitor interface traffic detail (QFX3500 Switch)

user@switch> monitor interface traffic detail  
switch

Seconds: 74

Time: 16:03:02

| Interface<br>Description | Link | Input packets | (pps) | Output packets | (pps) |
|--------------------------|------|---------------|-------|----------------|-------|
| ge-0/0/0                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/1                 | Up   | 392183        | (0)   | 392166         | (0)   |
| ge-0/0/2                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/3                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/4                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/5                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/6                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/7                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/8                 | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/9                 | Up   | 392181        | (0)   | 392168         | (0)   |
| ge-0/0/10                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/11                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/12                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/13                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/14                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/15                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/16                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/17                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/18                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/19                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/20                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/21                | Down | 0             | (0)   | 0              | (0)   |
| ge-0/0/22                | Up   | 392169        | (0)   | 392184         | (1)   |
| ge-0/0/23                | Up   | 392182        | (0)   | 392170         | (0)   |
| vcp-0                    | Down | 0             |       | 0              |       |
| vcp-1                    | Down | 0             |       | 0              |       |
| ae0                      | Down | 0             | (0)   | 0              | (0)   |
| bme0                     | Up   | 0             |       | 1568693        |       |

## show interfaces diagnostics optics

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show interfaces diagnostics optics <i>interface-name</i></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | <p>Command introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Display diagnostics data and alarms for Gigabit Ethernet optical transceivers (SFP, SFP+, XFP, QSFP+, or CFP) installed in EX Series or QFX Series switches. The information provided by this command is known as digital optical monitoring (DOM) information. For a list of transceivers supported on EX Series switches and their specifications, including DOM support, see <i>Pluggable Transceivers Supported on EX Series Switches</i>.</p> <p>Thresholds that trigger a high alarm, low alarm, high warning, or low warning are set by the transponder vendors. Generally, a high alarm or low alarm indicates that the optics module is not operating properly. This information can be used to diagnose why a transceiver is not working.</p> |
| <b>Options</b>                  | <i>interface-name</i> —Name of the interface associated with the port in which the transceiver is installed: <i>ge-fpc/pic/port</i> , <i>xe-fpc/pic/port</i> , or <i>et-fpc/pic/port</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Monitoring Interface Status and Traffic</i></li> <li>• <a href="#">Monitoring Interface Status and Traffic on page 65</a></li> <li>• <i>Installing a Transceiver in an EX Series Switch</i></li> <li>• <i>Installing a Transceiver in a QFX Series Device</i></li> <li>• <i>Removing a Transceiver from a Switch</i></li> <li>• <i>Removing a Transceiver from a QFX Series Device</i></li> <li>• <a href="#">Junos OS Ethernet Interfaces Configuration Guide</a></li> </ul>                                                                                                                                                                                                                                  |
| <b>List of Sample Output</b>    | <p><a href="#">show interfaces diagnostics optics ge-0/1/0 (SFP Transceiver) on page 316</a></p> <p><a href="#">show interfaces diagnostics optics xe-0/1/0 (SFP+ Transceiver) on page 317</a></p> <p><a href="#">show interfaces diagnostics optics xe-0/1/0 (XFP Transceiver) on page 318</a></p> <p><a href="#">show interfaces diagnostics optics et-3/0/0 (QSFP+ Transceiver) on page 319</a></p> <p><a href="#">show interfaces diagnostics optics et-4/1/0 (CFP Transceiver) on page 320</a></p>                                                                                                                                                                                                                                                    |
| <b>Output Fields</b>            | <a href="#">Table 31 on page 309</a> lists the output fields for the <b>show interfaces diagnostics optics</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Table 31: show interfaces diagnostics optics Output Fields

| Field Name         | Field Description                            |
|--------------------|----------------------------------------------|
| Physical interface | Displays the name of the physical interface. |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                           | Field Description                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Laser bias current</b>                                                                            | Displays the magnitude of the laser bias power setting current, in milliamperes. The laser bias provides direct modulation of laser diodes and modulates currents. |
| <b>Laser output power</b><br>(Not available for QSFP+ transceivers)                                  | Displays the laser output power, in milliwatts (mW) and decibels referred to 1.0 mW (dBm).                                                                         |
| <b>Laser temperature</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)               | Displays the laser temperature, in Celsius and Fahrenheit.                                                                                                         |
| <b>Module temperature</b>                                                                            | Displays the temperature, in Celsius and Fahrenheit.                                                                                                               |
| <b>Module voltage</b><br>(Not available for XFP transceivers)                                        | Displays the voltage, in Volts.                                                                                                                                    |
| <b>Laser rx power</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers)                  | Displays the laser received optical power, in milliwatts (mW) and decibels referred to 1.0 mW (dBm).                                                               |
| <b>Receiver signal average optical power</b><br>(Not available for XFP, QSFP+, and CFP transceivers) | Displays the receiver signal average optical power, in milliwatts (mW) and decibels referred to 1.0 mW (dBm).                                                      |
| <b>Laser bias current high alarm</b>                                                                 | Displays whether the laser bias power setting high alarm is <b>On</b> or <b>Off</b> .                                                                              |
| <b>Laser bias current low alarm</b>                                                                  | Displays whether the laser bias power setting low alarm is <b>On</b> or <b>Off</b> .                                                                               |
| <b>Laser bias current high warning</b>                                                               | Displays whether the laser bias power setting high warning is <b>On</b> or <b>Off</b> .                                                                            |
| <b>Laser bias current low warning</b>                                                                | Displays whether the laser bias power setting low warning is <b>On</b> or <b>Off</b> .                                                                             |
| <b>Laser output power high alarm</b><br>(Not available for QSFP+ transceivers)                       | Displays whether the laser output power high alarm is <b>On</b> or <b>Off</b> .                                                                                    |
| <b>Laser output power low alarm</b><br>(Not available for QSFP+ transceivers)                        | Displays whether the laser output power low alarm is <b>On</b> or <b>Off</b> .                                                                                     |
| <b>Laser output power high warning</b><br>(Not available for QSFP+ transceivers)                     | Displays whether the laser output power high warning is <b>On</b> or <b>Off</b> .                                                                                  |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                          | Field Description                                                                 |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Laser output power low warning</b><br>(Not available for QSFP+ transceivers)                     | Displays whether the laser output power low warning is <b>On</b> or <b>Off</b> .  |
| <b>Laser temperature high alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)   | Displays whether the laser temperature high alarm is <b>On</b> or <b>Off</b> .    |
| <b>Laser temperature low alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)    | Displays whether the laser temperature low alarm is <b>On</b> or <b>Off</b> .     |
| <b>Laser temperature high warning</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers) | Displays whether the laser temperature high warning is <b>On</b> or <b>Off</b> .  |
| <b>Laser temperature low warning</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)  | Displays whether the laser temperature low warning is <b>On</b> or <b>Off</b> .   |
| <b>Module temperature high alarm</b><br>(Not available for QSFP+ transceivers)                      | Displays whether the module temperature high alarm is <b>On</b> or <b>Off</b> .   |
| <b>Module temperature low alarm</b><br>(Not available for QSFP+ transceivers)                       | Displays whether the module temperature low alarm is <b>On</b> or <b>Off</b> .    |
| <b>Module temperature high warning</b><br>(Not available for QSFP+ transceivers)                    | Displays whether the module temperature high warning is <b>On</b> or <b>Off</b> . |
| <b>Module temperature low warning</b><br>(Not available for QSFP+ transceivers)                     | Displays whether the module temperature low warning is <b>On</b> or <b>Off</b> .  |
| <b>Module voltage high alarm</b><br>(Not available for XFP and QSFP+ transceivers)                  | Displays whether the module voltage high alarm is <b>On</b> or <b>Off</b> .       |
| <b>Module voltage low alarm</b><br>(Not available for XFP and QSFP+ transceivers)                   | Displays whether the module voltage low alarm is <b>On</b> or <b>Off</b> .        |
| <b>Module voltage high warning</b><br>(Not available for XFP and QSFP+ transceivers)                | Displays whether the module voltage high warning is <b>On</b> or <b>Off</b> .     |
| <b>Module voltage low warning</b><br>(Not available for XFP and QSFP+ transceivers)                 | Displays whether the module voltage low warning is <b>On</b> or <b>Off</b> .      |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                                  | Field Description                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Laser rx power high alarm</b><br>(Not available for QSFP+ and CFP transceivers)                          | Displays whether the receive laser power high alarm is <b>On</b> or <b>Off</b> .                                                             |
| <b>Laser rx power low alarm</b><br>(Not available for QSFP+ and CFP transceivers)                           | Displays whether the receive laser power low alarm is <b>On</b> or <b>Off</b> .                                                              |
| <b>Laser rx power high warning</b><br>(Not available for QSFP+ and CFP transceivers)                        | Displays whether the receive laser power high warning is <b>On</b> or <b>Off</b> .                                                           |
| <b>Laser rx power low warning</b><br>(Not available for QSFP+ and CFP transceivers)                         | Displays whether the receive laser power low warning is <b>On</b> or <b>Off</b> .                                                            |
| <b>Laser bias current high alarm threshold</b><br>(Not available for QSFP+ transceivers)                    | Displays the vendor-specified threshold for the laser bias current high alarm.                                                               |
| <b>Module not ready alarm</b><br>(Not available for SFP, SFP+, and QSFP+ transceivers)                      | Displays whether the module not ready alarm is <b>On</b> or <b>Off</b> . When the output is <b>On</b> , the module has an operational fault. |
| <b>Module low power alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)                 | Displays whether the module low power alarm is <b>On</b> or <b>Off</b> .                                                                     |
| <b>Module initialization incomplete alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers) | Displays whether the module initialization incomplete alarm is <b>On</b> or <b>Off</b> .                                                     |
| <b>Module fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)                     | Displays whether the module fault alarm is <b>On</b> or <b>Off</b> .                                                                         |
| <b>PLD Flash initialization fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)   | Displays whether the PLD Flash initialization fault alarm is <b>On</b> or <b>Off</b> .                                                       |
| <b>Power supply fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)               | Displays whether the power supply fault alarm is <b>On</b> or <b>Off</b> .                                                                   |
| <b>Checksum fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)                   | Displays whether the checksum fault alarm is <b>On</b> or <b>Off</b> .                                                                       |
| <b>Tx laser disabled alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)                | Displays whether the Tx laser disabled alarm is <b>On</b> or <b>Off</b> .                                                                    |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                   | Field Description                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module power down alarm</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers) | Displays whether the module power down alarm is <b>On</b> or <b>Off</b> . When the output is <b>On</b> , module is in a limited power mode, low for normal operation.                            |
| <b>Tx data not ready alarm</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers) | Any condition leading to invalid data on the transmit path. Displays whether the Tx data not ready alarm is <b>On</b> or <b>Off</b> .                                                            |
| <b>Tx not ready alarm</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers)      | Any condition leading to invalid data on the transmit path. Displays whether the Tx not ready alarm is <b>On</b> or <b>Off</b> .                                                                 |
| <b>Tx laser fault alarm</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers)    | Laser fault condition. Displays whether the Tx laser fault alarm is <b>On</b> or <b>Off</b> .                                                                                                    |
| <b>Tx CDR loss of lock alarm</b><br>(Not available for SFP, SFP+, and QSFP+ transceivers)    | Transmit clock and data recovery (CDR) loss of lock. Loss of lock on the transmit side of the CDR. Displays whether the Tx CDR loss of lock alarm is <b>On</b> or <b>Off</b> .                   |
| <b>Rx not ready alarm</b><br>(Not available for SFP, SFP+, QSFP+, and CFP transceivers)      | Any condition leading to invalid data on the receive path. Displays whether the Rx not ready alarm is <b>On</b> or <b>Off</b> .                                                                  |
| <b>Rx loss of signal alarm</b><br>(Not available for SFP and SFP+ transceivers)              | Receive loss of signal alarm. When the output is <b>On</b> , indicates insufficient optical input power to the module. Displays whether the Rx loss of signal alarm is <b>On</b> or <b>Off</b> . |
| <b>Rx CDR loss of lock alarm</b><br>(Not available for SFP, SFP+, and QSFP+ transceivers)    | Receive CDR loss of lock. Loss of lock on the receive side of the CDR. Displays whether the Rx CDR loss of lock alarm is <b>On</b> or <b>Off</b> .                                               |
| <b>Laser bias current low alarm threshold</b><br>(Not available for QSFP+ transceivers)      | Displays the vendor-specified threshold for the laser bias current low alarm.                                                                                                                    |
| <b>Laser bias current high warning threshold</b><br>(Not available for QSFP+ transceivers)   | Displays the vendor-specified threshold for the laser bias current high warning.                                                                                                                 |
| <b>Laser bias current low warning threshold</b><br>(Not available for QSFP+ transceivers)    | Displays the vendor-specified threshold for the laser bias current low warning.                                                                                                                  |
| <b>Laser output power high alarm threshold</b><br>(Not available for QSFP+ transceivers)     | Displays the vendor-specified threshold for the laser output power high alarm.                                                                                                                   |
| <b>Laser output power low alarm threshold</b><br>(Not available for QSFP+ transceivers)      | Displays the vendor-specified threshold for the laser output power low alarm.                                                                                                                    |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                     | Field Description                                                                |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Laser output power high warning threshold</b><br>(Not available for QSFP+ transceivers)     | Displays the vendor-specified threshold for the laser output power high warning. |
| <b>Laser output power low warning threshold</b><br>(Not available for QSFP+ transceivers)      | Displays the vendor-specified threshold for the laser output power low warning.  |
| <b>Module temperature high alarm threshold</b><br>(Not available for QSFP+ transceivers)       | Displays the vendor-specified threshold for the module temperature high alarm.   |
| <b>Module temperature low alarm threshold</b><br>(Not available for QSFP+ transceivers)        | Displays the vendor-specified threshold for the module temperature low alarm.    |
| <b>Module temperature high warning threshold</b><br>(Not available for QSFP+ transceivers)     | Displays the vendor-specified threshold for the module temperature high warning. |
| <b>Module temperature low warning threshold</b><br>(Not available for QSFP+ transceivers)      | Displays the vendor-specified threshold for the module temperature low warning.  |
| <b>Module voltage high alarm threshold</b><br>(Not available for XFP and QSFP+ transceivers)   | Displays the vendor-specified threshold for the module voltage high alarm.       |
| <b>Module voltage low alarm threshold</b><br>(Not available for XFP and QSFP+ transceivers)    | Displays the vendor-specified threshold for the module voltage low alarm.        |
| <b>Module voltage high warning threshold</b><br>(Not available for XFP and QSFP+ transceivers) | Displays the vendor-specified threshold for the module voltage high warning.     |
| <b>Module voltage low warning threshold</b><br>(Not available for XFP and QSFP+ transceivers)  | Displays the vendor-specified threshold for the module voltage low warning.      |
| <b>Laser rx power high alarm threshold</b><br>(Not available for QSFP+ transceivers)           | Displays the vendor-specified threshold for the laser rx power high alarm.       |
| <b>Laser rx power low alarm threshold</b><br>(Not available for QSFP+ transceivers)            | Displays the vendor-specified threshold for the laser rx power low alarm.        |
| <b>Laser rx power high warning threshold</b><br>(Not available for QSFP+ transceivers)         | Displays the vendor-specified threshold for the laser rx power high warning.     |



Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                                    | Field Description                                                                                          |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Laser rx power low warning threshold</b><br>(Not available for QSFP+ transceivers)                         | Displays the vendor-specified threshold for the laser rx power low warning.                                |
| <b>Laser temperature high alarm threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)   | Displays the vendor-specified threshold for the laser temperature high alarm, in Celsius and Fahrenheit.   |
| <b>Laser temperature low alarm threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)    | Displays the vendor-specified threshold for the laser temperature low alarm, in Celsius and Fahrenheit.    |
| <b>Laser temperature high warning threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers) | Displays the vendor-specified threshold for the laser temperature high warning, in Celsius and Fahrenheit. |
| <b>Laser temperature low warning threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)  | Displays the vendor-specified threshold for the laser temperature low warning, in Celsius and Fahrenheit.  |
| <b>SOA bias current high alarm threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)    | Displays the vendor-specified threshold for SOA bias current high alarm.                                   |
| <b>SOA bias current low alarm threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)     | Displays the vendor-specified threshold for SOA bias current low alarm.                                    |
| <b>SOA bias current high warning threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)  | Displays the vendor-specified threshold for SOA bias current high warning.                                 |
| <b>SOA bias current low warning threshold</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)   | Displays the vendor-specified threshold for SOA bias current low warning.                                  |
| <b>Laser receiver power high alarm</b><br>(Not available for SFP, SFP+, and XFP transceivers)                 | Displays whether the laser receiver power high alarm is <b>On</b> or <b>Off</b> .                          |
| <b>Laser receiver power low alarm</b><br>(Not available for SFP, SFP+, and XFP transceivers)                  | Displays whether the laser receiver power low alarm is <b>On</b> or <b>Off</b> .                           |
| <b>Laser receiver power high warning</b><br>(Not available for SFP, SFP+, and XFP transceivers)               | Displays whether the laser receiver power high warning is <b>On</b> or <b>Off</b> .                        |
| <b>Laser receiver power low warning</b><br>(Not available for SFP, SFP+, and XFP transceivers)                | Displays whether the laser receiver power low warning is <b>On</b> or <b>Off</b> .                         |

Table 31: show interfaces diagnostics optics Output Fields (*continued*)

| Field Name                                                                                          | Field Description                                                                            |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Laser receiver power</b><br>(Not available for SFP, SFP+, and XFP transceivers)                  | Displays the laser receiver power, in milliwatts (mW) and decibels referred to 1.0 mW (dBm). |
| <b>Tx loss of signal functionality alarm</b><br>(Not available for SFP, SFP+, and XFP transceivers) | Displays whether the Tx loss of signal functionality alarm is <b>On</b> or <b>Off</b> .      |
| <b>APD supply fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)         | Displays whether the APD supply fault alarm is <b>On</b> or <b>Off</b> .                     |
| <b>TEC fault alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)                | Displays whether the TEC fault alarm is <b>On</b> or <b>Off</b> .                            |
| <b>Wavelength unlocked alarm</b><br>(Not available for SFP, SFP+, XFP, and QSFP+ transceivers)      | Displays whether the Wavelength unlocked alarm is <b>On</b> or <b>Off</b> .                  |

## Sample Output

### show interfaces diagnostics optics ge-0/1/0 (SFP Transceiver)

```

user@switch> show interfaces diagnostics optics ge-0/1/0
Physical interface: ge-0/1/0
 Laser bias current : 5.444 mA
 Laser output power : 0.3130 mW / -5.04 dBm
 Module temperature : 36 degrees C / 97 degrees F
 Module voltage : 3.2120 V
 Receiver signal average optical power : 0.3840 mW / -4.16 dBm
 Laser bias current high alarm : Off
 Laser bias current low alarm : Off
 Laser bias current high warning : Off
 Laser bias current low warning : Off
 Laser output power high alarm : Off
 Laser output power low alarm : Off
 Laser output power high warning : Off
 Laser output power low warning : Off
 Module temperature high alarm : Off
 Module temperature low alarm : Off
 Module temperature high warning : Off
 Module temperature low warning : Off
 Module voltage high alarm : Off
 Module voltage low alarm : Off
 Module voltage high warning : Off
 Module voltage low warning : Off
 Laser rx power high alarm : Off
 Laser rx power low alarm : Off
 Laser rx power high warning : Off
 Laser rx power low warning : Off
 Laser bias current high alarm threshold : 15.000 mA
 Laser bias current low alarm threshold : 1.000 mA
 Laser bias current high warning threshold : 12.000 mA

```

```

Laser bias current low warning threshold : 2.000 mA
Laser output power high alarm threshold : 0.6300 mW / -2.01 dBm
Laser output power low alarm threshold : 0.0660 mW / -11.80 dBm
Laser output power high warning threshold : 0.6300 mW / -2.01 dBm
Laser output power low warning threshold : 0.0780 mW / -11.08 dBm
Module temperature high alarm threshold : 109 degrees C / 228 degrees F
Module temperature low alarm threshold : -29 degrees C / -20 degrees F
Module temperature high warning threshold : 103 degrees C / 217 degrees F
Module temperature low warning threshold : -13 degrees C / 9 degrees F
Module voltage high alarm threshold : 3.900 V
Module voltage low alarm threshold : 2.700 V
Module voltage high warning threshold : 3.700 V
Module voltage low warning threshold : 2.900 V
Laser rx power high alarm threshold : 1.2589 mW / 1.00 dBm
Laser rx power low alarm threshold : 0.0100 mW / -20.00 dBm
Laser rx power high warning threshold : 0.7939 mW / -1.00 dBm
Laser rx power low warning threshold : 0.0157 mW / -18.04 dBm

```

## Sample Output

### show interfaces diagnostics optics xe-0/1/0 (SFP+ Transceiver)

```

user@switch> show interfaces diagnostics optics xe-0/1/0
Physical interface: xe-0/1/0
Laser bias current : 4.968 mA
Laser output power : 0.4940 mW / -3.06 dBm
Module temperature : 27 degrees C / 81 degrees F
Module voltage : 3.2310 V
Receiver signal average optical power : 0.0000
Laser bias current high alarm : Off
Laser bias current low alarm : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm : Off
Laser output power low alarm : Off
Laser output power high warning : Off
Laser output power low warning : Off
Module temperature high alarm : Off
Module temperature low alarm : Off
Module temperature high warning : Off
Module temperature low warning : Off
Module voltage high alarm : Off
Module voltage low alarm : Off
Module voltage high warning : Off
Module voltage low warning : Off
Laser rx power high alarm : Off
Laser rx power low alarm : On
Laser rx power high warning : Off
Laser rx power low warning : On
Laser bias current high alarm threshold : 10.500 mA
Laser bias current low alarm threshold : 2.000 mA
Laser bias current high warning threshold : 9.000 mA
Laser bias current low warning threshold : 2.500 mA
Laser output power high alarm threshold : 1.4120 mW / 1.50 dBm
Laser output power low alarm threshold : 0.0740 mW / -11.31 dBm
Laser output power high warning threshold : 0.7070 mW / -1.51 dBm
Laser output power low warning threshold : 0.1860 mW / -7.30 dBm
Module temperature high alarm threshold : 75 degrees C / 167 degrees F
Module temperature low alarm threshold : -5 degrees C / 23 degrees F
Module temperature high warning threshold : 70 degrees C / 158 degrees F
Module temperature low warning threshold : 0 degrees C / 32 degrees F

```

```

Module voltage high alarm threshold : 3.630 V
Module voltage low alarm threshold : 2.970 V
Module voltage high warning threshold : 3.465 V
Module voltage low warning threshold : 3.135 V
Laser rx power high alarm threshold : 1.5849 mW / 2.00 dBm
Laser rx power low alarm threshold : 0.0407 mW / -13.90 dBm
Laser rx power high warning threshold : 0.7943 mW / -1.00 dBm
Laser rx power low warning threshold : 0.1023 mW / -9.90 dBm

```

## Sample Output

### show interfaces diagnostics optics xe-0/1/0 (XFP Transceiver)

```

user@switch> show interfaces diagnostics optics xe-0/1/0
Physical interface: xe-0/1/0
Laser bias current : 8.029 mA
Laser output power : 0.6430 mW / -1.92 dBm
Module temperature : 4 degrees C / 39 degrees F
Laser rx power : 0.0012 mW / -29.21 dBm
Laser bias current high alarm : Off
Laser bias current low alarm : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm : Off
Laser output power low alarm : Off
Laser output power high warning : Off
Laser output power low warning : Off
Module temperature high alarm : Off
Module temperature low alarm : Off
Module temperature high warning : Off
Module temperature low warning : Off
Laser rx power high alarm : Off
Laser rx power low alarm : On
Laser rx power high warning : Off
Laser rx power low warning : On
Module not ready alarm : On
Module power down alarm : Off
Tx data not ready alarm : Off
Tx not ready alarm : Off
Tx laser fault alarm : Off
Tx CDR loss of lock alarm : Off
Rx not ready alarm : On
Rx loss of signal alarm : On
Rx CDR loss of lock alarm : On
Laser bias current high alarm threshold : 13.000 mA
Laser bias current low alarm threshold : 2.000 mA
Laser bias current high warning threshold : 12.000 mA
Laser bias current low warning threshold : 3.000 mA
Laser output power high alarm threshold : 0.8310 mW / -0.80 dBm
Laser output power low alarm threshold : 0.1650 mW / -7.83 dBm
Laser output power high warning threshold : 0.7410 mW / -1.30 dBm
Laser output power low warning threshold : 0.1860 mW / -7.30 dBm
Module temperature high alarm threshold : 90 degrees C / 194 degrees F
Module temperature low alarm threshold : 0 degrees C / 32 degrees F
Module temperature high warning threshold : 85 degrees C / 185 degrees F
Module temperature low warning threshold : 0 degrees C / 32 degrees F
Laser rx power high alarm threshold : 0.8912 mW / -0.50 dBm
Laser rx power low alarm threshold : 0.0912 mW / -10.40 dBm
Laser rx power high warning threshold : 0.7943 mW / -1.00 dBm
Laser rx power low warning threshold : 0.1023 mW / -9.90 dBm

```

## Sample Output

### show interfaces diagnostics optics et-3/0/0 (QSFP+ Transceiver)

```

user@switch> show interfaces diagnostics optics et-3/0/0
Physical interface: et-3/0/0
 Module temperature : 33 degrees C / 92 degrees F
 Module voltage : 3.3060 V
Lane 0
 Laser bias current : 7.182 mA
 Laser receiver power : 0.743 mW / -1.29 dBm
 Laser bias current high alarm : Off
 Laser bias current low alarm : Off
 Laser bias current high warning : Off
 Laser bias current low warning : Off
 Laser receiver power high alarm : Off
 Laser receiver power low alarm : Off
 Laser receiver power high warning : Off
 Laser receiver power low warning : Off
 Tx loss of signal functionality alarm : Off
 Rx loss of signal alarm : Off
Lane 1
 Laser bias current : 7.326 mA
 Laser receiver power : 0.752 mW / -1.24 dBm
 Laser bias current high alarm : Off
 Laser bias current low alarm : Off
 Laser bias current high warning : Off
 Laser bias current low warning : Off
 Laser receiver power high alarm : Off
 Laser receiver power low alarm : Off
 Laser receiver power high warning : Off
 Laser receiver power low warning : Off
 Tx loss of signal functionality alarm : Off
 Rx loss of signal alarm : Off
Lane 2
 Laser bias current : 7.447 mA
 Laser receiver power : 0.790 mW / -1.03 dBm
 Laser bias current high alarm : Off
 Laser bias current low alarm : Off
 Laser bias current high warning : Off
 Laser bias current low warning : Off
 Laser receiver power high alarm : Off
 Laser receiver power low alarm : Off
 Laser receiver power high warning : Off
 Laser receiver power low warning : Off
 Tx loss of signal functionality alarm : Off
 Rx loss of signal alarm : Off
Lane 3
 Laser bias current : 7.734 mA
 Laser receiver power : 0.768 mW / -1.15 dBm
 Laser bias current high alarm : Off
 Laser bias current low alarm : Off
 Laser bias current high warning : Off
 Laser bias current low warning : Off
 Laser receiver power high alarm : Off
 Laser receiver power low alarm : Off
 Laser receiver power high warning : Off
 Laser receiver power low warning : Off
 Tx loss of signal functionality alarm : Off
 Rx loss of signal alarm : Off

```

## Sample Output

### show interfaces diagnostics optics et-4/1/0 (CFP Transceiver)

```

user@switch> show interfaces diagnostics optics et-4/1/0
Physical interface: et-4/1/0
 Module temperature : 38 degrees C / 101 degrees F
 Module voltage : 3.2500 V
 Module temperature high alarm : Off
 Module temperature low alarm : Off
 Module temperature high warning : Off
 Module temperature low warning : Off
 Module voltage high alarm : Off
 Module voltage low alarm : Off
 Module voltage high warning : Off
 Module voltage low warning : Off
 Module not ready alarm : Off
 Module low power alarm : Off
 Module initialization incomplete alarm : Off
 Module fault alarm : Off
 PLD Flash initialization fault alarm : Off
 Power supply fault alarm : Off
 Checksum fault alarm : Off
 Tx laser disabled alarm : Off
 Tx loss of signal functionality alarm : Off
 Tx CDR loss of lock alarm : Off
 Rx loss of signal alarm : Off
 Rx CDR loss of lock alarm : Off
 Module temperature high alarm threshold : 75 degrees C / 167 degrees F
 Module temperature low alarm threshold : -5 degrees C / 23 degrees F
 Module temperature high warning threshold : 70 degrees C / 158 degrees F
 Module temperature low warning threshold : 0 degrees C / 32 degrees F
 Module voltage high alarm threshold : 3.5000 V
 Module voltage low alarm threshold : 3.0990 V
 Module voltage high warning threshold : 3.4000 V
 Module voltage low warning threshold : 3.2000 V
 Laser bias current high alarm threshold : 250.000 mA
 Laser bias current low alarm threshold : 37.500 mA
 Laser bias current high warning threshold : 225.000 mA
 Laser bias current low warning threshold : 50.000 mA
 Laser output power high alarm threshold : 3.9800 mW / 6.00 dBm
 Laser output power low alarm threshold : 0.4670 mW / -3.31 dBm
 Laser output power high warning threshold : 3.5480 mW / 5.50 dBm
 Laser output power low warning threshold : 0.5240 mW / -2.81 dBm
 Laser rx power high alarm threshold : 3.5481 mW / 5.50 dBm
 Laser rx power low alarm threshold : 0.0616 mW / -12.10 dBm
 Laser rx power high warning threshold : 3.1622 mW / 5.00 dBm
 Laser rx power low warning threshold : 0.0691 mW / -11.61 dBm
 Laser temperature high alarm threshold : 67 degrees C / 153 degrees F
 Laser temperature low alarm threshold : 35 degrees C / 95 degrees F
 Laser temperature high warning threshold : 62 degrees C / 144 degrees F
 Laser temperature low warning threshold : 40 degrees C / 104 degrees F
 SOA bias current high alarm threshold : 0.000 mA
 SOA bias current low alarm threshold : 0.000 mA
 SOA bias current high warning threshold : 0.000 mA
 SOA bias current low warning threshold : 0.000 mA
Lane 0
 Laser bias current : 131.684 mA
 Laser output power : 1.002 mW / 0.01 dBm
 Laser temperature : 54 degrees C / 128 degrees F
 Laser receiver power : 0.497 mW / -3.03 dBm

```

```

Laser bias current high alarm : Off
Laser bias current low alarm : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm : Off
Laser output power low alarm : Off
Laser output power high warning : Off
Laser output power low warning : Off
Laser temperature high alarm : Off
Laser temperature low alarm : Off
Laser temperature high warning : Off
Laser temperature low warning : Off
Laser receiver power high alarm : Off
Laser receiver power low alarm : Off
Laser receiver power high warning : Off
Laser receiver power low warning : Off
Tx loss of signal functionality alarm : Off
Rx CDR loss of lock alarm : Off
Rx loss of signal alarm : Off
Rx CDR loss of lock alarm : Off
APD supply fault alarm : Off
TEC fault alarm : Off
Wavelength unlocked alarm : Off

Lane 1
Laser bias current : 122.345 mA
Laser output power : 1.002 mW / 0.01 dBm
Laser temperature : 51 degrees C / 124 degrees F
Laser receiver power : 0.611 mW / -2.14 dBm
Laser bias current high alarm : Off
Laser bias current low alarm : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm : Off
Laser output power low alarm : Off
Laser output power high warning : Off
Laser output power low warning : Off
Laser temperature high alarm : Off
Laser temperature low alarm : Off
Laser temperature high warning : Off
Laser temperature low warning : Off
Laser receiver power high alarm : Off
Laser receiver power low alarm : Off
Laser receiver power high warning : Off
Laser receiver power low warning : Off
Tx loss of signal functionality alarm : Off
Tx CDR loss of lock alarm : Off
Rx loss of signal alarm : Off
Rx CDR loss of lock alarm : Off
APD supply fault alarm : Off
TEC fault alarm : Off
Wavelength unlocked alarm : Off

Lane 2
Laser bias current : 112.819 mA
Laser output power : 1.000 mW / 0.00 dBm
Laser temperature : 50 degrees C / 122 degrees F
Laser receiver power : 0.540 mW / -2.67 dBm
Laser bias current high alarm : Off
Laser bias current low alarm : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm : Off

```

|                                       |                                |
|---------------------------------------|--------------------------------|
| Laser output power low alarm          | : Off                          |
| Laser output power high warning       | : Off                          |
| Laser output power low warning        | : Off                          |
| Laser temperature high alarm          | : Off                          |
| Laser temperature low alarm           | : Off                          |
| Laser temperature high warning        | : Off                          |
| Laser temperature low warning         | : Off                          |
| Laser receiver power high alarm       | : Off                          |
| Laser receiver power low alarm        | : Off                          |
| Laser receiver power high warning     | : Off                          |
| Laser receiver power low warning      | : Off                          |
| Tx loss of signal functionality alarm | : Off                          |
| Tx CDR loss of lock alarm             | : Off                          |
| Rx loss of signal alarm               | : Off                          |
| Rx CDR loss of lock alarm             | : Off                          |
| APD supply fault alarm                | : Off                          |
| TEC fault alarm                       | : Off                          |
| Wavelength unlocked alarm             | : Off                          |
| Lane 3                                |                                |
| Laser bias current                    | : 100.735 mA                   |
| Laser output power                    | : 1.002 mW / 0.01 dBm          |
| Laser temperature                     | : 50 degrees C / 122 degrees F |
| Laser receiver power                  | : 0.637 mW / -1.96 dBm         |
| Laser bias current high alarm         | : Off                          |
| Laser bias current low alarm          | : Off                          |
| Laser bias current high warning       | : Off                          |
| Laser bias current low warning        | : Off                          |
| Laser output power high alarm         | : Off                          |
| Laser output power low alarm          | : Off                          |
| Laser output power high warning       | : Off                          |
| Laser output power low warning        | : Off                          |
| Laser temperature high alarm          | : Off                          |
| Laser temperature low alarm           | : Off                          |
| Laser temperature high warning        | : Off                          |
| Laser temperature low warning         | : Off                          |
| Laser receiver power high alarm       | : Off                          |
| Laser receiver power low alarm        | : Off                          |
| Laser receiver power high warning     | : Off                          |
| Laser receiver power low warning      | : Off                          |
| Tx loss of signal functionality alarm | : Off                          |
| Tx CDR loss of lock alarm             | : Off                          |
| Rx loss of signal alarm               | : Off                          |
| Rx CDR loss of lock alarm             | : Off                          |
| APD supply fault alarm                | : Off                          |
| TEC fault alarm                       | : Off                          |
| Wavelength unlocked alarm             | : Off                          |



## show interfaces ge

**Syntax** `show interfaces device-name:type-fpc/pic/port`  
`<brief | detail | extensive | terse>`  
`<descriptions>`  
`<media>`  
`<routing-instance (all | instance-name)>`  
`<snmp-index snmp-index>`  
`<statistics>`

**Release Information** Command introduced in Junos OS Release 11.1 for the QFX Series.  
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Display status information about the specified Gigabit Ethernet interface. This command does not display statistics for routed VLAN interfaces.

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

***device-name:type-fpc/pic/port***—The device name is either the serial number or the alias of the QFabric system component, such as a Node device, Interconnect device, or QFabric infrastructure. The name can contain a maximum of 128 characters and cannot contain any colons.

**descriptions**—(Optional) Display interface description strings.

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

**routing instance (all | *instance-name*)**—(Optional) Display the name of an individual routing-instance or display all routing-instances.

**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

### Release History Table

| Release     | Description                                                                                                                                |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 14.1X53-D40 | <b>Bucket drops</b> —Starting in Junos OS Release 14.1X53-D40, the number of packets dropped due to policers configured for the interface. |

### Related Documentation

- [Monitoring Interface Status and Traffic on page 65](#)
- [Troubleshooting Network Interfaces on page 66](#)
- [Troubleshooting an Aggregated Ethernet Interface on page 114](#)
- *Junos OS Network Interfaces Library for Routing Devices*

**List of Sample Output** [show interfaces on page 331](#)  
[show interfaces brief on page 331](#)  
[show interfaces detail \(Symmetric Flow Control and Autonegotiation Enabled\) on page 331](#)  
[show interfaces detail \(Asymmetric Flow Control and Autonegotiation Enabled\) on page 332](#)  
[show interfaces extensive \(Symmetric Flow Control and Autonegotiation Enabled\) on page 333](#)  
[show interfaces extensive \(Asymmetric Flow Control and Autonegotiation Enabled\) on page 335](#)  
[show interfaces terse on page 337](#)  
[show interfaces terse \(QFabric Systems\) on page 337](#)

**Output Fields** [Table 32 on page 324](#) lists the output fields for the **show interfaces ge** command. Output fields are listed in the approximate order in which they appear.

**Table 32: show interfaces ge Output Fields**

| Field Name                | Field Description                                                                                                                                       | Level of Output               |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Physical Interface</b> |                                                                                                                                                         |                               |
| <b>Physical interface</b> | Name of the physical interface.                                                                                                                         | All levels                    |
| <b>Enabled</b>            | State of the interface: <b>Enabled</b> or <b>Disabled</b> .                                                                                             | All levels                    |
| <b>Interface index</b>    | Index number of the physical interface, which reflects its initialization sequence.                                                                     | <b>detail extensive none</b>  |
| <b>SNMP ifIndex</b>       | SNMP index number for the physical interface.                                                                                                           | <b>detail extensive none</b>  |
| <b>Generation</b>         | Unique number for use by Juniper Networks technical support only.                                                                                       | <b>detail extensive</b>       |
| <b>Description</b>        | Optional user-specified description.                                                                                                                    | <b>brief detail extensive</b> |
| <b>Link-level type</b>    | Encapsulation being used on the physical interface.                                                                                                     | All levels                    |
| <b>MTU</b>                | Maximum transmission unit size on the physical interface. The default is 1514.                                                                          | All levels                    |
| <b>Speed</b>              | Speed at which the interface is running.                                                                                                                | All levels                    |
| <b>Loopback</b>           | Loopback status: <b>Enabled</b> or <b>Disabled</b> . If loopback is enabled, type of loopback: <b>Local</b> or <b>Remote</b> .                          | All levels                    |
| <b>Source filtering</b>   | Source filtering status: <b>Enabled</b> or <b>Disabled</b> .                                                                                            | All levels                    |
| <b>Flow control</b>       | Flow control status: <b>Enabled</b> or <b>Disabled</b> .<br><br><b>NOTE:</b> This field is only displayed if asymmetric flow control is not configured. | detail extensive              |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Level of Output       |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>Configured-flow-control</b> | <p>Configured flow control for the interface transmit buffers (<b>tx-buffers</b>) and receive buffers (<b>rx-buffers</b>):</p> <ul style="list-style-type: none"> <li><b>tx-buffers</b>—<b>On</b> if the interface is configured to respond to Ethernet PAUSE messages received from the connected peer.<br/><b>Off</b> if the interface is not configured to respond to received PAUSE messages.</li> <li><b>rx-buffers</b>—<b>On</b> if the interface is configured to generate and send Ethernet PAUSE messages to the connected peer.<br/><b>Off</b> if the interface is not configured to generate and send PAUSE messages.</li> </ul> <p><b>NOTE:</b> This field is only displayed if asymmetric flow control is configured.</p> | detail extensive      |
| <b>Auto-negotiation</b>        | Autonegotiation status: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels            |
| <b>Remote-fault</b>            | <p>Remote fault status:</p> <ul style="list-style-type: none"> <li><b>Online</b>—Autonegotiation is manually configured as online.</li> <li><b>Offline</b>—Autonegotiation is manually configured as offline.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | All levels            |
| <b>Device flags</b>            | Information about the physical device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels            |
| <b>Interface flags</b>         | Information about the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | All levels            |
| <b>Link flags</b>              | Information about the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels            |
| <b>CoS queues</b>              | Number of CoS queues configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | detail extensive none |
| <b>Hold-times</b>              | Current interface hold-time up and hold-time down, in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | detail extensive      |
| <b>Current address</b>         | Configured MAC address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | detail extensive none |
| <b>Hardware address</b>        | MAC address of the hardware.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | detail extensive none |
| <b>Last flapped</b>            | Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2008-01-16 10:52:40 UTC (3d 22:58 ago)</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | detail extensive none |
| <b>Statistics last cleared</b> | Time when the statistics for the interface were last set to zero.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | detail extensive      |
| <b>Traffic statistics</b>      | <p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li><b>Input bytes</b>—Number of bytes received on the interface.</li> <li><b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li><b>Input packets</b>—Number of packets received on the interface</li> <li><b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> <p><b>NOTE:</b> The bandwidth bps counter is not enabled on the switch.</p>                                                                                                                                                                                                        | detail extensive      |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Level of Output         |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Input errors</b> | <p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Bucket drops</b>—Starting in Junos OS Release 14.1X53-D40, the number of packets dropped due to policers configured for the interface.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle.</li> <li>• <b>L3 incompletes</b>—Number of incoming packets discarded because they failed Layer 3 sanity checks of the headers. For example, a frame with less than 20 bytes of available IP header is discarded.</li> <li>• <b>L2 channel errors</b>—Number of times the software did not find a valid logical interface for an incoming frame.</li> <li>• <b>L2 mismatch timeouts</b>—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul> | <b>detail extensive</b> |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name                              | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Level of Output              |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Output errors</b>                    | <p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Collisions</b>—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.</li> <li>• <b>Aged packets</b>—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>HS link CRC errors</b>—Number of errors on the high-speed links between the ASICs responsible for handling the switch interfaces.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> <li>• <b>Bucket drops</b>—Number of packets dropped due to policers configured for the interface.</li> </ul> | <b>detail extensive</b>      |
| <b>Egress queues</b>                    | Total number of egress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive</b>      |
| <b>Queue counters (Egress )</b>         | <p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive</b>      |
| <b>Queue Number</b>                     | The CoS queue number and the forwarding classes mapped to the queue number. The <b>Mapped forwarding class</b> column lists the forwarding classes mapped to each CoS queue.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail extensive</b>      |
| <b>Active alarms and Active defects</b> | <p>Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the switch configuration, an alarm can ring the red or yellow alarm bell on the switch or turn on the red or yellow alarm LED on the front of the switch. These fields can contain the value <b>None</b> or <b>Link</b>.</p> <ul style="list-style-type: none"> <li>• <b>None</b>—There are no active defects or alarms.</li> <li>• <b>Link</b>—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive none</b> |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name               | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of Output  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>MAC statistics</b>    | <p>Receive and Transmit statistics reported by the PIC's MAC subsystem.</p> <ul style="list-style-type: none"> <li>• <b>Total octets</b> and <b>total packets</b>—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type.</li> <li>• <b>Unicast packets</b>, <b>Broadcast packets</b>, and <b>Multicast packets</b>—Number of unicast, broadcast, and multicast packets.</li> <li>• <b>CRC/Align errors</b>—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).</li> <li>• <b>FIFO error</b>—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>MAC control frames</b>—Number of MAC control frames.</li> <li>• <b>MAC pause frames</b>—Number of MAC control frames with <b>pause</b> operational code.</li> <li>• <b>Oversized frames</b>—Number of packets that exceeds the configured MTU.</li> <li>• <b>Jabber frames</b>—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.</li> <li>• <b>Fragment frames</b>—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.</li> <li>• <b>VLAN tagged frames</b>—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not. This counter is not supported on EX Series switches and is always displayed as 0.</li> <li>• <b>Code violations</b>—Number of times an event caused the PHY to indicate "Data reception error" or "invalid data symbol error."</li> </ul> | <b>extensive</b> |
| <b>Filter Statistics</b> | Receive and Transmit statistics reported by the PIC's MAC address filter subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>extensive</b> |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name                             | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Level of Output       |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Autonegotiation information            | <p>Information about link autonegotiation:</p> <ul style="list-style-type: none"> <li>• <b>Negotiation status:</b> <ul style="list-style-type: none"> <li>• <b>Incomplete</b>—Ethernet interface has the speed or link mode configured.</li> <li>• <b>No autonegotiation</b>—Remote Ethernet interface has the speed or link mode configured or does not perform autonegotiation.</li> <li>• <b>Complete</b>—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> </ul> </li> <li>• <b>Link partner status</b>—OK when the Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> <li>• <b>Link partner:</b> <ul style="list-style-type: none"> <li>• <b>Link mode</b>—Depending on the capability of the attached Ethernet device, either <b>Full-duplex</b> or <b>Half-duplex</b>.</li> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports <b>PAUSE</b> on both receive and transmit or <b>PAUSE</b> only on receive).</li> <li>• <b>Remote fault</b>—Remote fault information from the link partner—<b>Failure</b> indicates a receive link error. <b>OK</b> indicates that the link partner is receiving. <b>Negotiation error</b> indicates a negotiation error. <b>Offline</b> indicates that the link partner is going offline.</li> <li>• <b>Link partner speed</b>—Speed of the link partner.</li> </ul> </li> <li>• <b>Local resolution:</b> <ul style="list-style-type: none"> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports <b>PAUSE</b> on both receive and transmit or <b>PAUSE</b> only on receive). For asymmetric <b>PAUSE</b>, shows if the <b>PAUSE</b> transmit and <b>PAUSE</b> receive states on the interface are <b>enable</b> or <b>disable</b>.</li> <li>• <b>Remote fault</b>—Remote fault information. <b>Link OK</b> (no error detected on receive), <b>Offline</b> (local interface is offline), and <b>Link Failure</b> (link error detected on receive).</li> </ul> </li> </ul> | extensive             |
| Packet Forwarding Engine configuration | <p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> <li>• <b>Destination slot</b>—FPC slot number.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | extensive             |
| Logical Interface                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |
| Logical interface                      | Name of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | All levels            |
| Index                                  | Index number of the logical interface, which reflects its initialization sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | detail extensive none |
| SNMP ifIndex                           | SNMP interface index number for the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | detail extensive none |
| Generation                             | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | detail extensive      |
| Flags                                  | Information about the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All levels            |

Table 32: show interfaces ge Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                     | Level of Output              |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Encapsulation</b>           | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                               | All levels                   |
| <b>Protocol</b>                | Protocol family.                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive</b> none |
| <b>Traffic statistics</b>      | Number and rate of bytes and packets received (input) and transmitted (output) on the specified interface.                                                                                                                                                                                                                                                                                                            | <b>detail extensive</b>      |
| <b>IPv6 transit statistics</b> | If IPv6 statistics tracking is enabled, number of IPv6 bytes and packets received and transmitted on the logical interface.                                                                                                                                                                                                                                                                                           | <b>extensive</b>             |
| <b>Local statistics</b>        | Number and rate of bytes and packets destined to and from the switch.                                                                                                                                                                                                                                                                                                                                                 | <b>extensive</b>             |
| <b>Transit statistics</b>      | Number and rate of bytes and packets transiting the switch.                                                                                                                                                                                                                                                                                                                                                           | <b>extensive</b>             |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                     | <b>detail extensive</b>      |
| <b>Route Table</b>             | Route table in which the logical interface address is located. For example, 0 refers to the routing table <b>inet.0</b> .                                                                                                                                                                                                                                                                                             | <b>detail extensive</b> none |
| <b>Input Filters</b>           | Names of any input filters applied to this interface.                                                                                                                                                                                                                                                                                                                                                                 | <b>detail extensive</b>      |
| <b>Output Filters</b>          | Names of any output filters applied to this interface.                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>      |
| <b>Flags</b>                   | Information about protocol family flags.<br><br>If unicast reverse-path forwarding (RPF) is explicitly configured on the specified interface, the uRPF flag is displayed. If unicast RPF was configured on a different interface (and therefore is enabled on all switch interfaces) but was not explicitly configured on the specified interface, the uRPF flag is not displayed even though unicast RPF is enabled. | <b>detail extensive</b>      |
| <b><i>protocol-family</i></b>  | Protocol family configured on the logical interface. If the protocol is <b>inet</b> , the IP address of the interface is also displayed.                                                                                                                                                                                                                                                                              | <b>brief</b>                 |
| <b>Flags</b>                   | Information about the address flags.                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b> none |
| <b>Destination</b>             | IP address of the remote side of the connection.                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive</b> none |
| <b>Local</b>                   | IP address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b> none |
| <b>Broadcast</b>               | Broadcast address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                           | <b>detail extensive</b> none |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                     | <b>detail extensive</b>      |



## Sample Output

### show interfaces

```

user@switch> show interfaces ge-0/0/9
Physical interface: ge-0/0/9, Enabled, Physical link is Down
 Interface index: 129, SNMP ifIndex: 21
 Link-level type: Ethernet, MTU: 1514, Speed: Unspecified, Loopback: Disabled,
 Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
 Remote fault: Online
 Device flags : Present Running Down
 Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
 CoS queues : 8 supported, 8 maximum usable queues
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:19:e2:50:3f:41, Hardware address: 00:19:e2:50:3f:41
 Last flapped : 2008-01-16 11:40:53 UTC (4d 02:30 ago)
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 Ingress rate at Packet Forwarding Engine : 0 bps (0 pps)
 Ingress drop rate at Packet Forwarding Engine : 0 bps (0 pps)
 Active alarms : None
 Active defects : None

Logical interface ge-0/0/9.0 (Index 65) (SNMP ifIndex 22)
 Flags: SNMP-Traps
 Encapsulation: ENET2
 Input packets : 0
 Output packets: 0
 Protocol eth-switch
 Flags: None

```

### show interfaces brief

```

user@switch> show interfaces ge-0/0/9 brief
Physical interface: ge-0/0/9, Enabled, Physical link is Down
 Description: voice priority and tcp and icmp traffic rate-limiting filter at i
 ngress port
 Link-level type: Ethernet, MTU: 1514, Speed: Unspecified, Loopback: Disabled,
 Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
 Remote fault: Online
 Device flags : Present Running Down
 Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
 Link flags : None

Logical interface ge-0/0/9.0
 Flags: Device-Down SNMP-Traps Encapsulation: ENET2
 eth-switch

```

### show interfaces detail (Symmetric Flow Control and Autonegotiation Enabled)

```

user@switch> show interfaces ge-0/0/9 detail
Physical interface: ge-0/0/9, Enabled, Physical link is Up
 Interface index: 193, SNMP ifIndex: 206, Generation: 196
 Link-level type: Ethernet, MTU: 1514, Speed: Auto, Duplex: Auto,
 BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
 Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
 Remote fault: Online
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 8 supported, 8 maximum usable queues

```

```

Hold-times : Up 0 ms, Down 0 ms
Current address: 00:1f:12:30:ff:40, Hardware address: 00:1f:12:30:ff:40
Last flapped : 2009-05-05 06:03:05 UTC (00:22:13 ago)
Statistics last cleared: Never
Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Egress queues: 8 supported, 4 in use
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 0 0 0
 1 assured-forw 0 0 0
 5 expedited-fo 0 0 0
 7 network-cont 0 0 0

Active alarms : None
Active defects : None

Logical interface ge-0/0/9.0 (Index 65) (SNMP ifIndex 235) (Generation 130)
Flags: SNMP-Traps Encapsulation: ENET2
Bandwidth: 0
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
Protocol eth-switch, Generation: 146, Route table: 0
Flags: Is-Primary
Input Filters: f1,
Output Filters: f2,,,

```

#### show interfaces detail (Asymmetric Flow Control and Autonegotiation Enabled)

```

user@switch> show interfaces ge-0/0/9 detail
Physical interface: ge-0/0/9, Enabled, Physical link is Up
Interface index: 193, SNMP ifIndex: 206, Generation: 196
Link-level type: Ethernet, MTU: 1514, Speed: Auto, Duplex: Auto,
BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
Source filtering: Disabled, Configured-flow-control tx-buffers: off
rx-buffers: on ,
Auto-negotiation: Enabled,

```

```

Remote fault: Online
Device flags : Present Running
Interface flags: SNMP-Traps Internal: 0x0
Link flags : None
CoS queues : 8 supported, 8 maximum usable queues
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:1f:12:30:ff:40, Hardware address: 00:1f:12:30:ff:40
Last flapped : 2009-05-05 06:03:05 UTC (00:22:13 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets : 0 0 pps
Output packets: 0 0 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets : 0
Output packets: 0
Egress queues: 8 supported, 4 in use
Queue counters:

```

|                | Queued packets | Transmitted packets | Dropped packets |
|----------------|----------------|---------------------|-----------------|
| 0 best-effort  | 0              | 0                   | 0               |
| 1 assured-forw | 0              | 0                   | 0               |
| 5 expedited-fo | 0              | 0                   | 0               |
| 7 network-cont | 0              | 0                   | 0               |

```

Active alarms : None
Active defects : None

Logical interface ge-0/0/9.0 (Index 65) (SNMP ifIndex 235) (Generation 130)
Flags: SNMP-Traps Encapsulation: ENET2
Bandwidth: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets : 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets : 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets : 0 0 pps
Output packets: 0 0 pps
Protocol eth-switch, Generation: 146, Route table: 0
Flags: Is-Primary
Input Filters: f1,
Output Filters: f2,,,,

```

#### show interfaces extensive (Symmetric Flow Control and Autonegotiation Enabled)

```

user@switch> show interfaces ge-0/0/12 extensive
interface: ge-0/0/12, Enabled, Physical link is Down
Interface index: 49164, SNMP ifIndex: 574, Generation: 142

```

```

Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Duplex: Full-Duplex,
BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
Device flags : Present Running Down
Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Link flags : None
CoS queues : 8 supported, 8 maximum usable queues
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:22:83:2a:d8:dc, Hardware address: 00:22:83:2a:d8:dc
Last flapped : 2011-02-25 00:45:03 UTC (22:42:48 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets : 0 0 pps
Output packets: 0 0 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets : 0
Output packets: 0
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Bucket drops: 0, Policed
discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
FIFO errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0,
Bucket drops: 0
Egress queues: 8 supported, 8 in use
Queue counters: Queued packets Transmitted packets Dropped packets

0 best-effort 0 0 0
2 no-loss 0 0 0
3 fcoe 0 0 0
7 network-cont 0 0 0

Queue number: Mapped forwarding classes
0 best-effort
2 no-loss
3 fcoe
7 network-control
Active alarms : LINK
Active defects : LINK
MAC statistics:
Total octets Receive Transmit
Total packets 0 0
Unicast packets 0 0
Broadcast packets 0 0
Multicast packets 0 0
CRC/Align errors 0 0
FIFO errors 0 0
MAC control frames 0 0
MAC pause frames 0 0
Oversized frames 0

```

```

Jabber frames 0
Fragment frames 0
VLAN tagged frames 0
Code violations 0
MAC Priority Flow Control Statistics:
 Priority : 0 0 0
 Priority : 1 0 0
 Priority : 2 0 0
 Priority : 3 0 0
 Priority : 4 0 0
 Priority : 5 0 0
 Priority : 6 0 0
 Priority : 7 0 0
Filter statistics:
 Input packet count 0
 Input packet rejects 0
 Input DA rejects 0
 Input SA rejects 0
 Output packet count 0 0
 Output packet pad count 0 0
 Output packet error count 0 0
 CAM destination filters: 1, CAM source filters: 0
Autonegotiation information:
 Negotiation status: Incomplete
Packet Forwarding Engine configuration:
 Destination slot: 0
CoS information:
 Direction : Output
 CoS transmit queue Bandwidth Buffer Priority
Limit % bps % usec
0 best-effort 75 750000000 75 0 low
none
7 network-control 5 50000000 5 0 low
none
8 mcast-be 15 150000000 15 0 low
none
11 mcast-nc 5 50000000 5 0 low
none

```

#### show interfaces extensive (Asymmetric Flow Control and Autonegotiation Enabled)

```

user@switch> show interfaces ge-0/0/12 extensive
interface: ge-0/0/12, Enabled, Physical link is Down
 Interface index: 49164, SNMP ifIndex: 574, Generation: 142
 Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Duplex: Full-Duplex,
 BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
 Source filtering: Disabled, Configured-flow-control tx-buffers: off
rx-buffers: on
 Auto-negotiation: Enabled,
 Remote fault: Online
 Device flags : Present Running Down
 Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 8 supported, 8 maximum usable queues
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:22:83:2a:d8:dc, Hardware address: 00:22:83:2a:d8:dc
 Last flapped : 2011-02-25 00:45:03 UTC (22:42:48 ago)
 Statistics last cleared: Never
Traffic statistics:
 Input bytes : 0 0 bps

```

```

Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Bucket drops: 0, Policed
discards: 0,
 L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
 FIFO errors: 0, Resource errors: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0,
Bucket drops: 0
Egress queues: 8 supported, 8 in use
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 0 0 0
 2 no-loss 0 0 0
 3 fcoe 0 0 0
 7 network-cont 0 0 0

Queue number: Mapped forwarding classes
 0 best-effort
 2 no-loss
 3 fcoe
 7 network-control

Active alarms : LINK
Active defects : LINK
MAC statistics:
 Receive Transmit
Total octets 0 0
Total packets 0 0
Unicast packets 0 0
Broadcast packets 0 0
Multicast packets 0 0
CRC/Align errors 0 0
FIFO errors 0 0
MAC control frames 0 0
MAC pause frames 0 0
Oversized frames 0
Jabber frames 0
Fragment frames 0
VLAN tagged frames 0
Code violations 0

MAC Priority Flow Control Statistics:
 Priority : 0 0 0
 Priority : 1 0 0
 Priority : 2 0 0
 Priority : 3 0 0
 Priority : 4 0 0
 Priority : 5 0 0
 Priority : 6 0 0
 Priority : 7 0 0
Filter statistics:

```

```

Input packet count 0
Input packet rejects 0
Input DA rejects 0
Input SA rejects 0
Output packet count 0
Output packet pad count 0
Output packet error count 0
CAM destination filters: 1, CAM source filters: 0
Autonegotiation information:
Negotiation status: Complete
Link Partner:
 Link mode: Full-duplex, Flow control: None, Remote fault: OK,
 Link partner Speed: 1000 Mbps
Local resolution:
 Flow control: enable PAUSE transmit and Disable PAUSE receive, Remote
fault: Link OK
Packet Forwarding Engine configuration:
 Destination slot: 0
CoS information:
 Direction : Output
 CoS transmit queue Bandwidth Buffer Priority
Limit
 0 best-effort 75 750000000 75 0 low
none
 7 network-control 5 50000000 5 0 low
none
 8 mcast-be 15 150000000 15 0 low
none
 11 mcast-nc 5 50000000 5 0 low
none

```

#### show interfaces terse

```

user@switch> show interfaces ge-0/0/12 terse
Interface Admin Link Proto Local Remote
ge-0/0/12 up up

```

#### show interfaces terse (QFabric Systems)

```

user@switch> show interfaces node1:ge-0/0/0 terse
Physical interface: node1:ge-0/0/0, Enabled, Physical link is Down
Interface index: 129, SNMP ifIndex: 2884086
Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
Error: None, MAC-REWRITE Error: None,
Loopback: Disabled, Source filtering: Disabled, Flow control: Enabled
Interface flags: Internal: 0x4000
CoS queues : 8 supported, 8 maximum usable queues
Current address: 02:00:09:03:00:00, Hardware address: 02:00:09:03:00:00
Last flapped : Never
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)

```

## show interfaces (GRE)


|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>show interfaces <i>interface-type</i> &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 12.1 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Display status information about the specified generic routing encapsulation (GRE) interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <p><b><i>interface-type</i></b>—On M Series and T Series routers and EX Series switches, the interface type is <b><i>gr-fpc/pic/port</i></b>.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified output level of interface information.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information about network interfaces.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p> |
|                                 | <p> <b>NOTE:</b> You can configure generic routing encapsulation (GRE) interfaces (gre-x/y/z) only for GMPLS control channels. GRE interfaces are not supported or configurable for other applications. For more information about GMPLS, see the <i>Junos OS MPLS Applications Library for Routing Devices</i> and the <i>Junos OS, Release 14.1</i>.</p>                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>List of Sample Output</b>    | <p><a href="#">show interfaces (GRE) on page 342</a></p> <p><a href="#">show interfaces brief (GRE) on page 342</a></p> <p><a href="#">show interfaces detail (GRE) on page 342</a></p> <p><a href="#">show interfaces detail (GRE) on an EX4200 Virtual Chassis Member Switch on page 343</a></p> <p><a href="#">show interfaces extensive (GRE) on page 344</a></p>                                                                                                                                                                                                                                                                                 |
| <b>Output Fields</b>            | <p>Table 33 on page 339 lists the output fields for the <b>show interfaces (GRE)</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



Table 33: GRE show interfaces Output Fields

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Level of Output              |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Physical Interface</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |
| <b>Physical interface</b>      | Name of the physical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | All levels                   |
| <b>Enabled</b>                 | State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                               | All levels                   |
| <b>Interface index</b>         | Physical interface's index number, which reflects its initialization sequence.                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>detail extensive none</b> |
| <b>SNMP ifIndex</b>            | SNMP index number for the physical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive none</b> |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b>      |
| <b>Type</b>                    | Type of interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels                   |
| <b>Link-level type</b>         | Encapsulation used on the physical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | All levels                   |
| <b>MTU</b>                     | MTU size on the physical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | All levels                   |
| <b>Speed</b>                   | Speed at which the interface is running.                                                                                                                                                                                                                                                                                                                                                                                                                                                           | All levels                   |
| <b>Hold-times</b>              | Current interface hold-time up and hold-time down, in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>      |
| <b>Device Flags</b>            | Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                 | All levels                   |
| <b>Interface Flags</b>         | Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                    | All levels                   |
| <b>Input rate</b>              | Input rate in bits per second (bps) and packets per second (pps).                                                                                                                                                                                                                                                                                                                                                                                                                                  | None specified               |
| <b>Output rate</b>             | Output rate in bps and pps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | None specified               |
| <b>Statistics last cleared</b> | Time when the statistics for the interface were last set to zero.                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b>      |
| <b>Traffic statistics</b>      | <p>The number of and the rate at which input and output bytes and packets are received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> | <b>detail extensive</b>      |
| <b>Logical Interface</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |
| <b>Logical interface</b>       | Name of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | All levels                   |
| <b>Index</b>                   | Logical interface index number, which reflects its initialization sequence.                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive none</b> |

Table 33: GRE show interfaces Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Level of Output       |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| SNMP ifIndex                   | Logical interface SNMP interface index number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | detail extensive none |
| Generation                     | Unique number for use by Juniper Networks technical support.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | detail extensive      |
| Flags                          | <p>Information about the logical interface. Possible values listed in the “Logical Interface Flags” section under <i>Common Output Fields Description</i>. describe general information about the logical interface.</p> <p>GRE-specific information about the logical interface is indicated by the presence or absence of the following value in this field:</p> <ul style="list-style-type: none"> <li>• <b>Reassemble-Pkts</b>—If the <b>Flags</b> field includes this string, the GRE tunnel is configured to reassemble tunnel packets that were fragmented after tunnel encapsulation.</li> </ul>                               | All levels            |
| IP-Header                      | <p>IP header of the logical interface. If the <b>tunnel key</b> statement is configured, this information is included in the <b>IP Header</b> entry.</p> <p>GRE-specific information about the logical interface is indicated by the presence or absence of the following value in this field:</p> <ul style="list-style-type: none"> <li>• <b>df</b>—If the <b>IP-Header</b> field includes this string immediately following the 16 bits of identification information (that is, if <b>:df:</b> displays after the twelfth byte), the GRE tunnel is configured to allow fragmentation of GRE packets after encapsulation.</li> </ul> | All levels            |
| Encapsulation                  | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | All levels            |
| Copy-tos-to-outer-ip-header    | <p>Status of type of service (ToS) bits in the GRE packet header:</p> <ul style="list-style-type: none"> <li>• <b>On</b>—ToS bits were copied from the payload packet header into the header of the IP packet sent through the GRE tunnel.</li> <li>• <b>Off</b>—ToS bits were not copied from the payload packet header and are set to 0 in the GRE packet header.</li> </ul> <p><b>NOTE:</b> EX Series switches do not support copying ToS bits to the encapsulated packet, so the value of this field is always <b>Off</b> in switch output.</p>                                                                                    | detail extensive      |
| Gre keepalives configured      | <p>Indicates whether a GRE keepalive time and hold time are configured for the GRE tunnel.</p> <p><b>NOTE:</b> EX Series switches do not support configuration of GRE tunnel keepalive times and hold times, so the value of this field is always <b>Off</b> in switch output.</p>                                                                                                                                                                                                                                                                                                                                                     | detail extensive      |
| Gre keepalives adjacency state | Status of the other end of the GRE tunnel: <b>Up</b> or <b>Down</b> . If keepalive messages are not received by either end of the GRE tunnel within the hold-time period, the GRE keepalive adjacency state is down even when the GRE tunnel is up.                                                                                                                                                                                                                                                                                                                                                                                    | detail extensive      |
| Input packets                  | Number of packets received on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | None specified        |
| Output packets                 | Number of packets transmitted on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | None specified        |

Table 33: GRE show interfaces Output Fields (*continued*)

| Field Name                    | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Level of Output              |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Traffic statistics</b>     | <p>Rate of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.</p> <ul style="list-style-type: none"> <li>• <b>Input rate</b>—Rate of bits and packets received on the interface.</li> <li>• <b>Output rate</b>—Rate of bits and packets transmitted on the interface.</li> </ul> | <b>detail extensive</b>      |
| <b>Local statistics</b>       | Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.                                                                                                                                                                                                                                                                                          | <b>detail extensive</b>      |
| <b>Transit statistics</b>     | Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.                                                                                                                                                                                                                                                                                                                        | <b>detail extensive none</b> |
| <b>Protocol</b>               | Protocol family configured on the logical interface, such as <b>iso</b> , <b>inet6</b> , or <b>mpls</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive none</b> |
| <b><i>protocol-family</i></b> | Protocol family configured on the logical interface. If the protocol is <b>inet</b> , the IP address of the interface is also displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>brief</b>                 |
| <b>MTU</b>                    | MTU size on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail extensive none</b> |
| <b>Generation</b>             | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail extensive</b>      |
| <b>Route table</b>            | Routing table in which the logical interface address is located. For example, <b>0</b> refers to the routing table <b>inet.0</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail extensive</b>      |
| <b>Flags</b>                  | Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive none</b> |
| <b>Addresses, Flags</b>       | Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail extensive none</b> |
| <b>Destination</b>            | IP address of the remote side of the connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>detail extensive none</b> |
| <b>Local</b>                  | IP address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive none</b> |
| <b>Broadcast</b>              | Broadcast address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>detail extensive none</b> |
| <b>Generation</b>             | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail extensive</b>      |

## Sample Output

### show interfaces (GRE)

```

user@host> show interfaces gr-1/2/0
Physical interface: gr-0/0/0, Enabled, Physical link is Up
 Interface index: 132, SNMP ifIndex: 26
 Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
 Device flags : Present Running
 Interface flags: Point-To-Point SNMP-Traps
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)

Logical interface gr-0/0/0.0 (Index 68) (SNMP ifIndex 47)
 Flags: Point-To-Point SNMP-Traps 16384
 IP-Header 1.1.1.2:1.1.1.1:47:df:64:0000000000000000 Encapsulation: GRE-NULL
 Input packets : 0
 Output packets: 0
 Protocol inet, MTU: 1476
 Flags: None
 Addresses, Flags: Is-Primary
 Local: 1.10.1.1

```

### show interfaces brief (GRE)

```

user@host> show interfaces gr-1/2/0 brief
Physical interface: gr-1/2/0, Enabled, Physical link is Up
 Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
 Device flags : Present Running
 Interface flags: Point-To-Point SNMP-Traps

Logical interface gr-1/2/0.0
 Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000
 IP-Header 10.10.0.2:10.10.0.1:47:df:64:0000000000000000
 Encapsulation: GRE-NULL
 inet 10.100.0.1/30
 mpls

```

### show interfaces detail (GRE)

```

user@host> show interfaces gr-1/2/0 detail
Physical interface: gr-0/0/0, Enabled, Physical link is Up
 Interface index: 132, SNMP ifIndex: 26, Generation: 13
 Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 800mbps
 Hold-times : Up 0 ms, Down 0 ms
 Device flags : Present Running
 Interface flags: Point-To-Point SNMP-Traps
 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

Logical interface gr-0/0/0.0 (Index 68) (SNMP ifIndex 47) (Generation 8)
 Flags: Point-To-Point SNMP-Traps 16384
 IP-Header 1.1.1.2:1.1.1.1:47:df:64:0000000000000000 Encapsulation: GRE-NULL
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0

```

```

Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1476, Generation: 12, Route table: 0
Flags: None
Addresses, Flags: Is-Primary
Destination: Unspecified, Local: 1.10.1.1, Broadcast: Unspecified,
Generation: 15

```

### show interfaces detail (GRE) on an EX4200 Virtual Chassis Member Switch

```

user@switch> show interfaces gr-2/0/15 detail
Physical interface: gr-2/0/15, Enabled, Physical link is Up
Interface index: 195, SNMP ifIndex: 846, Generation: 198
Type: GRE, Link-level type: GRE, MTU: Unlimited, Speed: 1000mbps
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:1f:12:38:0f:d2, Hardware address: 00:1f:12:38:0f:d2
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Statistics last cleared: 2011-09-14 17:43:15 UTC (00:00:18 ago)
Traffic statistics:
Input bytes : 5600636 0 bps
Output bytes : 5600636 0 bps
Input packets: 20007 0 pps
Output packets: 20007 0 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

Logical interface gr-2/0/15.0 (Index 75) (SNMP ifIndex 847) (HW Token 4093)
(Generation 140)
Flags: Point-To-Point SNMP-Traps 0x0
IP-Header 180.20.30.2:180.20.3:47:df:64:0000000000000000
Encapsulation: GRE-NULL
Copy-tos-to-outer-ip-header: Off
Gre keepalives configured: Off, Gre keepalives adjacency state: down
Traffic statistics:
Input bytes : 5600886
Output bytes : 2881784
Input packets: 20010
Output packets: 10018
Local statistics:
Input bytes : 398
Output bytes : 264
Input packets: 5
Output packets: 3
Transit statistics:
Input bytes : 5600488 0 bps
Output bytes : 2881520 0 bps
Input packets: 20005 0 pps
Output packets: 10015 0 pps

```

```

Protocol inet, Generation: 159, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
 Destination: 90.90.90/24, Local: 90.90.90.10, Broadcast: 90.90.90.255,
 Generation: 144

```

```

Logical interface gr-2/0/15.1 (Index 80) (SNMP ifIndex 848) (HW Token 4088)
(Generation 150)

```

```

Flags: Point-To-Point SNMP-Traps 0x0
IP-Header 160.20.40.2:160.20.30.1:47:df:64:0000000000000000
Encapsulation: GRE-NULL
Copy-tos-to-outer-ip-header: Off
Gre keepalives configured: Off, Gre keepalives adjacency state: down

```

```
Traffic statistics:
```

```

Input bytes : 260
Output bytes : 2880148
Input packets: 4
Output packets: 10002

```

```
Local statistics:
```

```

Input bytes : 112
Output bytes : 0
Input packets: 2
Output packets: 0

```

```
Transit statistics:
```

```

Input bytes : 148 0 bps
Output bytes : 2880148 0 bps
Input packets: 2 0 pps
Output packets: 10002 0 pps

```

```
Protocol inet, Generation: 171, Route table: 0
```

```
Flags: None
```

```
Addresses, Flags: Is-Preferred Is-Primary
```

```

 Destination: 70.70.70/24, Local: 70.70.70.10, Broadcast: 70.70.70.255,
 Generation: 160

```

### show interfaces extensive (GRE)

The output for the **show interfaces extensive** command is identical to that for the **show interfaces detail** command. For sample output, see [show interfaces detail \(GRE\) on page 342](#) and [show interfaces detail \(GRE\) on an EX4200 Virtual Chassis Member Switch on page 343](#).

## show interfaces irb

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>show interfaces irb &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;routing-instance <i>instance-name</i>&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | <p>Command introduced in Junos OS Release 12.3R2.</p> <p>Command introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2 for the QFX Series</p>                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | Display integrated routing and bridging interfaces information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information about network interfaces.</p> <p><b>routing-instance <i>instance-name</i></b>—(Optional) Display information for the interface with the specified SNMP index.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information for the interface with the specified SNMP index.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p> |
| <b>Additional Information</b>   | Integrated routing and bridging (IRB) provides simultaneous support for Layer 2 bridging and Layer 3 IP routing on the same interface. IRB enables you to route local packets to another routed interface or to another VLAN that has a Layer 3 protocol configured.                                                                                                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>List of Sample Output</b>    | <p><a href="#">show interfaces irb extensive on page 349</a></p> <p><a href="#">show interfaces irb snmp-index on page 350</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Output Fields</b>            | <a href="#">Table 34 on page 345</a> lists the output fields for the <b>show interfaces irb</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Table 34: show interfaces irb Output Fields**

| Field Name                | Field Description                                                                                                                             | Level of Output |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Physical Interface</b> |                                                                                                                                               |                 |
| <b>Physical interface</b> | Name of the physical interface.                                                                                                               | All levels      |
| <b>Enabled</b>            | State of the physical interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> . | All levels      |

Table 34: show interfaces irb Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                          | Level of Output                    |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>Proto</b>                   | Protocol configured on the interface.                                                                                                                                                                                                                      | <b>terse</b>                       |
| <b>Interface index</b>         | Physical interface index number, which reflects its initialization sequence.                                                                                                                                                                               | <b>detail extensive none</b>       |
| <b>SNMP ifIndex</b>            | SNMP index number for the physical interface.                                                                                                                                                                                                              | <b>detail extensive none</b>       |
| <b>Type</b>                    | Physical interface type.                                                                                                                                                                                                                                   | <b>detail extensive none</b>       |
| <b>Link-level type</b>         | Encapsulation being used on the physical interface.                                                                                                                                                                                                        | <b>detail extensive brief none</b> |
| <b>MTU</b>                     | MTU size on the physical interface.                                                                                                                                                                                                                        | <b>detail extensive brief none</b> |
| <b>Clocking</b>                | Reference clock source: <b>Internal</b> or <b>External</b> . Always unspecified on IRB interfaces.                                                                                                                                                         | <b>detail extensive brief</b>      |
| <b>Speed</b>                   | Speed at which the interface is running. Always unspecified on IRB interfaces.                                                                                                                                                                             | <b>detail extensive brief</b>      |
| <b>Device flags</b>            | Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .                                                                                                         | <b>detail extensive brief none</b> |
| <b>Interface flags</b>         | Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .                                                                                                            | <b>detail extensive brief none</b> |
| <b>Link type</b>               | Physical interface link type: <b>full duplex</b> or <b>half duplex</b> .                                                                                                                                                                                   | <b>detail extensive none</b>       |
| <b>Link flags</b>              | Information about the link. Possible values are described in the “Links Flags” section under <i>Common Output Fields Description</i> .                                                                                                                     | <b>detail extensive none</b>       |
| <b>Physical Info</b>           | Physical interface information.                                                                                                                                                                                                                            | All levels                         |
| <b>Hold-times</b>              | Current interface hold-time up and hold-time down, in milliseconds.                                                                                                                                                                                        | <b>detail extensive</b>            |
| <b>Current address</b>         | Configured MAC address.                                                                                                                                                                                                                                    | <b>detail extensive none</b>       |
| <b>Hardware address</b>        | MAC address of the hardware.                                                                                                                                                                                                                               | <b>detail extensive none</b>       |
| <b>Alternate link address</b>  | Backup address of the link.                                                                                                                                                                                                                                | <b>detail extensive</b>            |
| <b>Last flapped</b>            | Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hours:minutes:seconds timezone (hours:minutes:seconds ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> . | <b>detail extensive none</b>       |
| <b>Statistics last cleared</b> | Time when the statistics for the interface were last set to zero.                                                                                                                                                                                          | <b>detail extensive</b>            |



Table 34: show interfaces irb Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Level of Output         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Traffic statistics</b>      | <p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>detail extensive</b> |
| <b>IPv6 transit statistics</b> | <p>Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail extensive</b> |
| <b>Input errors</b>            | <p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>           | <b>detail extensive</b> |
| <b>Output errors</b>           | <p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the DPC is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul> | <b>detail extensive</b> |

---

#### Logical Interface

Table 34: show interfaces irb Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Level of Output                 |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Logical interface</b>       | Name of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | All levels                      |
| <b>Index</b>                   | Index number of the logical interface (which reflects its initialization sequence).                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive</b><br>none |
| <b>SNMP ifIndex</b>            | SNMP interface index number of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b><br>none |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive</b>         |
| <b>Flags</b>                   | Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive</b>         |
| <b>Encapsulation</b>           | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>         |
| <b>Bandwidth</b>               | Speed at which the interface is running.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive</b>         |
| <b>Routing Instance</b>        | Routing instance IRB is configured under.                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail extensive</b>         |
| <b>Bridging Domain</b>         | Bridging domain IRB is participating in.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive</b>         |
| <b>Traffic statistics</b>      | <p>Number and rate of bytes and packets received and transmitted on the logical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>                                             | <b>detail extensive</b>         |
| <b>IPv6 transit statistics</b> | <p>Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> | <b>detail extensive</b>         |
| <b>Local statistics</b>        | Statistics for traffic received from and transmitted to the Routing Engine.                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>detail extensive</b>         |
| <b>Transit statistics</b>      | Statistics for traffic transiting the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail extensive</b>         |
| <b>Protocol</b>                | Protocol family configured on the local interface. Possible values are described in the "Protocol Field" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                       | <b>detail extensive</b>         |
| <b>MTU</b>                     | Maximum transmission unit size on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive</b>         |
| <b>Maximum labels</b>          | Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive</b><br>none |

Table 34: show interfaces irb Output Fields (*continued*)

| Field Name              | Field Description                                                                                                                                               | Level of Output         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Generation</b>       | Unique number for use by Juniper Networks technical support only.                                                                                               | <b>detail extensive</b> |
| <b>Route table</b>      | Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.                                             | <b>detail extensive</b> |
| <b>Addresses, Flags</b> | Information about address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .                 | <b>detail extensive</b> |
| <b>Policer</b>          | The policer that is to be evaluated when packets are received or transmitted on the interface.                                                                  | <b>detail extensive</b> |
| <b>Flags</b>            | Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> . | <b>detail extensive</b> |

## Sample Output

### show interfaces irb extensive

```

user@host> show interfaces irb extensive
Physical interface: irb, Enabled, Physical link is Up
 Interface index: 129, SNMP ifIndex: 23, Generation: 130
 Type: Ethernet, Link-level type: Ethernet, MTU: 1514, Clocking: Unspecified,
 Speed: Unspecified
 Device flags : Present Running
 Interface flags: SNMP-Traps
 Link type : Full-Duplex
 Link flags : None
 Physical info : Unspecified
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 02:00:00:00:00:30, Hardware address: 02:00:00:00:00:30
 Alternate link address: Unspecified
 Last flapped : Never
 Statistics last cleared: Never
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets: 0
 IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets: 0
 Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Giants: 0, Policed discards:
0, Resource errors: 0
 Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0

Logical interface irb.0 (Index 68) (SNMP ifIndex 70) (Generation 143)
 Flags: Hardware-Down SNMP-Traps 0x4000 Encapsulation: ENET2
 Bandwidth: 1000mbps
 Routing Instance: customer_0 Bridging Domain: bd0

```

```

Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Protocol inet, MTU: 1500, Generation: 154, Route table: 0
 Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
 Destination: 10.51.1/24, Local: 10.51.1.2, Broadcast: 10.51.1.255,
 Generation: 155
Protocol multiservice, MTU: 1500, Generation: 155, Route table: 0
 Flags: Is-Primary
 Policer: Input: __default_arp_policer

```

#### show interfaces irb snmp-index

```

user@host> show interfaces irb snmp-index 25
Physical interface: irb, Enabled, Physical link is Up
 Interface index: 128, SNMP ifIndex: 25
 Type: Ethernet, Link-level type: Ethernet, MTU: 1514
 Device flags : Present Running
 Interface flags: SNMP-Traps
 Link type : Full-Duplex
 Link flags : None
 Current address: 02:00:00:00:00:30, Hardware address: 02:00:00:00:00:30
 Last flapped : Never
 Input packets : 0
 Output packets: 0

Logical interface irb.0 (Index 68) (SNMP ifIndex 70)
 Flags: Hardware-Down SNMP-Traps 0x4000 Encapsulation: ENET2
 Bandwidth: 1000mbps
 Routing Instance: customer_0 Bridging Domain: bd0
 Input packets : 0
 Output packets: 0
 Protocol inet, MTU: 1500
 Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
 Destination: 10.51.1/24, Local: 10.51.1.2, Broadcast: 10.51.1.255
 Protocol multiservice, MTU: 1500
 Flags: Is-Primary

```

## show interfaces queue

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>show interfaces queue &lt;aggregate   remaining-traffic&gt; &lt;both-ingress-egress&gt; &lt;egress&gt; &lt;forwarding-class forwarding-class&gt; &lt;ingress&gt; &lt;interface-name interface-name&gt; &lt;l2-statistics&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b> | <p>Command introduced before Junos OS Release 7.4.</p> <p><b>both-ingress-egress</b>, <b>egress</b>, and <b>ingress</b> options introduced in Junos OS Release 7.6.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p><b>l2-statistics</b> option introduced in Junos OS Release 12.1.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>         | Display class-of-service (CoS) queue information for physical interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>             | <p><b>none</b>—Show detailed CoS queue statistics for all physical interfaces.</p> <p><b>aggregate</b>—(Optional) Display the aggregated queuing statistics of all logical interfaces that have traffic-control profiles configured. (Not on the QFX Series.)</p> <p><b>both-ingress-egress</b>—(Optional) On Gigabit Ethernet Intelligent Queuing 2 (IQ2) PICs, display both ingress and egress queue statistics. (Not on the QFX Series.)</p> <p><b>egress</b>—(Optional) Display egress queue statistics.</p> <p><b>forwarding-class forwarding-class</b>—(Optional) Forwarding class name for this queue. Shows detailed CoS statistics for the queue associated with the specified forwarding class.</p> <p><b>ingress</b>—(Optional) On Gigabit Ethernet IQ2 PICs, display ingress queue statistics. (Not on the QFX Series.)</p> <p><b>interface-name interface-name</b>—(Optional) Show detailed CoS queue statistics for the specified interface.</p> <p><b>l2-statistics</b>—(Optional) Display Layer 2 statistics for MLPPP, FRF.15, and FRF.16 bundles</p> <p><b>remaining-traffic</b>—(Optional) Display the remaining-traffic queue statistics of all logical interfaces that have traffic-control profiles configured.</p> |

### Overhead for Layer 2 Statistics

Transmitted packets and transmitted byte counts are displayed for the Layer 2 level with the addition of encapsulation overheads applied for fragmentation, as shown in [Table 35 on page 352](#). Others counters, such as packets and bytes queued (input) and drop counters, are displayed at the Layer 3 level. In the case of link fragmentation and interleaving (LFI) for which fragmentation is not applied, corresponding Layer 2 overheads are added, as shown in [Table 35 on page 352](#).

Table 35: Layer 2 Overhead and Transmitted Packets or Byte Counts

| Protocol       | Fragmentation       |                                   | LFI |
|----------------|---------------------|-----------------------------------|-----|
|                | First fragmentation | Second to <i>n</i> fragmentations |     |
|                | Bytes               | Bytes                             |     |
| MLPPP (Long)   | 13                  | 12                                | 8   |
| MLPPP (short)  | 11                  | 10                                | 8   |
| MLFR (FRF15)   | 12                  | 10                                | 8   |
| MFR (FRF16)    | 10                  | 8                                 | -   |
| MCMLPPP(Long)  | 13                  | 12                                | -   |
| MCMLPPP(Short) | 11                  | 10                                | -   |

## Layer 2 Statistics—Fragmentation Overhead Calculation

## MLPPP/MC-MLPPP Overhead details:

=====

## Fragment 1:

```

Outer PPP header : 4 bytes
Long or short sequence MLPPP header : 4 bytes or 2 bytes
Inner PPP header : 1 byte
HDLC flag and FCS bytes : 4 bytes

```

## Fragments 2 .. n :

```

Outer PPP header : 4 bytes
Long or short sequence MLPPP header : 4 bytes or 2 bytes
HDLC flag and FCS bytes : 4 bytes

```

## MLFR (FRF15) Overhead details:

=====

## Fragment 1:

```

Framereelay header : 2 bytes
Control,NLPID : 2 bytes
Fragmentaion header : 2 bytes
Inner proto : 2 bytes
HDLC flag and FCS : 4 bytes

```

## Fragments 2 ...n :

```

Framereelay header : 2 bytes
Control,NLPID : 2 bytes
Fragmentaion header : 2 bytes
HDLC flag and FCS : 4 bytes

```

## MFR (FRF16) Overhead details:

=====

```

Fragment 1:
 Fragmentation header : 2 bytes
 Framereelay header : 2 bytes
 Inner proto : 2 bytes
 HDLC flag and FCS : 4 bytes

Fragments 2 ...n :
 Fragmentation header : 2 bytes
 Framereelay header : 2 bytes
 HDLC flag and FCS : 4 bytes

```

## Overhead with LFI

```

MLPPP(Long & short sequence):
=====
 Outer PPP header : 4 bytes
 HDLC flag and FCS : 4 bytes

MLFR (FRF15):
=====
 Framereelay header : 2 bytes
 Control,NLPID : 2 bytes
 HDLC flag and FCS : 4 bytes

```

The following examples show overhead for different cases:

- A 1000-byte packet is sent to a mlppp bundle without any fragmentation. At the Layer 2 level, bytes transmitted is 1013 in 1 packet. This overhead is for MLPPP long sequence encap.
- A 1000-byte packet is sent to a mlppp bundle with a fragment threshold of 250byte. At the Layer 2 level, bytes transmitted is 1061 bytes in 5 packets.
- A 1000-byte LFI packet is sent to an mlppp bundle. At the Layer 2 level, bytes transmitted is 1008 in 1 packet.

**remaining-traffic**—(Optional) Display the queuing statistics of all logical interfaces that do not have traffic-control profiles configured. (Not on the QFX Series.)

## Additional Information

For rate-limited interfaces hosted on Modular Interface Cards (MICs), Modular Port Concentrators (MPCs), or Enhanced Queuing DPCs, rate-limit packet-drop operations occur *before* packets are queued for transmission scheduling. For such interfaces, the statistics for queued traffic do not include the packets that have already been dropped due to rate limiting, and consequently the displayed statistics for queued traffic are the same as the displayed statistics for transmitted traffic.



**NOTE:** For rate-limited interfaces hosted on other types of hardware, rate-limit packet-drop operations occur *after* packets are queued for transmission scheduling. For these other interface types, the statistics for queued traffic include the packets that are later dropped due to rate limiting, and consequently the displayed statistics for queued traffic equals the sum of the statistics for transmitted and rate-limited traffic.

On M Series routers (except for the M320 and M120 routers), this command is valid only for a PIC installed on an enhanced Flexible PIC Concentrator (FPC).

Queue statistics for aggregated interfaces are supported on the M Series and T Series routers only. Statistics for an aggregated interface are the summation of the queue statistics of the child links of that aggregated interface. You can view the statistics for a child interface by using the **show interfaces statistics** command for that child interface.

When you configure tricolor marking on a 10-port 1-Gigabit Ethernet PIC, for queues 6 and 7 only, the output does not display the number of queued bytes and packets, or the number of bytes and packets dropped because of RED. If you do not configure tricolor marking on the interface, these statistics are available for all queues.

For the 4-port Channelized OC12 IQE PIC and 1-port Channelized OC48 IQE PIC, the **Packet Forwarding Engine Chassis Queues** field represents traffic bound for a particular physical interface on the PIC. For all other PICs, the **Packet Forwarding Engine Chassis Queues** field represents the total traffic bound for the PIC.

For Gigabit Ethernet IQ2 PICs, the **show interfaces queue** command output does not display the number of tail-dropped packets. This limitation does not apply to Packet Forwarding Engine chassis queues.

When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (under the **Packet Forwarding Engine Chassis Queues** field) shows the prefragmentation values.

The behavior of the **egress** queues for the **Routing Engine-Generated Traffic** is not same as the configured queue for MLPPP and MFR configurations.

For information about how to configure CoS, see the *Junos OS Network Interfaces Library for Routing Devices*. For related CoS operational mode commands, see the [CLI Explorer](#).

**Required Privilege Level**

view

**List of Sample Output**

[show interfaces queue \(Rate-Limited Interface on a Gigabit Ethernet MIC in an MPC\) on page 359](#)  
[show interfaces queue \(Aggregated Ethernet on a T320 Router\) on page 360](#)  
[show interfaces queue \(Fast Ethernet on a J4300 Router\) on page 362](#)  
[show interfaces queue \(Gigabit Ethernet on a T640 Router\) on page 362](#)  
[show interfaces queue aggregate \(Gigabit Ethernet Enhanced DPC\) on page 363](#)  
[show interfaces queue \(Gigabit Ethernet IQ2 PIC\) on page 367](#)  
[show interfaces queue both-ingress-egress \(Gigabit Ethernet IQ2 PIC\) on page 370](#)  
[show interfaces queue ingress \(Gigabit Ethernet IQ2 PIC\) on page 372](#)  
[show interfaces queue egress \(Gigabit Ethernet IQ2 PIC\) on page 373](#)  
[show interfaces queue remaining-traffic \(Gigabit Ethernet Enhanced DPC\) on page 374](#)  
[show interfaces queue \(Channelized OC12 IQE Type 3 PIC in SONET Mode\) on page 377](#)  
[show interfaces queue \(QFX Series\) on page 387](#)  
[show interfaces queue l2-statistics \(lsq interface\) on page 388](#)  
[show interfaces queue lsq \(lsq-ifd\) on page 388](#)



**Output Fields** Table 36 on page 355 lists the output fields for the **show interfaces queue** command. Output fields are listed in the approximate order in which they appear.

**Table 36: show interfaces queue Output Fields**

| Field Name                                                                                                                                          | Field Description                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical interface                                                                                                                                  | Name of the physical interface.                                                                                                                                                                                                                                                                                                                                           |
| Enabled                                                                                                                                             | State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                      |
| Interface index                                                                                                                                     | Physical interface's index number, which reflects its initialization sequence.                                                                                                                                                                                                                                                                                            |
| SNMP ifIndex                                                                                                                                        | SNMP index number for the interface.                                                                                                                                                                                                                                                                                                                                      |
| Forwarding classes supported                                                                                                                        | Total number of forwarding classes supported on the specified interface.                                                                                                                                                                                                                                                                                                  |
| Forwarding classes in use                                                                                                                           | Total number of forwarding classes in use on the specified interface.                                                                                                                                                                                                                                                                                                     |
| Ingress queues supported                                                                                                                            | On Gigabit Ethernet IQ2 PICs only, total number of ingress queues supported on the specified interface.                                                                                                                                                                                                                                                                   |
| Ingress queues in use                                                                                                                               | On Gigabit Ethernet IQ2 PICs only, total number of ingress queues in use on the specified interface.                                                                                                                                                                                                                                                                      |
| Output queues supported                                                                                                                             | Total number of output queues supported on the specified interface.                                                                                                                                                                                                                                                                                                       |
| Output queues in use                                                                                                                                | Total number of output queues in use on the specified interface.                                                                                                                                                                                                                                                                                                          |
| Egress queues supported                                                                                                                             | Total number of egress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                       |
| Egress queues in use                                                                                                                                | Total number of egress queues in use on the specified interface.                                                                                                                                                                                                                                                                                                          |
| Queue counters (Ingress)                                                                                                                            | CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces. <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul> |
| Burst size                                                                                                                                          | (Logical interfaces on IQ PICs only) Maximum number of bytes up to which the logical interface can burst. The burst size is based on the shaping rate applied to the interface.                                                                                                                                                                                           |
| The following output fields are applicable to both interface component and Packet Forwarding component in the <b>show interfaces queue</b> command: |                                                                                                                                                                                                                                                                                                                                                                           |
| Queue                                                                                                                                               | Queue number.                                                                                                                                                                                                                                                                                                                                                             |
| Forwarding classes                                                                                                                                  | Forwarding class name.                                                                                                                                                                                                                                                                                                                                                    |

Table 36: show interfaces queue Output Fields (*continued*)

| Field Name                  | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Queued Packets</b>       | <p>Number of packets queued to this queue.</p> <p><b>NOTE:</b> For Gigabit Ethernet IQ2 interfaces, the Queued Packets count is calculated by the Junos OS interpreting one frame buffer as one packet. If the queued packets are very large or very small, the calculation might not be completely accurate for transit traffic. The count is completely accurate for traffic terminated on the router.</p> <p>For rate-limited interfaces hosted on MICs or MPCs only, this statistic does not include traffic dropped due to rate limiting. For more information, see <a href="#">“Additional Information” on page 353</a>.</p> |
| <b>Queued Bytes</b>         | <p>Number of bytes queued to this queue. The byte counts vary by interface hardware. For more information, see <a href="#">Table 37 on page 358</a>.</p> <p>For rate-limited interfaces hosted on MICs or MPCs only, this statistic does not include traffic dropped due to rate limiting. For more information, see <a href="#">“Additional Information” on page 353</a>.</p>                                                                                                                                                                                                                                                     |
| <b>Transmitted Packets</b>  | <p>Number of packets transmitted by this queue. When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (displayed under the <b>Packet Forwarding Engine Chassis Queues</b> field) shows the prefragmentation values.</p> <p><b>NOTE:</b> For Layer 2 statistics, see <a href="#">“Overhead for Layer 2 Statistics” on page 351</a></p>                                                                                                                                                                                          |
| <b>Transmitted Bytes</b>    | <p>Number of bytes transmitted by this queue. The byte counts vary by interface hardware. For more information, see <a href="#">Table 37 on page 358</a>.</p> <p><b>NOTE:</b> On MX Series routers, this number can be inaccurate when you issue the command for a physical interface repeatedly and in quick succession, because the statistics for the child nodes are collected infrequently. Wait ten seconds between successive iterations to avoid this situation.</p> <p><b>NOTE:</b> For Layer 2 statistics, see <a href="#">“Overhead for Layer 2 Statistics” on page 351</a></p>                                         |
| <b>Tail-dropped packets</b> | Number of packets dropped because of tail drop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>RL-dropped packets</b>   | <p>Number of packets dropped due to rate limiting.</p> <p>For rate-limited interfaces hosted on MICs, MPCs, and Enhanced Queuing DPCs only, this statistic is not included in the queued traffic statistics. For more information, see <a href="#">“Additional Information” on page 353</a>.</p>                                                                                                                                                                                                                                                                                                                                   |
| <b>RL-dropped bytes</b>     | <p>Number of bytes dropped due to rate limiting.</p> <p>For rate-limited interfaces hosted on MICs, MPCs, and Enhanced Queuing DPCs only, this statistic is not included in the queued traffic statistics. For more information, see <a href="#">“Additional Information” on page 353</a>.</p>                                                                                                                                                                                                                                                                                                                                     |

Table 36: show interfaces queue Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RED-dropped packets | <p>Number of packets dropped because of random early detection (RED).</p> <ul style="list-style-type: none"> <li>(M Series and T Series routers only) On M320 and M120 routers and the T Series routers, the total number of dropped packets is displayed. On all other M Series routers, the output classifies dropped packets into the following categories: <ul style="list-style-type: none"> <li><b>Low, non-TCP</b>—Number of low-loss priority non-TCP packets dropped because of RED.</li> <li><b>Low, TCP</b>—Number of low-loss priority TCP packets dropped because of RED.</li> <li><b>High, non-TCP</b>—Number of high-loss priority non-TCP packets dropped because of RED.</li> <li><b>High, TCP</b>—Number of high-loss priority TCP packets dropped because of RED.</li> </ul> </li> <li>(J Series routers and MX Series routers with enhanced DPCs, and T Series routers with enhanced FPCs only) The output classifies dropped packets into the following categories: <ul style="list-style-type: none"> <li><b>Low</b>—Number of low-loss priority packets dropped because of RED.</li> <li><b>Medium-low</b>—Number of medium-low loss priority packets dropped because of RED.</li> <li><b>Medium-high</b>—Number of medium-high loss priority packets dropped because of RED.</li> <li><b>High</b>—Number of high-loss priority packets dropped because of RED.</li> </ul> </li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p> |
| RED-dropped bytes   | <p>Number of bytes dropped because of RED. The byte counts vary by interface hardware. For more information, see <a href="#">Table 37 on page 358</a>.</p> <ul style="list-style-type: none"> <li>(M Series and T Series routers only) On M320 and M120 routers and the T Series routers, only the total number of dropped bytes is displayed. On all other M Series routers, the output classifies dropped bytes into the following categories: <ul style="list-style-type: none"> <li><b>Low, non-TCP</b>—Number of low-loss priority non-TCP bytes dropped because of RED.</li> <li><b>Low, TCP</b>—Number of low-loss priority TCP bytes dropped because of RED.</li> <li><b>High, non-TCP</b>—Number of high-loss priority non-TCP bytes dropped because of RED.</li> <li><b>High, TCP</b>—Number of high-loss priority TCP bytes dropped because of RED.</li> </ul> </li> <li>(J Series routers only) The output classifies dropped bytes into the following categories: <ul style="list-style-type: none"> <li><b>Low</b>—Number of low-loss priority bytes dropped because of RED.</li> <li><b>Medium-low</b>—Number of medium-low loss priority bytes dropped because of RED.</li> <li><b>Medium-high</b>—Number of medium-high loss priority bytes dropped because of RED.</li> <li><b>High</b>—Number of high-loss priority bytes dropped because of RED.</li> </ul> </li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>                   |

Byte counts vary by interface hardware. [Table 37 on page 358](#) shows how the byte counts on the outbound interfaces vary depending on the interface hardware. [Table 37 on page 358](#) is based on the assumption that outbound interfaces are sending IP traffic with 478 bytes per packet.

Table 37: Byte Count by Interface Hardware

| Interface Hardware               | Output Level                | Byte Count Includes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comments                                                                                                                                                                                                     |
|----------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gigabit Ethernet IQ and IQE PICs | Interface                   | <p>Queued: 490 bytes per packet, representing 478 bytes of Layer 3 packet + 12 bytes</p> <p>Transmitted: 490 bytes per packet, representing 478 bytes of Layer 3 packet + 12 bytes</p> <p>RED dropped: 496 bytes per packet representing 478 bytes of Layer 3 packet + 18 bytes</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>The 12 additional bytes include 6 bytes for the destination MAC address + 4 bytes for the VLAN + 2 bytes for the Ethernet type.</p> <p>For RED dropped, 6 bytes are added for the source MAC address.</p> |
|                                  | Packet forwarding component | <p>Queued: 478 bytes per packet, representing 478 bytes of Layer 3 packet</p> <p>Transmitted: 478 bytes per packet, representing 478 bytes of Layer 3 packet</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | —                                                                                                                                                                                                            |
| Non-IQ PIC                       | Interface                   | <p>T Series, TX Series, T1600, and MX Series routers:</p> <ul style="list-style-type: none"> <li>• Queued: 478 bytes of Layer 3 packet.</li> <li>• Transmitted: 478 bytes of Layer 3 packet.</li> </ul> <p>T4000 routers with Type 5 FPCs :</p> <ul style="list-style-type: none"> <li>• Queued: 478 bytes of Layer 3 packet + the full Layer 2 overhead including 4 bytes CRC + the full Layer 1 overhead 8 bytes preamble + 12 bytes Inter frame Gap.</li> <li>• Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead including 4 bytes CRC + the full Layer 1 overhead 8 bytes preamble + 12 bytes Interframe Gap.</li> </ul> <p>M Series routers:</p> <ul style="list-style-type: none"> <li>• Queued: 478 bytes of Layer 3 packet.</li> <li>• Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead.</li> </ul> <p>PTX Series Packet Transport Routers:</p> <ul style="list-style-type: none"> <li>• Queued: 478 bytes of Layer 3 packet + the full Layer 2 overhead including 4 bytes FCS + the full Layer 1 overhead of the MAC header DA + SA + EtherType (non-VLAN).</li> <li>• Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead including 4 bytes CRC + the full Layer 1 overhead of the MAC header DA + SA + EtherType (non-VLAN).</li> <li>• RED dropped: 478 bytes of Layer 3 packet + 22 bytes special header. To the TQ, this packet has 4 bytes more than queued or transmitted.</li> </ul> | <p>The Layer 2 overhead is 14 bytes for non-VLAN traffic and 18 bytes for VLAN traffic.</p>                                                                                                                  |

Table 37: Byte Count by Interface Hardware (*continued*)

| Interface Hardware                                   | Output Level                | Byte Count Includes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comments                                                                                                                           |
|------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| IQ and IQE PICs with a SONET/SDH interface           | Interface                   | <p>Queued: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes</p> <p>Transmitted: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes</p> <p>RED dropped: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes</p>                                                                                                                                                                                                                       | The additional 4 bytes are for the Layer 2 Point-to-Point Protocol (PPP) header.                                                   |
|                                                      | Packet forwarding component | <p>Queued: 478 bytes per packet, representing 478 bytes of Layer 3 packet</p> <p>Transmitted: 486 bytes per packet, representing 478 bytes of Layer 3 packet + 8 bytes</p>                                                                                                                                                                                                                                                                                                                              | For transmitted packets, the additional 8 bytes includes 4 bytes for the PPP header and 4 bytes for a cookie.                      |
| Non-IQ PIC with a SONET/SDH interface                | Interface                   | <p>T Series, TX Series, T1600, and MX Series routers:</p> <ul style="list-style-type: none"> <li>Queued: 478 bytes of Layer 3 packet.</li> <li>Transmitted: 478 bytes of Layer 3 packet.</li> </ul> <p>M Series routers:</p> <ul style="list-style-type: none"> <li>Queued: 478 bytes of Layer 3 packet.</li> <li>Transmitted: 483 bytes per packet, representing 478 bytes of Layer 3 packet + 5 bytes</li> <li>RED dropped: 478 bytes per packet, representing 478 bytes of Layer 3 packet</li> </ul> | For transmitted packets, the additional 5 bytes includes 4 bytes for the PPP header and 1 byte for the packet loss priority (PLP). |
| Interfaces configured with Frame Relay Encapsulation | Interface                   | The default Frame Relay overhead is 7 bytes. If you configure the Frame Check Sequence (FCS) to 4 bytes, then the overhead increases to 10 bytes.                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                    |
| 1-port 10-Gigabit Ethernet IQ2 and IQ2-E PICs        | Interface                   | <p>Queued: 478 bytes of Layer 3 packet + the full Layer 2 overhead including CRC.</p> <p>Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead including CRC.</p>                                                                                                                                                                                                                                                                                                                        | The Layer 2 overhead is 18 bytes for non-VLAN traffic and 22 bytes for VLAN traffic.                                               |
| 4-port 1G IQ2 and IQ2-E PICs                         | Packet forwarding component | Queued: 478 bytes of Layer 3 packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | —                                                                                                                                  |
| 8-port 1G IQ2 and IQ2-E PICs                         |                             | Transmitted: 478 bytes of Layer 3 packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |

## Sample Output

### show interfaces queue (Rate-Limited Interface on a Gigabit Ethernet MIC in an MPC)

The following example shows queue information for the rate-limited interface ge-4/2/0 on a Gigabit Ethernet MIC in an MPC. For rate-limited queues for interfaces hosted on MICs or MPCs, rate-limit packet drops occur prior to packet output queuing. In the

command output, the nonzero statistics displayed in the **RL-dropped packets** and **RL-dropped bytes** fields quantify the traffic dropped to rate-limit queue 0 output to 10 percent of 1 gigabyte (100 megabits) per second. Because the RL-dropped traffic is not included in the **Queued** statistics, the statistics displayed for queued traffic are the same as the statistics for transmitted traffic.

```

user@host> show interfaces queue ge-4/2/0
Physical interface: ge-4/2/0, Enabled, Physical link is Up
 Interface index: 203, SNMP ifIndex: 1054
Forwarding classes: 16 supported, 4 in use
Egress queues: 8 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 131300649 141751 pps
 Bytes : 11287964840 99793248 bps
 Transmitted:
 Packets : 131300649 141751 pps
 Bytes : 11287964840 99793248 bps
 Tail-dropped packets : 0 0 pps
 RL-dropped packets : 205050862 602295 pps
 RL-dropped bytes : 13595326612 327648832 bps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps

```

### show interfaces queue (Aggregated Ethernet on a T320 Router)

The following example shows that the aggregated Ethernet interface, **ae1**, has traffic on queues **af1** and **af12**:

```

user@host> show interfaces queue ae1
Physical interface: ae1, Enabled, Physical link is Up
 Interface index: 158, SNMP ifIndex: 33 Forwarding classes: 8 supported, 8 in use
Output queues: 8 supported, 8 in use
Queue: 0, Forwarding classes: be
 Queued:
 Packets : 5 0 pps
 Bytes : 242 0 bps
 Transmitted:
 Packets : 5 0 pps
 Bytes : 242 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: af1
 Queued:
 Packets : 42603765 595484 pps

```

```

Bytes : 5453281920 609776496 bps
Transmitted:
Packets : 42603765 595484 pps
Bytes : 5453281920 609776496 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: ef1
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: nc
Queued:
Packets : 45 0 pps
Bytes : 3930 0 bps
Transmitted:
Packets : 45 0 pps
Bytes : 3930 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 4, Forwarding classes: af11
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 5, Forwarding classes: ef11
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 6, Forwarding classes: af12
Queued:
Packets : 31296413 437436 pps
Bytes : 4005940864 447935200 bps
Transmitted:
Packets : 31296413 437436 pps
Bytes : 4005940864 447935200 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 7, Forwarding classes: nc2
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps

```

```

Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

#### show interfaces queue (Fast Ethernet on a J4300 Router)

```

user@host> show interfaces queue fe-4/0/0.0
Logical interface fe-4/0/0.0 (Index 71) (SNMP ifIndex 42)
Forwarding classes: 8 supported, 8 in use
Output queues: 8 supported, 8 in use
Queue: 0, Forwarding classes: be
 Queued:
 Packets : 5240762 3404 pps
 Bytes : 3020710354 15934544 bps
 Transmitted:
 Packets : 5240762 3404 pps
 Bytes : 3020710354 15934544 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
Queue: 1, Forwarding classes: af1
 Queued:
 Packets : 2480391 1650 pps
 Bytes : 1304685666 6945704 bps
 Transmitted:
 Packets : 2478740 1650 pps
 Bytes : 1303817240 6945704 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 1651 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 1651 0 pps
 RED-dropped bytes : 868426 0 bps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 868426 0 pps

```

#### show interfaces queue (Gigabit Ethernet on a T640 Router)

```

user@host> show interfaces queue
Physical interface: ge-7/0/1, Enabled, Physical link is Up
 Interface index: 150, SNMP ifIndex: 42
Forwarding classes: 8 supported, 8 in use
Output queues: 8 supported, 8 in use
Queue: 0, Forwarding classes: be
 Queued:

```



```

Packets : 13 0 pps
Bytes : 622 0 bps
Transmitted:
Packets : 13 0 pps
Bytes : 622 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: af1
Queued:
Packets : 1725947945 372178 pps
Bytes : 220921336960 381110432 bps
Transmitted:
Packets : 1725947945 372178 pps
Bytes : 220921336960 381110432 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: ef1
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: nc
Queued:
Packets : 571 0 pps
Bytes : 49318 336 bps
Transmitted:
Packets : 571 0 pps
Bytes : 49318 336 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

### show interfaces queue aggregate (Gigabit Ethernet Enhanced DPC)

```

user@host> show interfaces queue ge-2/2/9 aggregate
Physical interface: ge-2/2/9, Enabled, Physical link is Up
Interface index: 238, SNMP ifIndex: 71
Forwarding classes: 16 supported, 4 in use
Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
Packets : 148450735 947295 pps
Bytes : 8016344944 409228848 bps
Transmitted:
Packets : 76397439 487512 pps
Bytes : 4125461868 210602376 bps
Tail-dropped packets : Not Available
RED-dropped packets : 72053285 459783 pps
Low : 72053285 459783 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 3890877444 198626472 bps

```

```

 Low : 3890877444 198626472 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
 Packets : 410278257 473940 pps
 Bytes : 22156199518 204742296 bps
Transmitted:
 Packets : 4850003 4033 pps
 Bytes : 261900162 1742256 bps
Tail-dropped packets : Not Available
RED-dropped packets : 405425693 469907 pps
 Low : 405425693 469907 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 21892988124 203000040 bps
 Low : 21892988124 203000040 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Forwarding classes: 16 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort

```

```

Queued:
 Packets : 76605230 485376 pps
 Bytes : 5209211400 264044560 bps
Transmitted:
 Packets : 76444631 484336 pps
 Bytes : 5198235612 263478800 bps
Tail-dropped packets : Not Available
RED-dropped packets : 160475 1040 pps
 Low : 160475 1040 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 10912300 565760 bps
 Low : 10912300 565760 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
 Packets : 4836136 3912 pps
 Bytes : 333402032 2139056 bps
Transmitted:
 Packets : 3600866 1459 pps
 Bytes : 244858888 793696 bps
Tail-dropped packets : Not Available
RED-dropped packets : 1225034 2450 pps
 Low : 1225034 2450 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 83302312 1333072 bps
 Low : 83302312 1333072 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available

```

|                     |   |   |       |
|---------------------|---|---|-------|
| RED-dropped packets | : | 0 | 0 pps |
| Low                 | : | 0 | 0 pps |
| Medium-low          | : | 0 | 0 pps |
| Medium-high         | : | 0 | 0 pps |
| High                | : | 0 | 0 pps |
| RED-dropped bytes   | : | 0 | 0 bps |
| Low                 | : | 0 | 0 bps |
| Medium-low          | : | 0 | 0 bps |
| Medium-high         | : | 0 | 0 bps |
| High                | : | 0 | 0 bps |

Packet Forwarding Engine Chassis Queues:

Queues: 4 supported, 4 in use

Queue: 0, Forwarding classes: best-effort

Queued:

|         |   |            |               |
|---------|---|------------|---------------|
| Packets | : | 77059796   | 486384 pps    |
| Bytes   | : | 3544750624 | 178989576 bps |

Transmitted:

|                      |   |            |               |
|----------------------|---|------------|---------------|
| Packets              | : | 77059797   | 486381 pps    |
| Bytes                | : | 3544750670 | 178988248 bps |
| Tail-dropped packets | : | 0          | 0 pps         |
| RED-dropped packets  | : | 0          | 0 pps         |
| Low                  | : | 0          | 0 pps         |
| Medium-low           | : | 0          | 0 pps         |
| Medium-high          | : | 0          | 0 pps         |
| High                 | : | 0          | 0 pps         |
| RED-dropped bytes    | : | 0          | 0 bps         |
| Low                  | : | 0          | 0 bps         |
| Medium-low           | : | 0          | 0 bps         |
| Medium-high          | : | 0          | 0 bps         |
| High                 | : | 0          | 0 bps         |

Queue: 1, Forwarding classes: expedited-forwarding

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

Queue: 2, Forwarding classes: assured-forwarding

Queued:

|         |   |           |             |
|---------|---|-----------|-------------|
| Packets | : | 4846580   | 3934 pps    |
| Bytes   | : | 222942680 | 1447768 bps |

Transmitted:

|                      |   |           |             |
|----------------------|---|-----------|-------------|
| Packets              | : | 4846580   | 3934 pps    |
| Bytes                | : | 222942680 | 1447768 bps |
| Tail-dropped packets | : | 0         | 0 pps       |
| RED-dropped packets  | : | 0         | 0 pps       |
| Low                  | : | 0         | 0 pps       |
| Medium-low           | : | 0         | 0 pps       |
| Medium-high          | : | 0         | 0 pps       |

```

 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 3, Forwarding classes: network-control
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps

```

#### show interfaces queue (Gigabit Ethernet IQ2 PIC)

```

user@host> show interfaces queue ge-7/1/3
Physical interface: ge-7/1/3, Enabled, Physical link is Up
 Interface index: 170, SNMP ifIndex: 70 Forwarding classes: 16 supported, 4 in use
 Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 418390039 10 pps
 Bytes : 38910269752 7440 bps
 Transmitted:
 Packets : 418390039 10 pps
 Bytes : 38910269752 7440 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps

```

```

 RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
 Packets : 7055 1 pps
 Bytes : 451552 512 bps
Transmitted:
 Packets : 7055 1 pps
 Bytes : 451552 512 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Forwarding classes: 16 supported, 4 in use Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
 Packets : 1031 0 pps
 Bytes : 143292 0 bps
Transmitted:
 Packets : 1031 0 pps
 Bytes : 143292 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
 Packets : 77009 11 pps
 Bytes : 6894286 7888 bps
Transmitted:
 Packets : 77009 11 pps
 Bytes : 6894286 7888 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

## Packet Forwarding Engine Chassis Queues:

Queues: 4 supported, 4 in use

Queue: 0, Forwarding classes: best-effort

## Queued:

|         |   |        |       |
|---------|---|--------|-------|
| Packets | : | 1031   | 0 pps |
| Bytes   | : | 147328 | 0 bps |

## Transmitted:

|                      |   |        |       |
|----------------------|---|--------|-------|
| Packets              | : | 1031   | 0 pps |
| Bytes                | : | 147328 | 0 bps |
| Tail-dropped packets | : | 0      | 0 pps |
| RED-dropped packets  | : | 0      | 0 pps |
| Low, non-TCP         | : | 0      | 0 pps |
| Low, TCP             | : | 0      | 0 pps |
| High, non-TCP        | : | 0      | 0 pps |
| High, TCP            | : | 0      | 0 pps |
| RED-dropped bytes    | : | 0      | 0 bps |
| Low, non-TCP         | : | 0      | 0 bps |
| Low, TCP             | : | 0      | 0 bps |
| High, non-TCP        | : | 0      | 0 bps |
| High, TCP            | : | 0      | 0 bps |

Queue: 1, Forwarding classes: expedited-forwarding

## Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

## Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low, non-TCP         | : | 0 | 0 pps |
| Low, TCP             | : | 0 | 0 pps |
| High, non-TCP        | : | 0 | 0 pps |
| High, TCP            | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low, non-TCP         | : | 0 | 0 bps |
| Low, TCP             | : | 0 | 0 bps |
| High, non-TCP        | : | 0 | 0 bps |
| High, TCP            | : | 0 | 0 bps |

Queue: 2, Forwarding classes: assured-forwarding

## Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

## Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low, non-TCP         | : | 0 | 0 pps |
| Low, TCP             | : | 0 | 0 pps |
| High, non-TCP        | : | 0 | 0 pps |
| High, TCP            | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low, non-TCP         | : | 0 | 0 bps |
| Low, TCP             | : | 0 | 0 bps |
| High, non-TCP        | : | 0 | 0 bps |
| High, TCP            | : | 0 | 0 bps |

Queue: 3, Forwarding classes: network-control

## Queued:

|         |   |          |          |
|---------|---|----------|----------|
| Packets | : | 94386    | 12 pps   |
| Bytes   | : | 13756799 | 9568 bps |

## Transmitted:

|                      |   |          |          |
|----------------------|---|----------|----------|
| Packets              | : | 94386    | 12 pps   |
| Bytes                | : | 13756799 | 9568 bps |
| Tail-dropped packets | : | 0        | 0 pps    |
| RED-dropped packets  | : | 0        | 0 pps    |
| Low, non-TCP         | : | 0        | 0 pps    |
| Low, TCP             | : | 0        | 0 pps    |
| High, non-TCP        | : | 0        | 0 pps    |
| High, TCP            | : | 0        | 0 pps    |
| RED-dropped bytes    | : | 0        | 0 bps    |
| Low, non-TCP         | : | 0        | 0 bps    |
| Low, TCP             | : | 0        | 0 bps    |
| High, non-TCP        | : | 0        | 0 bps    |
| High, TCP            | : | 0        | 0 bps    |

### show interfaces queue both-ingress-egress (Gigabit Ethernet IQ2 PIC)

```

user@host> show interfaces queue ge-6/2/0 both-ingress-egress
Physical interface: ge-6/2/0, Enabled, Physical link is Up
 Interface index: 175, SNMP ifIndex: 121
 Forwarding classes: 8 supported, 4 in use
 Ingress queues: 4 supported, 4 in use
 Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 254 0 pps
 Bytes : 16274 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Queue: 2, Forwarding classes: assured-forwarding
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Queue: 3, Forwarding classes: network-control
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps

```



```

 RED-dropped bytes : 0 0 bps
Forwarding classes: 8 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 3 0 pps
 Bytes : 126 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
 Queued:
 Packets : Not Available
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Packet Forwarding Engine Chassis Queues:
Queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 80564692 0 pps
 Bytes : 3383717100 0 bps
 Transmitted:
 Packets : 80564692 0 pps
 Bytes : 3383717100 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : 80564685 0 pps
 Bytes : 3383716770 0 bps
 Transmitted:
 Packets : 80564685 0 pps

```

```

Bytes : 3383716770 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
Packets : 9397 0 pps
Bytes : 3809052 232 bps
Transmitted:
Packets : 9397 0 pps
Bytes : 3809052 232 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

#### show interfaces queue ingress (Gigabit Ethernet IQ2 PIC)

```

user@host> show interfaces queue ge-6/2/0 ingress
Physical interface: ge-6/2/0, Enabled, Physical link is Up
Interface index: 175, SNMP ifIndex: 121
Forwarding classes: 8 supported, 4 in use
Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 288 0 pps
Bytes : 18450 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available

```

```

RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

### show interfaces queue egress (Gigabit Ethernet IQ2 PIC)

```

user@host> show interfaces queue ge-6/2/0 egress
Physical interface: ge-6/2/0, Enabled, Physical link is Up
Interface index: 175, SNMP ifIndex: 121
Forwarding classes: 8 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 3 0 pps
Bytes : 126 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
Packets : Not Available
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

```

```

Packet Forwarding Engine Chassis Queues:
Queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 80564692 0 pps
 Bytes : 3383717100 0 bps
 Transmitted:
 Packets : 80564692 0 pps
 Bytes : 3383717100 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : 80564685 0 pps
 Bytes : 3383716770 0 bps
 Transmitted:
 Packets : 80564685 0 pps
 Bytes : 3383716770 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: network-control
 Queued:
 Packets : 9538 0 pps
 Bytes : 3819840 0 bps
 Transmitted:
 Packets : 9538 0 pps
 Bytes : 3819840 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps

```

#### show interfaces queue remaining-traffic (Gigabit Ethernet Enhanced DPC)

```

user@host> show interfaces queue ge-2/2/9 remaining-traffic
Physical interface: ge-2/2/9, Enabled, Physical link is Up
 Interface index: 238, SNMP ifIndex: 71
Forwarding classes: 16 supported, 4 in use
Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 110208969 472875 pps
 Bytes : 5951284434 204282000 bps
 Transmitted:
 Packets : 110208969 472875 pps
 Bytes : 5951284434 204282000 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps

```

```

Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps
Medium-high : 0 0 bps
High : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
Low : 0 0 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps
Medium-high : 0 0 bps
High : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
Low : 0 0 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps
Medium-high : 0 0 bps
High : 0 0 bps
Queue: 3, Forwarding classes: network-control
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
Low : 0 0 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps
Medium-high : 0 0 bps

```

```

 High : 0 0 bps
Forwarding classes: 16 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 109355853 471736 pps
 Bytes : 7436199152 256627968 bps
 Transmitted:
 Packets : 109355852 471736 pps
 Bytes : 7436198640 256627968 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 1, Forwarding classes: expedited-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 2, Forwarding classes: assured-forwarding
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 3, Forwarding classes: network-control
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps

```

```

Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps

```

#### show interfaces queue (Channelized OC12 IQE Type 3 PIC in SONET Mode)

```

user@host> show interfaces queue t3-1/1/0:7
Physical interface: t3-1/1/0:7, Enabled, Physical link is Up

 Interface index: 192, SNMP ifIndex: 1948

 Description: full T3 interface connect to 6ce13 t3-3/1/0:7 for FR testing -
 Lam

 Forwarding classes: 16 supported, 9 in use

 Egress queues: 8 supported, 8 in use

 Queue: 0, Forwarding classes: DEFAULT

 Queued:

 Packets : 214886 13449 pps
 Bytes : 9884756 5164536 bps

 Transmitted:

 Packets : 214886 13449 pps
 Bytes : 9884756 5164536 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps

```

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 bps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 bps |
|------|---|---|-------|

Queue: 1, Forwarding classes: REALTIME

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

Transmitted:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

|                      |   |   |       |
|----------------------|---|---|-------|
| Tail-dropped packets | : | 0 | 0 pps |
|----------------------|---|---|-------|

|                     |   |   |       |
|---------------------|---|---|-------|
| RED-dropped packets | : | 0 | 0 pps |
|---------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 pps |
|-----|---|---|-------|

|            |   |   |       |
|------------|---|---|-------|
| Medium-low | : | 0 | 0 pps |
|------------|---|---|-------|

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 pps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 pps |
|------|---|---|-------|

|                   |   |   |       |
|-------------------|---|---|-------|
| RED-dropped bytes | : | 0 | 0 bps |
|-------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 bps |
|-----|---|---|-------|

|            |   |   |       |
|------------|---|---|-------|
| Medium-low | : | 0 | 0 bps |
|------------|---|---|-------|

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 bps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 bps |
|------|---|---|-------|

Queue: 2, Forwarding classes: PRIVATE

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

Transmitted:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

|                      |   |   |       |
|----------------------|---|---|-------|
| Tail-dropped packets | : | 0 | 0 pps |
|----------------------|---|---|-------|

|                     |   |   |       |
|---------------------|---|---|-------|
| RED-dropped packets | : | 0 | 0 pps |
|---------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 pps |
|-----|---|---|-------|



|                   |   |   |       |
|-------------------|---|---|-------|
| Medium-low        | : | 0 | 0 pps |
| Medium-high       | : | 0 | 0 pps |
| High              | : | 0 | 0 pps |
| RED-dropped bytes | : | 0 | 0 bps |
| Low               | : | 0 | 0 bps |
| Medium-low        | : | 0 | 0 bps |
| Medium-high       | : | 0 | 0 bps |
| High              | : | 0 | 0 bps |

Queue: 3, Forwarding classes: CONTROL

Queued:

|         |   |      |       |
|---------|---|------|-------|
| Packets | : | 60   | 0 pps |
| Bytes   | : | 4560 | 0 bps |

Transmitted:

|                      |   |      |       |
|----------------------|---|------|-------|
| Packets              | : | 60   | 0 pps |
| Bytes                | : | 4560 | 0 bps |
| Tail-dropped packets | : | 0    | 0 pps |
| RED-dropped packets  | : | 0    | 0 pps |
| Low                  | : | 0    | 0 pps |
| Medium-low           | : | 0    | 0 pps |
| Medium-high          | : | 0    | 0 pps |
| High                 | : | 0    | 0 pps |
| RED-dropped bytes    | : | 0    | 0 bps |
| Low                  | : | 0    | 0 bps |
| Medium-low           | : | 0    | 0 bps |
| Medium-high          | : | 0    | 0 bps |
| High                 | : | 0    | 0 bps |

Queue: 4, Forwarding classes: CLASS\_B\_OUTPUT

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

Queue: 5, Forwarding classes: CLASS\_C\_OUTPUT

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |

```

 High : 0 0 bps
Queue: 6, Forwarding classes: CLASS_V_OUTPUT
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
 RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps
Queue: 7, Forwarding classes: CLASS_S_OUTPUT, GETS
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps

```

|                   |   |   |       |
|-------------------|---|---|-------|
| High              | : | 0 | 0 pps |
| RED-dropped bytes | : | 0 | 0 bps |
| Low               | : | 0 | 0 bps |
| Medium-low        | : | 0 | 0 bps |
| Medium-high       | : | 0 | 0 bps |
| High              | : | 0 | 0 bps |

#### Packet Forwarding Engine Chassis Queues:

Queues: 8 supported, 8 in use

Queue: 0, Forwarding classes: DEFAULT

##### Queued:

|         |   |          |             |
|---------|---|----------|-------------|
| Packets | : | 371365   | 23620 pps   |
| Bytes   | : | 15597330 | 7936368 bps |

##### Transmitted:

|                      |   |          |             |
|----------------------|---|----------|-------------|
| Packets              | : | 371365   | 23620 pps   |
| Bytes                | : | 15597330 | 7936368 bps |
| Tail-dropped packets | : | 0        | 0 pps       |
| RED-dropped packets  | : | 0        | 0 pps       |
| Low                  | : | 0        | 0 pps       |
| Medium-low           | : | 0        | 0 pps       |
| Medium-high          | : | 0        | 0 pps       |
| High                 | : | 0        | 0 pps       |
| RED-dropped bytes    | : | 0        | 0 bps       |
| Low                  | : | 0        | 0 bps       |
| Medium-low           | : | 0        | 0 bps       |
| Medium-high          | : | 0        | 0 bps       |
| High                 | : | 0        | 0 bps       |

Queue: 1, Forwarding classes: REALTIME

##### Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

```

Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
Low : 0 0 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps
Medium-high : 0 0 bps
High : 0 0 bps
Queue: 2, Forwarding classes: PRIVATE
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : 0 0 pps
Low : 0 0 pps
Medium-low : 0 0 pps
Medium-high : 0 0 pps
High : 0 0 pps
RED-dropped bytes : 0 0 bps
Low : 0 0 bps
Medium-low : 0 0 bps

```

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 bps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 bps |
|------|---|---|-------|

Queue: 3, Forwarding classes: CONTROL

Queued:

|         |   |       |       |
|---------|---|-------|-------|
| Packets | : | 32843 | 0 pps |
|---------|---|-------|-------|

|       |   |         |        |
|-------|---|---------|--------|
| Bytes | : | 2641754 | 56 bps |
|-------|---|---------|--------|

Transmitted:

|         |   |       |       |
|---------|---|-------|-------|
| Packets | : | 32843 | 0 pps |
|---------|---|-------|-------|

|       |   |         |        |
|-------|---|---------|--------|
| Bytes | : | 2641754 | 56 bps |
|-------|---|---------|--------|

|                      |   |   |       |
|----------------------|---|---|-------|
| Tail-dropped packets | : | 0 | 0 pps |
|----------------------|---|---|-------|

|                     |   |   |       |
|---------------------|---|---|-------|
| RED-dropped packets | : | 0 | 0 pps |
|---------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 pps |
|-----|---|---|-------|

|            |   |   |       |
|------------|---|---|-------|
| Medium-low | : | 0 | 0 pps |
|------------|---|---|-------|

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 pps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 pps |
|------|---|---|-------|

|                   |   |   |       |
|-------------------|---|---|-------|
| RED-dropped bytes | : | 0 | 0 bps |
|-------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 bps |
|-----|---|---|-------|

|            |   |   |       |
|------------|---|---|-------|
| Medium-low | : | 0 | 0 bps |
|------------|---|---|-------|

|             |   |   |       |
|-------------|---|---|-------|
| Medium-high | : | 0 | 0 bps |
|-------------|---|---|-------|

|      |   |   |       |
|------|---|---|-------|
| High | : | 0 | 0 bps |
|------|---|---|-------|

Queue: 4, Forwarding classes: CLASS\_B\_OUTPUT

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

Transmitted:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
|---------|---|---|-------|

|       |   |   |       |
|-------|---|---|-------|
| Bytes | : | 0 | 0 bps |
|-------|---|---|-------|

|                      |   |   |       |
|----------------------|---|---|-------|
| Tail-dropped packets | : | 0 | 0 pps |
|----------------------|---|---|-------|

|                     |   |   |       |
|---------------------|---|---|-------|
| RED-dropped packets | : | 0 | 0 pps |
|---------------------|---|---|-------|

|     |   |   |       |
|-----|---|---|-------|
| Low | : | 0 | 0 pps |
|-----|---|---|-------|

|                   |   |   |       |
|-------------------|---|---|-------|
| Medium-low        | : | 0 | 0 pps |
| Medium-high       | : | 0 | 0 pps |
| High              | : | 0 | 0 pps |
| RED-dropped bytes | : | 0 | 0 bps |
| Low               | : | 0 | 0 bps |
| Medium-low        | : | 0 | 0 bps |
| Medium-high       | : | 0 | 0 bps |
| High              | : | 0 | 0 bps |

Queue: 5, Forwarding classes: CLASS\_C\_OUTPUT

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

Queue: 6, Forwarding classes: CLASS\_V\_OUTPUT

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

Queue: 7, Forwarding classes: CLASS\_S\_OUTPUT, GETS

Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |



High : 0 0 bps

### show interfaces queue (QFX Series)

```

user@switch> show interfaces queue xe-0/0/15
Physical interface: xe-0/0/15, Enabled, Physical link is Up
Interface index: 49165, SNMP ifIndex: 539
Forwarding classes: 12 supported, 8 in use
Egress queues: 12 supported, 8 in use
Queue: 0, Forwarding classes: best-effort
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 Total-dropped packets: 0 0 pps
 Total-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: fcoe
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 Total-dropped packets: 0 0 pps
 Total-dropped bytes : 0 0 bps
0 bps
Queue: 4, Forwarding classes: no-loss
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 Total-dropped packets: 0 0 pps
 Total-dropped bytes : 0 0 bps
Queue: 7, Forwarding classes: network-control
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 Total-dropped packets: 0 0 pps
 Total-dropped bytes : 0 0 bps
Queue: 8, Forwarding classes: mcast
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available

```

|                        |   |       |
|------------------------|---|-------|
| Total-dropped packets: | 0 | 0 pps |
| Total-dropped bytes :  | 0 | 0 bps |

### show interfaces queue l2-statistics (lsq interface)

```

user@switch> show interfaces queue lsq-2/2/0.2 l2-statistics
Logical interface lsq-2/2/0.2 (Index 69) (SNMP ifIndex 1598)
Forwarding classes: 16 supported, 4 in use
Egress queues: 8 supported, 4 in use
Burst size: 0
Queue: 0, Forwarding classes: be
 Queued:
 Packets : 1 0 pps
 Bytes : 1001 0 bps
 Transmitted:
 Packets : 5 0 pps
 Bytes : 1062 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: ef
 Queued:
 Packets : 1 0 pps
 Bytes : 1500 0 bps
 Transmitted:
 Packets : 6 0 pps
 Bytes : 1573 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: af
 Queued:
 Packets : 1 0 pps
 Bytes : 512 0 bps
 Transmitted:
 Packets : 3 0 pps
 Bytes : 549 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: nc
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : 0 0 pps
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
=====

```

### show interfaces queue lsq (lsq-ifd)

```

user@switch> show interfaces queue lsq-1/0/0
Logical interface lsq-1/0/0 (Index 348) (SNMP ifIndex 660)
Forwarding classes: 16 supported, 4 in use
Egress queues: 8 supported, 4 in use
Burst size: 0

```

## Queue: 0, Forwarding classes: be

## Queued:

|         |   |          |             |
|---------|---|----------|-------------|
| Packets | : | 55576    | 1206 pps    |
| Bytes   | : | 29622008 | 5145472 bps |

## Transmitted:

|                      |   |          |             |
|----------------------|---|----------|-------------|
| Packets              | : | 55576    | 1206 pps    |
| Bytes                | : | 29622008 | 5145472 bps |
| Tail-dropped packets | : | 0        | 0 pps       |
| RL-dropped packets   | : | 0        | 0 pps       |
| RL-dropped bytes     | : | 0        | 0 bps       |
| RED-dropped packets  | : | 0        | 0 pps       |
| Low                  | : | 0        | 0 pps       |
| Medium-low           | : | 0        | 0 pps       |
| Medium-high          | : | 0        | 0 pps       |
| High                 | : | 0        | 0 pps       |
| RED-dropped bytes    | : | 0        | 0 bps       |
| Low                  | : | 0        | 0 bps       |
| Medium-low           | : | 0        | 0 bps       |
| Medium-high          | : | 0        | 0 bps       |
| High                 | : | 0        | 0 bps       |

## Queue: 1, Forwarding classes: ef

## Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

## Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RL-dropped packets   | : | 0 | 0 pps |
| RL-dropped bytes     | : | 0 | 0 bps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

## Queue: 2, Forwarding classes: af

## Queued:

|         |   |   |       |
|---------|---|---|-------|
| Packets | : | 0 | 0 pps |
| Bytes   | : | 0 | 0 bps |

## Transmitted:

|                      |   |   |       |
|----------------------|---|---|-------|
| Packets              | : | 0 | 0 pps |
| Bytes                | : | 0 | 0 bps |
| Tail-dropped packets | : | 0 | 0 pps |
| RL-dropped packets   | : | 0 | 0 pps |
| RL-dropped bytes     | : | 0 | 0 bps |
| RED-dropped packets  | : | 0 | 0 pps |
| Low                  | : | 0 | 0 pps |
| Medium-low           | : | 0 | 0 pps |
| Medium-high          | : | 0 | 0 pps |
| High                 | : | 0 | 0 pps |
| RED-dropped bytes    | : | 0 | 0 bps |
| Low                  | : | 0 | 0 bps |
| Medium-low           | : | 0 | 0 bps |
| Medium-high          | : | 0 | 0 bps |
| High                 | : | 0 | 0 bps |

## Queue: 3, Forwarding classes: nc

```

Queued:
 Packets : 22231 482 pps
 Bytes : 11849123 2057600 bps
Transmitted:
 Packets : 22231 482 pps
 Bytes : 11849123 2057600 bps
Tail-dropped packets : 0 0 pps
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
 Low : 0 0 pps
 Medium-low : 0 0 pps
 Medium-high : 0 0 pps
 High : 0 0 pps
RED-dropped bytes : 0 0 bps
 Low : 0 0 bps
 Medium-low : 0 0 bps
 Medium-high : 0 0 bps
 High : 0 0 bps

```

## show interfaces xe

**Syntax** `show interfaces device-name:type-fpc/pic/port`  
`<brief | detail | extensive | terse>`  
`<descriptions>`  
`<media>`  
`<routing-instance (all | instance-name)>`  
`<snmp-index snmp-index>`  
`<statistics>`

**Release Information** Command introduced in Junos OS Release 11.1 for the QFX Series.  
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Display status information about the specified 10-Gigabit Ethernet interface. This command does not display statistics for routed VLAN interfaces.

**Options** *device-name:type-fpc/pic/port*—(QFabric systems only) The device name is either the serial number or the alias of the QFabric system component, such as a Node device, Interconnect device, or QFabric infrastructure. The name must contain a maximum of 128 characters and not contain any colons.

**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.

**routing-instance (all | *instance-name*)**—(Optional) Display the name of an individual routing instance or display all routing instances.

**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

### Release History Table

| Release     | Description                                                                                                                                |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 14.1X53-D40 | <b>Bucket drops</b> —Starting in Junos OS Release 14.1X53-D40, the number of packets dropped due to policers configured for the interface. |

### Related Documentation

- [Monitoring Interface Status and Traffic on page 65](#)
- [Troubleshooting Network Interfaces on page 66](#)
- [Troubleshooting an Aggregated Ethernet Interface on page 114](#)
- *Junos OS Network Interfaces Library for Routing Devices*

**List of Sample Output** [show interfaces on page 399](#)  
[show interfaces \(Asymmetric Flow Control\) on page 400](#)  
[show interfaces brief on page 400](#)  
[show interfaces detail on page 400](#)  
[show interfaces detail \(Asymmetric Flow Control\) on page 402](#)  
[show interfaces extensive on page 403](#)  
[show interfaces extensive \(Asymmetric Flow Control\) on page 405](#)  
[show interfaces terse on page 407](#)  
[show interfaces \(QFabric System\) on page 407](#)

**Output Fields** [Table 38 on page 392](#) lists the output fields for the **show interfaces xe** command. Output fields are listed in the approximate order in which they appear.

**Table 38: show interfaces xe Output Fields**

| Field Name                | Field Description                                                                                                                                                                             | Level of Output              |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Physical Interface</b> |                                                                                                                                                                                               |                              |
| <b>Physical interface</b> | Name of the physical interface.                                                                                                                                                               | All levels                   |
| <b>Enabled</b>            | State of the interface.                                                                                                                                                                       | All levels                   |
| <b>Interface index</b>    | Index number of the physical interface, which reflects its initialization sequence.                                                                                                           | <b>detail extensive none</b> |
| <b>SNMP ifIndex</b>       | SNMP index number for the physical interface.                                                                                                                                                 | <b>detail extensive none</b> |
| <b>Generation</b>         | Unique number for use by Juniper Networks technical support only.                                                                                                                             | <b>detail extensive</b>      |
| <b>Link-level type</b>    | Encapsulation being used on the physical interface.                                                                                                                                           | All levels                   |
| <b>MTU</b>                | Maximum transmission unit size on the physical interface.                                                                                                                                     | All levels                   |
| <b>Speed</b>              | Speed at which the interface is running.                                                                                                                                                      | All levels                   |
| <b>Duplex</b>             | Duplex mode of the interface, either <b>Full-Duplex</b> or <b>Half-Duplex</b> .                                                                                                               | All levels                   |
| <b>Loopback</b>           | Loopback status: <b>Enabled</b> or <b>Disabled</b> . If loopback is enabled, type of loopback: <b>Local</b> or <b>Remote</b> .                                                                | All levels                   |
| <b>Source filtering</b>   | Source filtering status: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                  | All levels                   |
| <b>LAN-PHY mode</b>       | 10-Gigabit Ethernet interface operating in Local Area Network Physical Layer Device (LAN PHY) mode. LAN PHY allows 10-Gigabit Ethernet wide area links to use existing Ethernet applications. | All levels                   |
| <b>Unidirectional</b>     | Unidirectional link mode status for 10-Gigabit Ethernet interface: <b>Enabled</b> or <b>Disabled</b> for parent interface; <b>Rx-only</b> or <b>Tx-only</b> for child interfaces.             | All levels                   |
| <b>Flow control</b>       | Flow control status: <b>Enabled</b> or <b>Disabled</b> .<br><br><b>NOTE:</b> This field is only displayed if asymmetric flow control is not configured.                                       | All levels                   |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Level of Output              |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Configured-flow-control</b> | <p>Configured flow control for the interface transmit buffers (<b>tx-buffers</b>) and receive buffers (<b>rx-buffers</b>):</p> <ul style="list-style-type: none"> <li><b>tx-buffers</b>—<b>On</b> if the interface is configured to respond to Ethernet PAUSE messages received from the connected peer.<br/><b>Off</b> if the interface is not configured to respond to received PAUSE messages.</li> <li><b>rx-buffers</b>—<b>On</b> if the interface is configured to generate and send Ethernet PAUSE messages to the connected peer.<br/><b>Off</b> if the interface is not configured to generate and send PAUSE messages.</li> </ul> <p><b>NOTE:</b> This field is only displayed if asymmetric flow control is configured.</p> | All levels                   |
| <b>Auto-negotiation</b>        | Autonegotiation status: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels                   |
| <b>Remote-fault</b>            | <p>Remote fault status:</p> <ul style="list-style-type: none"> <li><b>Online</b>—Autonegotiation is manually configured as online.</li> <li><b>Offline</b>—Autonegotiation is manually configured as offline.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | All levels                   |
| <b>Device flags</b>            | Information about the physical device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels                   |
| <b>Interface flags</b>         | Information about the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | All levels                   |
| <b>Link flags</b>              | Information about the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels                   |
| <b>Wavelength</b>              | Configured wavelength, in nanometers (nm).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | All levels                   |
| <b>Frequency</b>               | Frequency associated with the configured wavelength, in terahertz (THz).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | All levels                   |
| <b>CoS queues</b>              | Number of CoS queues configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>detail extensive none</b> |
| <b>Schedulers</b>              | Number of CoS schedulers configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>extensive</b>             |
| <b>Hold-times</b>              | Current interface hold-time up and hold-time down, in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive</b>      |
| <b>Current address</b>         | Configured MAC address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive none</b> |
| <b>Hardware address</b>        | Hardware MAC address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive none</b> |
| <b>Last flapped</b>            | Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2008-01-16 10:52:40 UTC (3d 22:58 ago)</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive none</b> |
| <b>Input Rate</b>              | Input rate in bits per second (bps) and packets per second (pps).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | None specified               |
| <b>Output Rate</b>             | Output rate in bps and pps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | None specified               |
| <b>Statistics last cleared</b> | Time when the statistics for the interface were last set to zero.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive</b>      |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Level of Output         |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Traffic statistics</b> | <p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> <p><b>NOTE:</b> The bandwidth bps counter is not enabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive</b> |
| <b>Input errors</b>       | <p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Bucket drops</b>—Starting in Junos OS Release 14.1X53-D40, the number of packets dropped due to policers configured for the interface.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle.</li> <li>• <b>L3 incompletes</b>—Number of incoming packets discarded because they failed Layer 3 sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored if you configure the <b>ignore-l3-incompletes</b> statement.</li> <li>• <b>L2 channel errors</b>—Number of times the software did not find a valid logical interface for an incoming frame.</li> <li>• <b>L2 mismatch timeouts</b>—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul> | <b>detail extensive</b> |



Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                      | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Level of Output         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Output errors</b>            | <p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Collisions</b>—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.</li> <li>• <b>Aged packets</b>—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>HS link CRC errors</b>—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> <li>• <b>Bucket drops</b>—Number of packets dropped due to policers configured for the interface.</li> </ul> | <b>detail extensive</b> |
| <b>Egress queues</b>            | Total number of egress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive</b> |
| <b>Queue counters (Egress)</b>  | <p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive</b> |
| <b>Queue Number</b>             | The CoS queue number and the forwarding classes mapped to the queue number. The <b>Mapped forwarding class</b> column lists the forwarding classes mapped to each CoS queue.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail extensive</b> |
| <b>Ingress queues</b>           | Total number of ingress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>extensive</b>        |
| <b>Queue counters (Ingress)</b> | <p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>extensive</b>        |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                              | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of Output              |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Active alarms and Active defects</b> | <p>Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the switch configuration, an alarm can ring the red or yellow alarm bell on the switch, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value <b>None</b> or <b>Link</b>.</p> <ul style="list-style-type: none"> <li>• <b>None</b>—There are no active defects or alarms.</li> <li>• <b>Link</b>—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive none</b> |
| <b>PCS statistics</b>                   | Physical Coding Sublayer (PCS) fault conditions from the LAN PHY device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail extensive</b>      |
| <b>MAC statistics</b>                   | <p>Receive and Transmit statistics reported by the PIC's MAC subsystem.</p> <ul style="list-style-type: none"> <li>• <b>Total octets</b> and <b>total packets</b>—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type.</li> <li>• <b>Unicast packets</b>, <b>Broadcast packets</b>, and <b>Multicast packets</b>—Number of unicast, broadcast, and multicast packets.</li> <li>• <b>CRC/Align errors</b>—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).</li> <li>• <b>FIFO error</b>—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>MAC control frames</b>—Number of MAC control frames.</li> <li>• <b>MAC pause frames</b>—Number of MAC control frames with <b>pause</b> operational code.</li> <li>• <b>Oversized frames</b>—Number of packets that exceeds the configured MTU.</li> <li>• <b>Jabber frames</b>—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.</li> <li>• <b>Fragment frames</b>—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.</li> <li>• <b>VLAN tagged frames</b>—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not. This counter is not supported on EX Series switches and is always displayed as 0.</li> <li>• <b>Code violations</b>—Number of times an event caused the PHY to indicate "Data reception error" or "invalid data symbol error."</li> </ul> | <b>extensive</b>             |
| <b>Filter statistics</b>                | Receive and Transmit statistics reported by the PIC's MAC address filter subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>extensive</b>             |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                  | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Level of Output |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Autonegotiation information | <p>Information about link autonegotiation.</p> <ul style="list-style-type: none"> <li>• <b>Negotiation status:</b> <ul style="list-style-type: none"> <li>• <b>Incomplete</b>—Ethernet interface has the speed or link mode configured.</li> <li>• <b>No autonegotiation</b>—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.</li> <li>• <b>Complete</b>—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> </ul> </li> <li>• <b>Link partner status</b>—OK when the Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> <li>• <b>Link partner:</b> <ul style="list-style-type: none"> <li>• <b>Link mode</b>—Depending on the capability of the attached Ethernet device, either <b>Full-duplex</b> or <b>Half-duplex</b>.</li> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Fast Ethernet interfaces, the type is <b>None</b>. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive).</li> <li>• <b>Remote fault</b>—Remote fault information from the link partner—<b>Failure</b> indicates a receive link error. <b>OK</b> indicates that the link partner is receiving. <b>Negotiation error</b> indicates a negotiation error. <b>Offline</b> indicates that the link partner is going offline.</li> </ul> </li> <li>• <b>Local resolution:</b> <ul style="list-style-type: none"> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive). For asymmetric <b>PAUSE</b>, shows if the <b>PAUSE</b> transmit and <b>PAUSE</b> receive states on the interface are <b>enable</b> or <b>disable</b>.</li> <li>• <b>Remote fault</b>—Remote fault information. <b>Link OK</b> (no error detected on receive), <b>Offline</b> (local interface is offline), and <b>Link Failure</b> (link error detected on receive).</li> </ul> </li> </ul> | extensive       |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name                                    | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Level of Output              |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Packet Forwarding Engine configuration</b> | Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> <li><b>Destination slot</b>—FPC slot number.</li> <li><b>CoS transmit queue</b>—Queue number and its associated user-configured forwarding class name.</li> <li><b>Bandwidth %</b>—Percentage of bandwidth allocated to the queue.</li> <li><b>Bandwidth bps</b>—Bandwidth allocated to the queue (in bps).</li> <li><b>Buffer %</b>—Percentage of buffer space allocated to the queue.</li> <li><b>Buffer usec</b>—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.</li> <li><b>Priority</b>—Queue priority: <b>low</b> or <b>high</b>.</li> <li><b>Limit</b>—Displayed if rate limiting is configured for the queue. Possible values are <b>none</b> and <b>exact</b>. If <b>exact</b> is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If <b>none</b> is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.</li> </ul> | <b>extensive</b>             |
| <b>Logical Interface</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                              |
| <b>Logical interface</b>                      | Name of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | All levels                   |
| <b>Index</b>                                  | Index number of the logical interface, which reflects its initialization sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive none</b> |
| <b>SNMP ifIndex</b>                           | SNMP interface index number for the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive none</b> |
| <b>Generation</b>                             | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive</b>      |
| <b>Flags</b>                                  | Information about the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | All levels                   |
| <b>Encapsulation</b>                          | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | All levels                   |
| <b>Protocol</b>                               | Protocol family.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>detail extensive none</b> |
| <b>Traffic statistics</b>                     | Number and rate of bytes and packets received (input) and transmitted (output) on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail extensive</b>      |
| <b>IPv6 transit statistics</b>                | If IPv6 statics tracking is enabled, number of IPv6 bytes and packets received and transmitted on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>extensive</b>             |
| <b>Local statistics</b>                       | Number and rate of bytes and packets destined to and from the switch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>extensive</b>             |
| <b>Transit statistics</b>                     | Number and rate of bytes and packets transiting the switch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>extensive</b>             |
| <b>Generation</b>                             | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive</b>      |
| <b>Route Table</b>                            | Route table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive none</b> |

Table 38: show interfaces xe Output Fields (*continued*)

| Field Name              | Field Description                                                                                                                                                                                                                                                                                                                                                                                  | Level of Output              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Input Filters</b>    | Names of any input filters applied to this interface.                                                                                                                                                                                                                                                                                                                                              | <b>detail extensive</b>      |
| <b>Output Filters</b>   | Names of any output filters applied to this interface.                                                                                                                                                                                                                                                                                                                                             | <b>detail extensive</b>      |
| <b>Flags</b>            | Information about protocol family flags.<br><br>If unicast Reverse Path Forwarding (uRPF) is explicitly configured on the specified interface, the uRPF flag appears. If uRPF was configured on a different interface (and therefore is enabled on all switch interfaces) but was not explicitly configured on the specified interface, the uRPF flag does not appear even though uRPF is enabled. | <b>detail extensive</b>      |
| <b>Addresses, Flags</b> | Information about the address flags.                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive none</b> |
| <i>protocol-family</i>  | Protocol family configured on the logical interface. If the protocol is <code>inet</code> , the IP address of the interface is also displayed.                                                                                                                                                                                                                                                     | <b>brief</b>                 |
| <b>Flags</b>            | Information about the address flag.                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive none</b> |
| <b>Destination</b>      | IP address of the remote side of the connection.                                                                                                                                                                                                                                                                                                                                                   | <b>detail extensive none</b> |
| <b>Local</b>            | IP address of the logical interface.                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive none</b> |
| <b>Broadcast</b>        | Broadcast address of the logical interface.                                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive none</b> |
| <b>Generation</b>       | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive</b>      |

## Sample Output

### show interfaces

```

user@switch> show interfaces xe-0/0/1
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Interface index: 49195, SNMP ifIndex: 591
 Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
 Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
 Disabled,
 Flow control: Disabled
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 12 supported, 12 maximum usable queues
 Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
 Last flapped : 2011-06-01 00:42:03 PDT (00:02:42 ago)
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 Active alarms : None
 Active defects : None

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523)
 Flags: SNMP-Traps 0x0 Encapsulation: ENET2
 Input packets : 0

```

```
Output packets: 0
Protocol eth-switch, MTU: 0
Flags: Trunk-Mode
```

## show interfaces (Asymmetric Flow Control)

```
user@switch> show interfaces xe-0/0/1
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Interface index: 49195, SNMP ifIndex: 591
 Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
 Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
 Disabled,
 Configured-flow-control tx-buffers: off rx-buffers: on
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 12 supported, 12 maximum usable queues
 Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
 Last flapped : 2011-06-01 00:42:03 PDT (00:02:42 ago)
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 Active alarms : None
 Active defects : None

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523)
 Flags: SNMP-Traps 0x0 Encapsulation: ENET2
 Input packets : 0
 Output packets: 0
 Protocol eth-switch, MTU: 0
 Flags: Trunk-Mode
```

## show interfaces brief

```
user@switch> show interfaces xe-0/0/1 brief
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Loopback: Disabled,
 Source filtering: Disabled, Flow control: Enabled
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None

Logical interface xe-0/0/1.0
 Flags: SNMP-Traps Encapsulation: ENET2
 eth-switch
```

## show interfaces detail

```
user@switch> show interfaces xe-0/0/1 detail
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Interface index: 49195, SNMP ifIndex: 591, Generation: 169
 Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
 Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
 Disabled,
 Flow control: Disabled
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 12 supported, 12 maximum usable queues
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
```

```

Last flapped : 2011-06-01 00:42:03 PDT (00:02:50 ago)
Statistics last cleared: 2011-06-01 00:44:39 PDT (00:00:14 ago)
Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Egress queues: 12 supported, 9 in use
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 0 0 0
 1 fc7 0 0 0
 2 no-loss 0 0 0
 3 fcoe 0 0 0
 4 fc4 0 0 0
 5 fc5 0 0 0
 6 fc6 0 0 0
 7 network-cont 0 0 0
 8 mcast 0 0 0

Queue number: Mapped forwarding classes
 0 best-effort
 1 fc7
 2 no-loss
 3 fcoe
 4 fc4
 5 fc5
 6 fc6
 7 network-control
 8 mcast
Active alarms : None
Active defects : None

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523) (Generation 143)
Flags: SNMP-Traps 0x0 Encapsulation: ENET2
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps

```

```

Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol eth-switch, MTU: 0, Generation: 170, Route table: 0
Flags: Trunk-Mode

```

### show interfaces detail (Asymmetric Flow Control)

```

user@switch> show interfaces xe-0/0/1 detail
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Interface index: 49195, SNMP ifIndex: 591, Generation: 169
 Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
 Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
 Disabled,
 Configured-flow-control tx-buffers: off rx-buffers: on
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 12 supported, 12 maximum usable queues
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
 Last flapped : 2011-06-01 00:42:03 PDT (00:02:50 ago)
 Statistics last cleared: 2011-06-01 00:44:39 PDT (00:00:14 ago)
 Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes: 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
 IPv6 transit statistics:
 Input bytes : 0
 Output bytes: 0
 Input packets: 0
 Output packets: 0
 Egress queues: 12 supported, 9 in use
 Queue counters:
 Queued packets Transmitted packets Dropped packets

 0 best-effort 0 0 0
 1 fc7 0 0 0
 2 no-loss 0 0 0
 3 fcoe 0 0 0
 4 fc4 0 0 0
 5 fc5 0 0 0
 6 fc6 0 0 0
 7 network-cont 0 0 0
 8 mcast 0 0 0

 Queue number: Mapped forwarding classes
 0 best-effort
 1 fc7
 2 no-loss
 3 fcoe
 4 fc4
 5 fc5
 6 fc6

```



```

7 network-control
8 mcast
Active alarms : None
Active defects : None

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523) (Generation 143)
Flags: SNMP-Traps 0x0 Encapsulation: ENET2
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
Protocol eth-switch, MTU: 0, Generation: 170, Route table: 0
Flags: Trunk-Mode

```

#### show interfaces extensive

```

user@switch> show interfaces xe-0/0/1 extensive
Physical interface: xe-0/0/1, Enabled, Physical link is Up
Interface index: 49195, SNMP ifIndex: 591, Generation: 169
Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
Disabled,
Flow control: Disabled
Device flags : Present Running
Interface flags: SNMP-Traps Internal: 0x0
Link flags : None
CoS queues : 12 supported, 12 maximum usable queues
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
Last flapped : 2011-06-01 00:42:03 PDT (00:03:08 ago)
Statistics last cleared: 2011-06-01 00:44:39 PDT (00:00:32 ago)
Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
IPv6 transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Bucket drops: 0, Policed
discards: 0, L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
FIFO errors: 0, Resource errors: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0, Bucket
drops: 0
Egress queues: 12 supported, 9 in use

```

| Queue counters: | Queued packets | Transmitted packets | Dropped packets |
|-----------------|----------------|---------------------|-----------------|
| 0 best-effort   | 0              | 0                   | 0               |
| 1 fc7           | 0              | 0                   | 0               |
| 2 no-loss       | 0              | 0                   | 0               |
| 3 fcoe          | 0              | 0                   | 0               |
| 4 fc4           | 0              | 0                   | 0               |
| 5 fc5           | 0              | 0                   | 0               |
| 6 fc6           | 0              | 0                   | 0               |
| 7 network-cont  | 0              | 0                   | 0               |
| 8 mcast         | 0              | 0                   | 0               |

| Queue number: | Mapped forwarding classes |
|---------------|---------------------------|
| 0             | best-effort               |
| 1             | fc7                       |
| 2             | no-loss                   |
| 3             | fcoe                      |
| 4             | fc4                       |
| 5             | fc5                       |
| 6             | fc6                       |
| 7             | network-control           |
| 8             | mcast                     |

Active alarms : None

Active defects : None

| MAC statistics:    | Receive | Transmit |
|--------------------|---------|----------|
| Total octets       | 0       | 0        |
| Total packets      | 0       | 0        |
| Unicast packets    | 0       | 0        |
| Broadcast packets  | 0       | 0        |
| Multicast packets  | 0       | 0        |
| CRC/Align errors   | 0       | 0        |
| FIFO errors        | 0       | 0        |
| MAC control frames | 0       | 0        |
| MAC pause frames   | 0       | 0        |
| Oversized frames   | 0       |          |
| Jabber frames      | 0       |          |
| Fragment frames    | 0       |          |
| VLAN tagged frames | 0       |          |
| Code violations    | 0       |          |

MAC Priority Flow Control Statistics:

|              |   |   |
|--------------|---|---|
| Priority : 0 | 0 | 0 |
| Priority : 1 | 0 | 0 |
| Priority : 2 | 0 | 0 |
| Priority : 3 | 0 | 0 |
| Priority : 4 | 0 | 0 |
| Priority : 5 | 0 | 0 |
| Priority : 6 | 0 | 0 |
| Priority : 7 | 0 | 0 |

Filter statistics:

|                      |   |
|----------------------|---|
| Input packet count   | 0 |
| Input packet rejects | 0 |
| Input DA rejects     | 0 |
| Input SA rejects     | 0 |

```

Output packet count 0
Output packet pad count 0
Output packet error count 0
CAM destination filters: 1, CAM source filters: 0
Packet Forwarding Engine configuration:
 Destination slot: 0
CoS information:
 Direction : Output
 CoS transmit queue Bandwidth Buffer Priority
Limit
 0 best-effort 75 7500000000 75 0 low
none
 7 network-control 5 500000000 5 0 low
none
 8 mcast 20 2000000000 20 0 low
none

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523) (Generation 143)
Flags: SNMP-Traps 0x0 Encapsulation: ENET2
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
Protocol eth-switch, MTU: 0, Generation: 170, Route table: 0
Flags: Trunk-Mode

```

### show interfaces extensive (Asymmetric Flow Control)

```

user@switch> show interfaces xe-0/0/1 extensive
Physical interface: xe-0/0/1, Enabled, Physical link is Up
 Interface index: 49195, SNMP ifIndex: 591, Generation: 169
 Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU
 Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
 Disabled,
 Configured-flow-control tx-buffers: off rx-buffers: on
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x0
 Link flags : None
 CoS queues : 12 supported, 12 maximum usable queues
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:1d:b5:f7:4e:e1, Hardware address: 00:1d:b5:f7:4e:e1
 Last flapped : 2011-06-01 00:42:03 PDT (00:03:08 ago)
 Statistics last cleared: 2011-06-01 00:44:39 PDT (00:00:32 ago)
Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
IPv6 transit statistics:

```

```

Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Bucket drops: 0, Policed
discards: 0, L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
FIFO errors: 0, Resource errors: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0, Bucket
drops: 0
Egress queues: 12 supported, 9 in use
Queue counters: Queued packets Transmitted packets Dropped packets

0 best-effort 0 0 0
1 fc7 0 0 0
2 no-loss 0 0 0
3 fcoe 0 0 0
4 fc4 0 0 0
5 fc5 0 0 0
6 fc6 0 0 0
7 network-cont 0 0 0
8 mcast 0 0 0

Queue number: Mapped forwarding classes
0 best-effort
1 fc7
2 no-loss
3 fcoe
4 fc4
5 fc5
6 fc6
7 network-control
8 mcast
Active alarms : None
Active defects : None
MAC statistics: Receive Transmit
Total octets 0 0
Total packets 0 0
Unicast packets 0 0
Broadcast packets 0 0
Multicast packets 0 0
CRC/Align errors 0 0
FIFO errors 0 0
MAC control frames 0 0
MAC pause frames 0 0
Oversized frames 0
Jabber frames 0
Fragment frames 0
VLAN tagged frames 0
Code violations 0
MAC Priority Flow Control Statistics:

```

```

Priority : 0 0 0
Priority : 1 0 0
Priority : 2 0 0
Priority : 3 0 0
Priority : 4 0 0
Priority : 5 0 0
Priority : 6 0 0
Priority : 7 0 0
Filter statistics:
 Input packet count 0
 Input packet rejects 0
 Input DA rejects 0
 Input SA rejects 0
 Output packet count 0
 Output packet pad count 0
 Output packet error count 0
 CAM destination filters: 1, CAM source filters: 0
Packet Forwarding Engine configuration:
 Destination slot: 0
CoS information:
 Direction : Output
 CoS transmit queue Bandwidth Buffer Priority Limit
 % bps % usec
0 best-effort 75 7500000000 75 0 low none
7 network-control 5 500000000 5 0 low none
8 mcast 20 2000000000 20 0 low none

Logical interface xe-0/0/1.0 (Index 73) (SNMP ifIndex 523) (Generation 143)
Flags: SNMP-Traps 0x0 Encapsulation: ENET2
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
Protocol eth-switch, MTU: 0, Generation: 170, Route table: 0
Flags: Trunk-Mode

```

### show interfaces terse

```

user@switch> show interfaces xe-0/0/1 terse
Interface Admin Link Proto Local Remote

xe-0/0/1 up up
xe-0/0/1.0 up up eth-switch

```

### show interfaces (QFabric System)

```

user@switch> show interfaces node1:xe-0/0/0
Physical interface: node1:xe-0/0/0, Enabled, Physical link is Down
Interface index: 129, SNMP ifIndex: 2884086
Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Duplex: Full-Duplex, BPDU

```

```
Error: None, MAC-REWRITE Error: None,
Loopback: Disabled, Source filtering: Disabled, Flow control: Enabled
Interface flags: Internal: 0x4000
CoS queues : 8 supported, 8 maximum usable queues
Current address: 02:00:09:03:00:00, Hardware address: 02:00:09:03:00:00
Last flapped : Never
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
```

## CHAPTER 22

# Ethernet OAM Link Fault Management Operational Command

- `show oam ethernet link-fault-management`

## show oam ethernet link-fault-management

|                                 |                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show oam ethernet link-fault-management<br><brief   detail><br><interface-name>                                                                                                                                                                                   |
| <b>Release Information</b>      | Command introduced in Junos OS Release 9.4 for EX Series switches.                                                                                                                                                                                                |
| <b>Description</b>              | Displays Operation, Administration, and Maintenance (OAM) link fault management (LFM) information for Ethernet interfaces.                                                                                                                                        |
| <b>Options</b>                  | <b>brief   detail</b> —(Optional) Display the specified level of output.<br><br><b>interface-name</b> —(Optional) Display link fault management information for the specified Ethernet interface only.                                                            |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 72</a></li> <li>• <a href="#">Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 70</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show oam ethernet link-fault-management brief on page 414</a><br><a href="#">show oam ethernet link-fault-management detail on page 414</a>                                                                                                           |
| <b>Output Fields</b>            | Table 39 on page 410 lists the output fields for the <b>show oam ethernet link-fault-management</b> command. Output fields are listed in the approximate order in which they appear.                                                                              |

Table 39: show oam ethernet link-fault-management Output Fields

| Field Name             | Field Description                                                                                                                                                                                               | Level of Output |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Status</b>          | Indicates the status of the established link. <ul style="list-style-type: none"> <li>• <b>Fail</b>—A link fault condition exists.</li> <li>• <b>Running</b>—A link fault condition does not exist.</li> </ul>   | All levels      |
| <b>Discovery state</b> | State of the discovery mechanism: <ul style="list-style-type: none"> <li>• <b>Passive Wait</b></li> <li>• <b>Send Any</b></li> <li>• <b>Send Local Remote</b></li> <li>• <b>Send Local Remote Ok</b></li> </ul> | All levels      |
| <b>Peer address</b>    | Address of the OAM peer.                                                                                                                                                                                        | All levels      |



Table 39: show oam ethernet link-fault-management Output Fields (*continued*)

| Field Name                       | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of Output |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Flags</b>                     | Information about the interface. <ul style="list-style-type: none"> <li>• <b>Remote-Stable</b>—Indicates remote OAM client acknowledgment of, and satisfaction with local OAM state information. <b>False</b> indicates that remote DTE has either not seen or is unsatisfied with local state information. <b>True</b> indicates that remote DTE has seen and is satisfied with local state information.</li> <li>• <b>Local-Stable</b>—Indicates local OAM client acknowledgment of, and satisfaction with remote OAM state information. <b>False</b> indicates that local DTE either has not seen or is unsatisfied with remote state information. <b>True</b> indicates that local DTE has seen and is satisfied with remote state information.</li> <li>• <b>Remote-State-Valid</b>—Indicates the OAM client has received remote state information found within Local Information TLVs of received Information OAM PDUs. <b>False</b> indicates that OAM client has not seen remote state information. <b>True</b> indicates that the OAM client has seen remote state information.</li> </ul>                                                                              | All levels      |
| <b>Remote loopback status</b>    | Indicates the remote loopback status. An OAM entity can put its remote peer into loopback mode using the Loopback control OAM PDU. In loopback mode, every frame received is transmitted back on the same port (except for OAM PDUs, which are needed to maintain the OAM session).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | All levels      |
| <b>Remote entity information</b> | Remote entity information. <ul style="list-style-type: none"> <li>• <b>Remote MUX action</b>—Indicates the state of the multiplexer functions of the OAM sublayer. Device is forwarding non-OAM PDUs to the lower sublayer or discarding non-OAM PDUs.</li> <li>• <b>Remote parser action</b>—Indicates the state of the parser function of the OAM sublayer. Device is forwarding non-OAM PDUs to higher sublayer, looping back non-OAM PDUs to the lower sublayer, or discarding non-OAM PDUs.</li> <li>• <b>Discovery mode</b>—Indicates whether discovery mode is active or inactive.</li> <li>• <b>Unidirectional mode</b>—Indicates the ability to operate a link in a unidirectional mode for diagnostic purposes.</li> <li>• <b>Remote loopback mode</b>—Indicates whether remote loopback is supported or not supported.</li> <li>• <b>Link events</b>—Indicates whether interpreting link events is supported or not supported on the remote peer.</li> <li>• <b>Variable requests</b>—Indicates whether variable requests are supported or not supported. The Variable Request OAM PDU, is used to request one or more MIB variables from the remote peer.</li> </ul> | All levels      |
| <b>OAM Receive Statistics</b>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |
| <b>Information</b>               | The number of information PDUs received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b>   |
| <b>Event</b>                     | The number of loopback control PDUs received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail</b>   |
| <b>Variable request</b>          | The number of variable request PDUs received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail</b>   |
| <b>Variable response</b>         | The number of variable response PDUs received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail</b>   |
| <b>Loopback control</b>          | The number of loopback control PDUs received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail</b>   |

Table 39: show oam ethernet link-fault-management Output Fields (*continued*)

| Field Name                                         | Field Description                                                                                                                                                                  | Level of Output |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Organization specific</b>                       | The number of vendor organization specific PDUs received.                                                                                                                          | <b>detail</b>   |
| <b>OAM Transmit Statistics</b>                     |                                                                                                                                                                                    |                 |
| <b>Information</b>                                 | The number of information PDUs transmitted.                                                                                                                                        | <b>detail</b>   |
| <b>Event</b>                                       | The number of event notification PDUs transmitted.                                                                                                                                 | <b>detail</b>   |
| <b>Variable request</b>                            | The number of variable request PDUs transmitted.                                                                                                                                   | <b>detail</b>   |
| <b>Variable response</b>                           | The number of variable response PDUs transmitted.                                                                                                                                  | <b>detail</b>   |
| <b>Loopback control</b>                            | The number of loopback control PDUs transmitted.                                                                                                                                   | <b>detail</b>   |
| <b>Organization specific</b>                       | The number of vendor organization specific PDUs transmitted.                                                                                                                       | <b>detail</b>   |
| <b>OAM Received Symbol Error Event information</b> |                                                                                                                                                                                    |                 |
| <b>Events</b>                                      | The number of symbol error event TLVs that have been received after the OAM sublayer was reset.                                                                                    | <b>detail</b>   |
| <b>Window</b>                                      | The symbol error event window in the received PDU.<br><br>The protocol default value is the number of symbols that can be received in one second on the underlying physical layer. | <b>detail</b>   |
| <b>Threshold</b>                                   | The number of errored symbols in the period required for the event to be generated.                                                                                                | <b>detail</b>   |
| <b>Errors in period</b>                            | The number of symbol errors in the period reported in the received event PDU.                                                                                                      | <b>detail</b>   |
| <b>Total errors</b>                                | The number of errored symbols that have been reported in received event TLVs after the OAM sublayer was reset.<br><br>Symbol errors are coding symbol errors.                      | <b>detail</b>   |
| <b>OAM Received Frame Error Event Information</b>  |                                                                                                                                                                                    |                 |
| <b>Events</b>                                      | The number of errored frame event TLVs that have been received after the OAM sublayer was reset.                                                                                   | <b>detail</b>   |
| <b>Window</b>                                      | The duration of the window in terms of the number of 100 ms period intervals.                                                                                                      | <b>detail</b>   |
| <b>Threshold</b>                                   | The number of detected errored frames required for the event to be generated.                                                                                                      | <b>detail</b>   |
| <b>Errors in period</b>                            | The number of detected errored frames in the period.                                                                                                                               | <b>detail</b>   |

Table 39: show oam ethernet link-fault-management Output Fields (*continued*)

| Field Name                                               | Field Description                                                                                                                                                                       | Level of Output |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Total errors</b>                                      | The number of errored frames that have been reported in received event TLVs after the OAM sublayer was reset.<br><br>A frame error is any frame error on the underlying physical layer. | <b>detail</b>   |
| <b>OAM Received Frame Period Error Event Information</b> |                                                                                                                                                                                         |                 |
| <b>Events</b>                                            | The number of frame seconds errors event TLVs that have been received after the OAM sublayer was reset.                                                                                 | <b>detail</b>   |
| <b>Window</b>                                            | The duration of the frame seconds window.                                                                                                                                               | <b>detail</b>   |
| <b>Threshold</b>                                         | The number of frame seconds errors in the period.                                                                                                                                       | <b>detail</b>   |
| <b>Errors in period</b>                                  | The number of frame seconds errors in the period.                                                                                                                                       | <b>detail</b>   |
| <b>Total errors</b>                                      | The number of frame seconds errors that have been reported in received event TLVs after the OAM sublayer was reset.                                                                     | <b>detail</b>   |
| <b>OAM Transmitted Symbol Error Event Information</b>    |                                                                                                                                                                                         |                 |
| <b>Events</b>                                            | The number of symbol error event TLVs that have been transmitted after the OAM sublayer was reset.                                                                                      | <b>detail</b>   |
| <b>Window</b>                                            | The symbol error event window in the transmitted PDU.                                                                                                                                   | <b>detail</b>   |
| <b>Threshold</b>                                         | The number of errored symbols in the period required for the event to be generated.                                                                                                     | <b>detail</b>   |
| <b>Errors in period</b>                                  | The number of symbol errors in the period reported in the transmitted event PDU.                                                                                                        | <b>detail</b>   |
| <b>Total errors</b>                                      | The number of errored symbols reported in event TLVs that have been transmitted after the OAM sublayer was reset.                                                                       | <b>detail</b>   |
| <b>OAM Transmitted Frame Error Event Information</b>     |                                                                                                                                                                                         |                 |
| <b>Events</b>                                            | The number of errored frame event TLVs that have been transmitted after the OAM sublayer was reset.                                                                                     | <b>detail</b>   |
| <b>Window</b>                                            | The duration of the window in terms of the number of 100 ms period intervals.                                                                                                           | <b>detail</b>   |
| <b>Threshold</b>                                         | The number of detected errored frames required for the event to be generated.                                                                                                           | <b>detail</b>   |
| <b>Errors in period</b>                                  | The number of detected errored frames in the period.                                                                                                                                    | <b>detail</b>   |
| <b>Total errors</b>                                      | The number of errored frames that have been detected after the OAM sublayer was reset.                                                                                                  | <b>detail</b>   |

## Sample Output

### show oam ethernet link-fault-management brief

```
user@host> show oam ethernet link-fault-management brief
Interface: ge-0/0/1
Status: Running, Discovery state: Send Any
Peer address: 00:90:69:72:2c:83
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
Remote loopback status: Disabled on local port, Enabled on peer port
Remote entity information:
 Remote MUX action: discarding, Remote parser action: loopback
 Discovery mode: active, Unidirectional mode: unsupported
 Remote loopback mode: supported, Link events: supported
 Variable requests: unsupported
```

### show oam ethernet link-fault-management detail

```
user@host> show oam ethernet link-fault-management detail
Interface: ge-0/0/1
Status: Running, Discovery state: Send Any
Peer address: 00:90:69:0a:07:14
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
OAM receive statistics:
 Information: 186365, Event: 0, Variable request: 0, Variable response: 0
 Loopback control: 0, Organization specific: 0
OAM transmit statistics:
 Information: 186347, Event: 0, Variable request: 0, Variable response: 0
 Loopback control: 0, Organization specific: 0
OAM received symbol error event information:
 Events: 0, Window: 0, Threshold: 0
 Errors in period: 0, Total errors: 0
OAM received frame error event information:
 Events: 0, Window: 0, Threshold: 0
 Errors in period: 0, Total errors: 0
OAM received frame period error event information:
 Events: 0, Window: 0, Threshold: 0
 Errors in period: 0, Total errors: 0
OAM transmitted symbol error event information:
 Events: 0, Window: 0, Threshold: 1
 Errors in period: 0, Total errors: 0
OAM transmitted frame error event information:
 Events: 0, Window: 0, Threshold: 1
 Errors in period: 0, Total errors: 0
Remote entity information:
 Remote MUX action: forwarding, Remote parser action: forwarding
 Discovery mode: active, Unidirectional mode: unsupported
 Remote loopback mode: supported, Link events: supported
 Variable requests: unsupported
```

## CHAPTER 23

# LAGs and LACP Operational Commands

- [show interfaces \(Aggregated Ethernet\)](#)
- [show lacp interfaces](#)
- [show lacp statistics interfaces \(View\)](#)

## show interfaces (Aggregated Ethernet)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>show interfaces ae <i>number</i> &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2X51-D10 for QFX Series switches.</p> <p>Command introduced in Junos OS Release 14.1 for PTX Series Packet Transport Routers.</p>                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | (M Series, T Series, MX Series, and PTX Series routers, and EX Series and QFX Series switches) Display status information about the specified aggregated Fast Ethernet or Gigabit Ethernet interface.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b>ae <i>number</i></b>—Display standard information about the specified aggregated Fast Ethernet or Gigabit Ethernet interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information about the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>List of Sample Output</b>    | <p><a href="#">show interfaces (Aggregated Ethernet) on page 421</a></p> <p><a href="#">show interfaces brief (Aggregated Ethernet) on page 422</a></p> <p><a href="#">show interfaces detail (Aggregated Ethernet) on page 422</a></p> <p><a href="#">show interfaces extensive (Aggregated Ethernet) on page 423</a></p> <p><a href="#">show interfaces extensive (Aggregated Ethernet with VLAN Stacking) on page 424</a></p>                                                                                                                                                               |
| <b>Output Fields</b>            | Table 40 on page 416 lists the output fields for the <b>show interfaces</b> (Aggregated Ethernet) command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                                                                                                             |

Table 40: show interfaces (Aggregated Ethernet) Output Fields

| Field Name         | Field Description                                          | Level of Output |
|--------------------|------------------------------------------------------------|-----------------|
| Physical Interface |                                                            |                 |
| Physical interface | Name of the physical interface and state of the interface. | All levels      |

Table 40: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                             | Level of Output              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Enabled</b>                 | State of the physical interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .                                                                                                                                 | All levels                   |
| <b>Interface index</b>         | Index number of the physical interface, which reflects its initialization sequence.                                                                                                                                                                                           | All levels                   |
| <b>SNMP ifIndex</b>            | SNMP index number for the physical interface.                                                                                                                                                                                                                                 | <b>detail extensive</b> none |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                             | <b>detail extensive</b>      |
| <b>Link-level type</b>         | Encapsulation being used on the physical interface.                                                                                                                                                                                                                           | All levels                   |
| <b>MTU</b>                     | Maximum transmission unit size on the physical interface.                                                                                                                                                                                                                     | All levels                   |
| <b>Speed</b>                   | Speed at which the interface is running.                                                                                                                                                                                                                                      | All levels                   |
| <b>Loopback</b>                | Loopback status: <b>Enabled</b> or <b>Disabled</b> . If loopback is enabled, type of loopback: <b>Local</b> or <b>Remote</b> .                                                                                                                                                | All levels                   |
| <b>Source filtering</b>        | Source filtering status: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                  | All levels                   |
| <b>Flow control</b>            | Flow control status: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                      | All levels                   |
| <b>Minimum links needed</b>    | Number of child links that must be operational for the aggregate interface to be operational.                                                                                                                                                                                 | All levels                   |
| <b>Device flags</b>            | Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .                                                                                                                            | All levels                   |
| <b>Interface flags</b>         | Information about the interface. Possible values are described in the “Interfaces Flags” section under <i>Common Output Fields Description</i> .                                                                                                                              | All levels                   |
| <b>Current address</b>         | Configured MAC address.                                                                                                                                                                                                                                                       | <b>detail extensive</b>      |
| <b>Hardware address</b>        | Hardware MAC address.                                                                                                                                                                                                                                                         | <b>detail extensive</b>      |
| <b>Last flapped</b>            | Date, time, and how long ago the interface went from down to up or from up to down. The format is <b>Last flapped: year-month-day hours:minutes:seconds timezone (hours:minutes:seconds ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> . | <b>detail extensive</b>      |
| <b>Input Rate</b>              | Input rate in bits per second (bps) and packets per second (pps).                                                                                                                                                                                                             | None specified               |
| <b>Output Rate</b>             | Output rate in bps and pps.                                                                                                                                                                                                                                                   | None specified               |
| <b>Statistics last cleared</b> | Time when the statistics for the interface were last set to zero.                                                                                                                                                                                                             | <b>detail extensive</b>      |

Table 40: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

| Field Name                | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Level of Output         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Traffic statistics</b> | <p>Number of and rate at which bytes and packets are received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes and rate, in bps, at which bytes are received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes and rate, in bps, at which bytes are transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets and rate, in pps, at which packets are received on the interface.</li> <li>• <b>Output packets</b>—Number of packets and rate, in pps, at which packets are transmitted on the interface.</li> </ul> <p><b>NOTE:</b> For QFX5100 and EX4600 switches, the input and output packet statistics in packets per second (pps) might not be populated. As a result, these fields might continually display 0.</p>                                                                                                                                                        | <b>detail extensive</b> |
| <b>Input errors</b>       | <p>Input errors on the interface:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of incoming frame aborts and frame check sequence (FCS) errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid FCS.</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that Junos OS does not handle.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul> | <b>detail extensive</b> |
| <b>Output errors</b>      | <p>Output errors on the interface:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b> —Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the PIC is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>        | <b>detail extensive</b> |



Table 40: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of Output              |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>IPv6 transit statistics</b> | Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled. <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> | <b>detail extensive</b>      |
| <b>Queue counters</b>          | CoS queue number and its associated user-configured forwarding class name. <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>                                                                                                                                                     | <b>detail extensive</b>      |
| <b>Logical Interface</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |
| <b>Logical interface</b>       | Name of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All levels                   |
| <b>Index</b>                   | Index number of the logical interface (which reflects its initialization sequence).                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail extensive</b> none |
| <b>SNMP ifIndex</b>            | SNMP interface index number of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>detail extensive</b> none |
| <b>Generation</b>              | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>      |
| <b>Flags</b>                   | Information about the logical interface. Possible values are described in the "Logical Interface Flags Field" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                            | All levels                   |
| <b>VLAN-Tag</b>                | Tag Protocol Identifier (TPID) and VLAN identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                              | All levels                   |
| <b>Demux</b>                   | IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following: <ul style="list-style-type: none"> <li>• <b>Source Family Inet</b></li> <li>• <b>Destination Family Inet</b></li> </ul>                                                                                                                                                                                                                            | <b>detail extensive</b> none |
| <b>Encapsulation</b>           | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | All levels                   |

Table 40: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

| Field Name | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Level of Output              |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Statistics | <p>Information about the number of packets, packets per second, number of bytes, and bytes per second on this aggregate interface.</p> <ul style="list-style-type: none"> <li>• <b>Bundle</b>—Information about input and output bundle rates.</li> </ul> <p><b>NOTE:</b> For QFX5100 and EX4600 switches, the input and output packet statistics in packets per second (pps) might not be populated. As a result, these fields might continually display 0.</p> <ul style="list-style-type: none"> <li>• <b>Link</b>—(<b>detail</b> and <b>extensive</b> only) Information about specific links in the aggregate, including link state and input and output rates.</li> <li>• <b>Adaptive Statistics</b>—(<b>extensive</b> only) Information about adaptive load balancing counter statistics. <ul style="list-style-type: none"> <li>• <b>Adaptive Adjusts</b>—Number of times traffic flow imbalance was corrected by implementation of adaptive load balancing.</li> <li>• <b>Adaptive Scans</b>—Number of times the link utilization on each member link of the AE bundle was scanned by for adaptive load balancing</li> <li>• <b>Adaptive Tolerance</b>—Tolerance level, in percentage, for load imbalance on link utilization on each member link of the AE bundle.</li> <li>• <b>Adaptive Updates</b>—Number of times traffic flow load have been updated on an AE bundle.</li> </ul> </li> <li>• <b>Marker Statistics</b>—(<b>detail</b> and <b>extensive</b> only) Information about 802.3ad marker protocol statistics on the specified links. <ul style="list-style-type: none"> <li>• <b>Marker Rx</b>—Number of valid marker protocol data units (PDUs) received on this aggregation port.</li> <li>• <b>Resp Tx</b>—Number of marker response PDUs transmitted on this aggregation port.</li> <li>• <b>Unknown Rx</b>—Number of frames received that either carry the slow protocols Ethernet type value (43B.4) but contain an unknown PDU, or are addressed to the slow protocols group MAC address (43B.3) but do not carry the slow protocols Ethernet type.</li> <li>• <b>Illegal Rx</b>—Number of frames received that carry the slow protocols Ethernet type value (43B.4) but contain a badly formed PDU or an illegal value of protocol subtype (43B.4).</li> </ul> </li> </ul> | <b>detail extensive none</b> |
| LACP info  | <p>Link Aggregation Control Protocol (LACP) information for each aggregated interface.</p> <ul style="list-style-type: none"> <li>• <b>Role</b> can be one of the following: <ul style="list-style-type: none"> <li>• <b>Actor</b>—Local device participating in LACP negotiation.</li> <li>• <b>Partner</b>—Remote device participating in LACP negotiation.</li> </ul> </li> <li>• <b>System priority</b>—Priority assigned to the system (by management or administrative policy), encoded as an unsigned integer.</li> <li>• <b>System identifier</b>—Actor or partner system ID, encoded as a MAC address.</li> <li>• <b>Port priority</b>—Priority assigned to the port by the actor or partner (by management or administrative policy), encoded as an unsigned integer.</li> <li>• <b>Port number</b>—Port number assigned to the port by the actor or partner, encoded as an unsigned integer.</li> <li>• <b>Port key</b>—Operational key value assigned to the port by the actor or partner, encoded as an unsigned integer.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |

Table 40: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of Output              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| LACP Statistics              | <p>LACP statistics for each aggregated interface.</p> <ul style="list-style-type: none"> <li>• <b>LACP Rx</b>—LACP received counter that increments for each normal hello.</li> <li>• <b>LACP Tx</b>—Number of LACP transmit packet errors logged.</li> <li>• <b>Unknown Rx</b>—Number of unrecognized packet errors logged.</li> <li>• <b>Illegal Rx</b>—Number of invalid packets received.</li> </ul> <p><b>NOTE:</b> For <b>LACP Rx</b> and <b>LACP Tx</b>, Packet count is updated only on snmp timer expiry (30 secs).</p> |                              |
| <i>protocol-family</i>       | Protocol family configured on the logical interface. Possible values are described in the "Protocol Field" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                               | <b>brief</b>                 |
| <b>Protocol</b>              | Protocol family configured on the logical interface. Possible values are described in the "Protocol Field" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                               | <b>detail extensive none</b> |
| <b>MTU</b>                   | Maximum transmission unit size on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail extensive none</b> |
| <b>Maximum labels</b>        | Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive none</b> |
| <b>Generation</b>            | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>      |
| <b>Route Table</b>           | Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail extensive</b>      |
| <b>Flags</b>                 | Information about protocol family flags. Possible values are described in the "Family Flags Field" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                                       | <b>detail extensive none</b> |
| <b>Mac-Validate Failures</b> | Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.                                                                                                                                                                                                                                                                                                                                                                       | <b>detail extensive none</b> |
| <b>Addresses, Flags</b>      | Information about address flags. Possible values are described in the "Addresses Flags" section under <i>Common Output Fields Description</i> .                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail extensive none</b> |
| <b>Destination</b>           | IP address of the remote side of the connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>detail extensive none</b> |
| <b>Local</b>                 | IP address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>detail extensive none</b> |
| <b>Broadcast</b>             | Broadcast address of the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail extensive none</b> |
| <b>Generation</b>            | Unique number for use by Juniper Networks technical support only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail extensive</b>      |

## Sample Output

### show interfaces (Aggregated Ethernet)

```
user@host> show interfaces ae0
```

```

Physical interface: ae0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 59
Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1
Device flags : Present Running
Interface flags: SNMP-Traps 16384
Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0
Last flapped : Never
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)

Logical interface ae0.0 (Index 72) (SNMP ifIndex 60)
Flags: SNMP-Traps 16384 Encapsulation: ENET2
Statistics Packets pps Bytes bps
Bundle:
 Input : 0 0 0 0
 Output: 0 0 0 0
Protocol inet, MTU: 1500
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.100.1/24, Local: 10.100.1.2, Broadcast: 10.100.1.255

```

#### show interfaces brief (Aggregated Ethernet)

```

user@host> show interfaces ae0 brief
Physical interface: ae0, Enabled, Physical link is Up
Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled
Device flags : Present Running
Interface flags: SNMP-Traps 16384

Logical interface ae0.0
Flags: SNMP-Traps 16384 Encapsulation: ENET2
inet 10.100.1.2/24

```

#### show interfaces detail (Aggregated Ethernet)

```

user@host> show interfaces ae0 detail
Physical interface: ae0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 59, Generation: 36
Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1
Device flags : Present Running
Interface flags: SNMP-Traps 16384
Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0
Last flapped : Never
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Queue counters: Queued packets Transmitted packets Dropped packets

0 best-effort 7375 7375 0
1 expedited-fo 0 0 0
2 assured-forw 0 0 0
3 network-cont 2268 2268 0

```

```

Logical interface ae0.0 (Index 72) (SNMP ifIndex 60) (Generation 18)
Flags: SNMP-Traps 16384 Encapsulation: ENET2
Statistics Packets pps Bytes bps
Bundle:
 Input : 0 0 0 0
 Output: 0 0 0 0
Link:
 fe-0/1/0.0
 Input : 0 0 0 0
 Output: 0 0 0 0
 fe-0/1/2.0
 Input : 0 0 0 0
 Output: 0 0 0 0
 fe-0/1/3.0
 Input : 0 0 0 0
 Output: 0 0 0 0
Marker Statistics: Marker Rx Resp Tx Unknown Rx Illegal Rx
fe-0/1/0.0 0 0 0 0
fe-0/1/2.0 0 0 0 0
fe-0/1/3.0 0 0 0 0
Protocol inet, MTU: 1500, Generation: 37, Route table: 0
Flags: Is-Primary, Mac-Validate-Strict
Mac-Validate Failures: Packets: 0, Bytes: 0
 Destination: 10.100.1/24, Local: 10.100.1.2, Broadcast: 10.100.1.255,
 Generation: 49

```

#### show interfaces extensive (Aggregated Ethernet)

```

user@host> show interfaces ae0 extensive
Physical interface: ae0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 59, Generation: 36
Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1
Device flags : Present Running
Interface flags: SNMP-Traps 16384
Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0
Last flapped : Never
Statistics last cleared: Never
Traffic statistics:
 Input bytes : 60 0 bps
 Output bytes : 0 0 bps
 Input packets: 1 0 pps
 Output packets: 0 0 pps
Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
 Policed discards: 0, Resource errors: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
 Resource errors: 0
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 7375 7375 0
 1 expedited-fo 0 0 0
 2 assured-forw 0 0 0
 3 network-cont 2268 2268 0

```

```

Logical interface ae0.0 (Index 73) (SNMP ifIndex 563) (Generation 176)
Flags: Up SNMP-Traps 0x4000 Encapsulation: ENET2
Statistics Packets pps Bytes bps
Bundle:
 Input : 0 0 0 0
 Output: 0 0 0 0
Adaptive Statistics:
 Adaptive Adjusts: 0
 Adaptive Scans : 0
 Adaptive Updates: 0
Link:
 fe-1/0/3.0
 Input : 0 0 0 0
 Output: 0 0 0 0
LACP info: Role System System Port Port Port
 priority identifier priority number key

 fe-1/0/3.0 Actor 127 00:24:dc:85:af:f0 127 2 1
 fe-1/0/3.0 Partner 127 00:23:9c:c3:1f:f0 127 1 1

LACP Statistics: LACP Rx LACP Tx Unknown Rx Illegal Rx
fe-1/0/3.0 3188 3186 0 0
Marker Statistics: Marker Rx Resp Tx Unknown Rx Illegal Rx
fe-1/0/3.0 0 0 0 0
Protocol inet, MTU: 1500, Generation: 224, Route table: 0
Flags: Sendbcst-pkt-to-re
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.40.1.0/30, Local: 10.40.1.1, Broadcast: 10.40.1.3,
Generation: 187
Protocol multiservice, MTU: Unlimited, Generation: 225, Route table: 0
Flags: Is-Primary
Policer: Input: __default_arp_policer__

```

### show interfaces extensive (Aggregated Ethernet with VLAN Stacking)

```

user@host> show interfaces ae0 extensive
Physical interface: ae0, Enabled, Physical link is Up
Interface index: 155, SNMP ifIndex: 48, Generation: 186
Link-level type: 52, MTU: 1518, Speed: 2000mbps, Loopback: Disabled, Source
filtering: Disabled,
Flow control: Disabled, Minimum links needed: 1, Minimum bandwidth needed: 0
Device flags : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Current address: 00:12:1e:19:3f:f0, Hardware address: 00:12:1e:19:3f:f0
Last flapped : Never
Statistics last cleared: Never
Traffic statistics:
Input bytes : 2406875 40152 bps
Output bytes : 1124470 22056 bps
Input packets: 5307 5 pps
Output packets: 13295 21 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

```

Input errors:
 Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
0, Resource errors: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0
Ingress queues: 4 supported, 4 in use
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 0 859777 0
 1 expedited-fo 0 0 0
 2 assured-forw 0 0 0
 3 network-cont 0 0 0

Egress queues: 4 supported, 4 in use
Queue counters: Queued packets Transmitted packets Dropped packets

 0 best-effort 0 1897615 0
 1 expedited-fo 0 0 0
 2 assured-forw 0 0 0
 3 network-cont 0 662505 0

```

Logical interface ae0.451 (Index 69) (SNMP ifIndex 167) (Generation 601)

Flags: SNMP-Traps VLAN-Tag [ 0x8100.451 ] Encapsulation: VLAN-VPLS

| Statistics | Packets | pps | Bytes  | bps  |
|------------|---------|-----|--------|------|
| Bundle:    |         |     |        |      |
| Input :    | 289     | 0   | 25685  | 376  |
| Output:    | 1698    | 4   | 130375 | 3096 |

Link:

ge-1/2/0.451

|         |     |   |       |     |
|---------|-----|---|-------|-----|
| Input : | 289 | 0 | 25685 | 376 |
| Output: | 0   | 0 | 0     | 0   |

ge-1/2/1.451

|         |      |   |        |      |
|---------|------|---|--------|------|
| Input : | 0    | 0 | 0      | 0    |
| Output: | 1698 | 4 | 130375 | 3096 |

| Marker Statistics: | Marker | Rx | Resp | Tx | Unknown | Rx | Illegal | Rx |
|--------------------|--------|----|------|----|---------|----|---------|----|
| ge-1/2/0.451       |        | 0  |      | 0  |         | 0  |         | 0  |
| ge-1/2/1.451       |        | 0  |      | 0  |         | 0  |         | 0  |

Protocol vpls, MTU: 1518, Generation: 849, Route table: 3

Flags: Is-Primary

Logical interface ae0.452 (Index 70) (SNMP ifIndex 170) (Generation 602)

Flags: SNMP-Traps VLAN-Tag [ 0x8100.452 ] Encapsulation: VLAN-VPLS

| Statistics | Packets | pps | Bytes  | bps  |
|------------|---------|-----|--------|------|
| Bundle:    |         |     |        |      |
| Input :    | 293     | 1   | 26003  | 1072 |
| Output:    | 1694    | 3   | 130057 | 2400 |

Link:

ge-1/2/0.452

|         |      |   |        |      |
|---------|------|---|--------|------|
| Input : | 293  | 1 | 26003  | 1072 |
| Output: | 1694 | 3 | 130057 | 2400 |

ge-1/2/1.452

|         |   |   |   |   |
|---------|---|---|---|---|
| Input : | 0 | 0 | 0 | 0 |
| Output: | 0 | 0 | 0 | 0 |

```

Marker Statistics: Marker Rx Resp Tx Unknown Rx Illegal Rx
ge-1/2/0.452 0 0 0 0
ge-1/2/1.452 0 0 0 0
Protocol vpls, MTU: 1518, Generation: 850, Route table: 3
Flags: None
...

```



## show lacp interfaces

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show lacp interfaces<br><interface-name>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Command introduced in Junos OS Release 10.0 for EX Series switches.<br>Command introduced in Junos OS Release 11.1 for the QFX Series.<br>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | Display Link Aggregation Control Protocol (LACP) information about the specified aggregated Ethernet or Gigabit Ethernet interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | none—Display LACP information for all interfaces.<br><br><i>interface-name</i> —(Optional) Display LACP information for the specified interface: <ul style="list-style-type: none"> <li>• Aggregated Ethernet—<i>aex</i></li> <li>• Gigabit Ethernet—<i>ge-fpc/pic/port</i></li> <li>• 10-Gigabit Ethernet—<i>xe-fpc/pic/port</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch</i></li> <li>• <i>Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch</i></li> <li>• <a href="#">Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104</a></li> <li>• <a href="#">Configuring Aggregated Ethernet Links (CLI Procedure)</a></li> <li>• <a href="#">Configuring Link Aggregation on page 101</a></li> <li>• <a href="#">Configuring Aggregated Ethernet LACP (CLI Procedure)</a></li> <li>• <a href="#">Configuring Aggregated Ethernet LACP on page 100</a></li> <li>• <a href="#">Configuring LACP Link Protection of Aggregated Ethernet Interfaces (CLI Procedure)</a></li> <li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP</a></li> <li>• <a href="#">Understanding Aggregated Ethernet Interfaces and LACP on page 97</a></li> <li>• <a href="#">Junos OS Interfaces Fundamentals Configuration Guide</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show lacp interfaces (EX Series Switches) on page 429</a><br><a href="#">show lacp interfaces (QFX Series) on page 430</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Output Fields</b>            | <a href="#">Table 41 on page 428</a> lists the output fields for the <b>show lacp interfaces</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

Table 41: show lacp interfaces Output Fields

| Field Name           | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aggregated interface | Aggregated Ethernet interface name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| LACP State           | <p>LACP state information for each aggregated Ethernet interface:</p> <ul style="list-style-type: none"> <li>For a child interface configured with the <b>force-up</b> statement, LACP state displays <b>FUP</b> along with the interface name.</li> <li><b>Role</b>—Role played by the interface. It can be one of the following: <ul style="list-style-type: none"> <li><b>Actor</b>—Local device participating in the LACP negotiation.</li> <li><b>Partner</b>—Remote device participating in the LACP negotiation.</li> </ul> </li> <li><b>Exp</b>—Expired state. <b>Yes</b> indicates that the actor or partner is in an expired state. <b>No</b> indicates that the actor or partner is not in an expired state.</li> <li><b>Def</b>—Default. <b>Yes</b> indicates that the actor's receive machine is using the default operational partner information, which is administratively configured for the partner. <b>No</b> indicates that the operational partner information in use has been received in an LACP PDU.</li> <li><b>Dist</b>—Distribution of outgoing frames. <b>No</b> indicates that the distribution of outgoing frames on the link is currently disabled and is not expected to be enabled. Otherwise, the value is <b>Yes</b>.</li> <li><b>Col</b>—Collection of incoming frames. <b>Yes</b> indicates that the collection of incoming frames on the link is currently enabled and is not expected to be disabled. Otherwise, the value is <b>No</b>.</li> <li><b>Syn</b>—Synchronization. If the value is <b>Yes</b>, the link is considered to be synchronized. The link has been allocated to the correct link aggregation group, the group has been associated with a compatible aggregator, and the identity of the link aggregation group is consistent with the system ID and operational key information transmitted. If the value is <b>No</b>, the link is not synchronized. The link is currently not in the right aggregation.</li> <li><b>Aggr</b>—Ability of the aggregation port to aggregate (<b>Yes</b>) or to operate only as an individual link (<b>No</b>).</li> <li><b>Timeout</b>—LACP timeout preference. Periodic transmissions of LACP PDUs occur at either a slow or a fast transmission rate, depending upon the expressed LACP timeout preference (<b>Long Timeout</b> or <b>Short Timeout</b>).</li> <li><b>Activity</b>—Actor's or partner's port activity. <b>Passive</b> indicates the port's preference for not transmitting LAC PDUs unless its partner's control value is <b>Active</b>. <b>Active</b> indicates the port's preference to participate in the protocol regardless of the partner's control value.</li> </ul> |

Table 41: show lacp interfaces Output Fields (*continued*)

| Field Name    | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LACP Protocol | <p>LACP protocol information for each aggregated interface:</p> <ul style="list-style-type: none"> <li>Link state (active or standby) indicated in parentheses next to the interface when link protection is configured.</li> <li><b>Receive State</b>—One of the following values: <ul style="list-style-type: none"> <li><b>Current</b>—The state machine receives an LACP PDU and enters the <b>Current</b> state.</li> <li><b>Defaulted</b>—If no LACP PDU is received before the timer for the <b>Current</b> state expires a second time, the state machine enters the <b>Defaulted</b> state.</li> <li><b>Expired</b>—If no LACP PDU is received before the timer for the <b>Current</b> state expires once, the state machine enters the <b>Expired</b> state.</li> <li><b>Initialize</b>—When the physical connectivity of a link changes or a Begin event occurs, the state machine enters the <b>Initialize</b> state.</li> <li><b>LACP Disabled</b>—If the port is operating in half duplex, the operation of LACP is disabled on the port, forcing the state to <b>LACP Disabled</b>. This state is similar to the <b>Defaulted</b> state, except that the port is forced to operate as an individual port.</li> <li><b>Port Disabled</b>—If the port becomes inoperable and a Begin event has not occurred, the state machine enters the <b>Port Disabled</b> state.</li> </ul> </li> <li><b>Transmit State</b>—Transmit state of the state machine. The transmit state is one of the following values: <ul style="list-style-type: none"> <li><b>Fast periodic</b>—Periodic transmissions are enabled at a fast transmission rate.</li> <li><b>No periodic</b>—Periodic transmissions are disabled.</li> <li><b>Periodic timer</b>—Transitory state entered when the periodic timer expires.</li> <li><b>Slow periodic</b>—Periodic transmissions are enabled at a slow transmission rate.</li> </ul> </li> <li><b>Mux State</b>—State of the multiplexer state machine for the aggregation port. The state is one of the following values: <ul style="list-style-type: none"> <li><b>Attached</b>—The multiplexer state machine initiates the process of attaching the port to the selected aggregator.</li> <li><b>Collecting—Yes</b> indicates that the receive function of this link is enabled with respect to its participation in an aggregation. Received frames are passed to the aggregator for collection. <b>No</b> indicates the receive function of this link is not enabled.</li> <li><b>Collecting distributing</b>—Collecting and distributing states are merged together to form a combined state (coupled control). Because independent control is not possible, the coupled control state machine does not wait for the partner to signal that collection has started before enabling both collection and distribution.</li> <li><b>Detached</b>—Process of detaching the port from the aggregator is in progress.</li> <li><b>Distributing—Yes</b> indicates that the transmit function of this link is enabled with respect to its participation in an aggregation. Frames can be passed down from the aggregator's distribution function for transmission. <b>No</b> indicates the transmit function of this link is not enabled.</li> <li><b>Waiting</b>—The multiplexer state machine is in a holding process, awaiting an outcome.</li> </ul> </li> </ul> |

## Sample Output

### show lacp interfaces (EX Series Switches)

```

user@switch> show lacp interfaces ae5
Aggregated interface: ae5
 LACP state: Role Exp Def Dist Col Syn Aggr Timeout Activity
 xe-2/0/7 Actor No No Yes Yes Yes Yes Fast Active
 xe-2/0/7 Partner No No Yes Yes Yes Yes Fast Passive

```

|          |         |    |    |    |     |     |     |      |         |
|----------|---------|----|----|----|-----|-----|-----|------|---------|
| xe-4/0/7 | Actor   | No | No | No | No  | No  | Yes | Fast | Active  |
| xe-4/0/7 | Partner | No | No | No | Yes | Yes | Yes | Fast | Passive |

|                    |               |                |                         |
|--------------------|---------------|----------------|-------------------------|
| LACP protocol:     | Receive State | Transmit State | Mux State               |
| xe-2/0/7(Active)   | Current       | Fast periodic  | Collecting distributing |
| xe-34/0/7(Standby) | Current       | Fast periodic  | Waiting                 |

### show lacp interfaces (QFX Series)

```

user@switch> show lacp interfaces nodegroup1:ae0 extensive
Aggregated interface: nodegroup1:ae0
LACP state: Role Exp Def Dist Col Syn Aggr Timeout Activity

node1:xe-0/0/1FUP Actor No Yes No No No No Yes Fast
Active
node1xe-0/0/1FUP Partner No Yes No No No No Yes Fast
Passive
node2:xe-0/0/2 Actor No Yes No No No No Yes Fast
Active
node2:xe-0/0/2 Partner No Yes No No No No Yes Fast
Passive

```

|              | LACP protocol:           | Receive State | Transmit State | Mux State  |
|--------------|--------------------------|---------------|----------------|------------|
|              | node1:xe-0/0/1FUP        | Current       | Fast periodic  | Collecting |
| distributing | node2:xe-0/0/2           | Current       | Fast periodic  | Collecting |
| distributing | node1:xe-0/0/1 (active)  | Current       | Fast periodic  | Collecting |
| distributing | node2:xe-0/0/2 (standby) | Current       | Fast periodic  | WAITING    |

## show lacp statistics interfaces (View)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <b>show lacp statistics interfaces</b> <i>interface-name</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | <p>Command modified in Release 10.2 of Junos OS.</p> <p>Command introduced in Release 11.1 of Junos OS for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Display Link Aggregation Control Protocol (LACP) statistics about the specified aggregated Ethernet interface or redundant Ethernet interface. If you do not specify an interface name, LACP statistics for all interfaces are displayed.                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <i>interface-name</i> —(Optional) Name of an interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Link Aggregation on page 101</a></li> <li>• <a href="#">Verifying the Status of a LAG Interface on page 113</a></li> <li>• <a href="#">Verifying That LACP Is Configured Correctly and Bundle Members Are Exchanging LACP Protocol Packets on page 113</a></li> <li>• <a href="#">Example: Configuring Link Aggregation Between a QFX Series Product and an Aggregation Switch on page 104</a></li> <li>• <a href="#">Example: Configuring Link Aggregation with LACP Between a QFX Series Product and an Aggregation Switch on page 108</a></li> </ul> |
| <b>List of Sample Output</b>    | <p><a href="#">show lacp statistics interfaces on page 433</a></p> <p><a href="#">show lacp statistics interfaces (QFX Series) on page 433</a></p> <p><a href="#">show lacp statistics interfaces (QFabric Systems) on page 433</a></p>                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Output Fields</b>            | <p><a href="#">Table 42 on page 432</a> lists the output fields for the <b>show lacp statistics interfaces</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 42: show lacp statistics interfaces Output Fields**

| Field Name                  | Field Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aggregated interface</b> | Aggregated interface value.                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>LACP Statistics</b>      | <p>LACP statistics provide the following information:</p> <ul style="list-style-type: none"> <li>• <b>LACP Rx</b>—LACP received counter that increments for each normal hello.</li> <li>• <b>LACP Tx</b>—LACP transmit counter that increments for each normal hello.</li> <li>• <b>Unknown Rx</b>—Number of unrecognized packet errors logged.</li> <li>• <b>Illegal Rx</b>—Number of invalid packets received.</li> </ul> |

## Sample Output

### show lacp statistics interfaces

```
user@host> show lacp statistics interfaces ae0
Aggregated interface: ae0
LACP Statistics: LACP Rx LACP Tx Unknown Rx Illegal Rx
ge-2/0/0 1352 2035 0 0
ge-2/0/1 1352 2056 0 0
ge-2/2/0 1352 2045 0 0
ge-2/2/1 1352 2043 0 0
```

### show lacp statistics interfaces (QFX Series)

```
user@host> show lacp statistics interfaces ae0
Aggregated interface: ae0
LACP Statistics: LACP Rx LACP Tx Unknown Rx Illegal Rx
xe-0/0/2 1352 2035 0 0
xe-0/0/3 1352 2056 0 0
```

### show lacp statistics interfaces (QFabric Systems)

```
user@host> show lacp statistics interfaces nodegroup1:ae0
Aggregated interface: nodegroup1:ae0
LACP Statistics: LACP Rx LACP Tx Unknown Rx Illegal Rx
node1:xe-0/0/2 1352 2035 0 0
node2:xe-0/0/3 1352 2056 0 0
```





## CHAPTER 24

# Redundant Trunk Group Operational Command

- `show redundant-trunk-group`

## show redundant-trunk-group

|                                 |                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <b>show redundant-trunk-group &lt;group-name group-name&gt;</b>                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Command introduced in Junos OS Release 9.0 for EX Series switches.<br>Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.                                                                                                                                                                        |
| <b>Description</b>              | Display information about redundant trunk groups.                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>group-name group-name</b> —Display information about the specified redundant trunk group.                                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery</a></li> <li>• <a href="#">Example: Configuring Redundant Trunk Links for Faster Recovery on page 131</a></li> <li>• <a href="#">Understanding Redundant Trunk Links on page 129</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show redundant-trunk-group group-name Group1 on page 436</a>                                                                                                                                                                                                                                            |
| <b>Output Fields</b>            | <a href="#">Table 43 on page 436</a> lists the output fields for the <b>show redundant-trunk-group</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                             |

**Table 43: show redundant-trunk-group Output Fields**

| Field Name               | Field Description                                                                                                                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Group name</b>        | Name of the redundant trunk port group.                                                                                                                                                                                                                                                  |
| <b>Interface</b>         | Name of an interface belonging to the trunk port group.                                                                                                                                                                                                                                  |
| <b>State</b>             | Operating state of the interface. <ul style="list-style-type: none"> <li>• <b>Up</b> denotes the interface is up.</li> <li>• <b>Down</b> denotes the interface is down.</li> <li>• <b>Pri</b> denotes a primary interface.</li> <li>• <b>Act</b> denotes an active interface.</li> </ul> |
| <b>Time of last flap</b> | Date and time at which the advertised link became unavailable, and then, available again.                                                                                                                                                                                                |
| <b>Flap count</b>        | Total number of flaps since the last switch reboot.                                                                                                                                                                                                                                      |

## Sample Output

### show redundant-trunk-group group-name Group1

```
user@switch> show redundant-trunk-group group-name Group1
```

| Group name | Interface | State | Time of last flap | Flap Count |
|------------|-----------|-------|-------------------|------------|
|------------|-----------|-------|-------------------|------------|

|        |             |            |       |   |
|--------|-------------|------------|-------|---|
| Group1 | ge-0/0/45.0 | UP/Pri/Act | Never | 0 |
|        | ge-0/0/47.0 | UP         | Never | 0 |



## CHAPTER 25

# Resilient Hashing Operational Command

- `show forwarding-options enhanced-hash-key`

## show forwarding-options enhanced-hash-key

|                                 |                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <b>show forwarding-options enhanced-hash-key</b>                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | <p>Command introduced in Junos OS Release 13.2X51-D15 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.</p> <p><b>Fabric Load Balancing Options</b> output fields introduced in Junos OS Release 14.1X53-D10.</p>                                                                                             |
| <b>Description</b>              | <p>Display information about which packet fields are used by the hashing algorithm to make hashing decisions.</p> <p>You can configure the fields that are inspected by the hashing algorithm to make hashing decisions for traffic entering a LAG bundle using the <b>forwarding-options enhanced-hash-key</b> statement.</p>                                        |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring the Fields in the Algorithm Used To Hash LAG Bundle and ECMP Traffic (CLI Procedure) on page 146</a></li> <li>• <a href="#">Understanding the Algorithm Used to Hash LAG Bundle and Egress Next-Hop ECMP Traffic on page 139</a></li> <li>• <a href="#">enhanced-hash-key on page 286</a></li> </ul> |
| <b>List of Sample Output</b>    | <p><a href="#">show forwarding-options enhanced-hash-key (Layer 2 Payload Hash Mode) on page 441</a></p> <p><a href="#">show forwarding-options enhanced-hash-key (Layer 2 Header Hash Mode) on page 442</a></p> <p><a href="#">show forwarding-options enhanced-hash-key (Fabric Load Balancing Options) on page 442</a></p>                                         |
| <b>Output Fields</b>            | <p><a href="#">Table 44 on page 440</a> lists the output fields for the <b>show forwarding-options enhanced-hash-key</b> command. Output fields are listed in the approximate order in which they first appear.</p>                                                                                                                                                   |

**Table 44: show forwarding-options enhanced-hash-key Output Fields**

| Field Name                   | Field Description                                                                                        |
|------------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Hash-Mode</b>             | Current hash mode: Layer 2 header or Layer 2 payload.                                                    |
| <b>Protocol</b>              | Indicates whether the Protocol field is or is not used by the hashing algorithm: Yes or No.              |
| <b>Destination L4 Port</b>   | Indicates whether the Destination L4 Port field is or is not used by the hashing algorithm: Yes or No.   |
| <b>Source L4 Port</b>        | Indicates whether the Source L4 Port field is or is not used by the hashing algorithm: Yes or No.        |
| <b>Destination IPv4 Addr</b> | Indicates whether the Destination IPv4 Addr field is or is not used by the hashing algorithm: Yes or No. |

Table 44: show forwarding-options enhanced-hash-key Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                           |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Source IPv4 Addr</b>        | Indicates whether the Source IPv4 Addr field is or is not used by the hashing algorithm: Yes or No.                                                                                                                         |
| <b>Vlan id</b>                 | Indicates whether the Vlan id field is or is not used by the hashing algorithm: Yes or No.                                                                                                                                  |
| <b>Next Hdr</b>                | Indicates whether the Next Hdr field is or is not used by the hashing algorithm: Yes or No.                                                                                                                                 |
| <b>Destination IPv6 Addr</b>   | Indicates whether the Destination IPv6 Addr field is or is not used by the hashing algorithm: Yes or No.                                                                                                                    |
| <b>Source IPv6 Addr</b>        | Indicates whether the Source IPv6 Addr field is or is not used by the hashing algorithm: Yes or No.                                                                                                                         |
| <b>Ether Type</b>              | Indicates whether the Ether Type field is or is not used by the hashing algorithm: Yes or No.                                                                                                                               |
| <b>Destination MAC Address</b> | Indicates whether the Destination MAC Address field is or is not used by the hashing algorithm: Yes or No.                                                                                                                  |
| <b>Source MAC Address</b>      | Indicates whether the Source MAC Address field is or is not used by the hashing algorithm: Yes or No.                                                                                                                       |
| <b>Load Balancing Method</b>   | Indicates the load balancing method for adaptive load balancing (ALB): flowlet or per-packet.<br><br>The load balancing method is flowlet by default, and can be configured using the <i>fabric-load-balance</i> statement. |
| <b>Fabric Link Scale</b>       | Indicates the fabric link scale, in mbps.                                                                                                                                                                                   |
| <b>Inactivity Interval</b>     | Indicates the fabric load balance inactivity interval, in microseconds (us).<br><br>The inactivity interval is 16 microseconds by default, and can be configured using the <i>inactivity-interval</i> statement.            |
| <b>Hash Region Size/Trunk</b>  | Indicates the hash region size, in buckets per fabric trunk.                                                                                                                                                                |

## Sample Output

### show forwarding-options enhanced-hash-key (Layer 2 Payload Hash Mode)

```
user@switch> show forwarding-options enhanced-hash-key
Slot 0
```

#### Current Hash Settings

```

Hash-Mode : layer2-payload
```

```
inet Hash settings-

inet packet fields
 Protocol : Yes
 Destination L4 Port : Yes
 Source L4 Port : Yes
 Destination IPv4 Addr : Yes
 Source IPv4 Addr : Yes
 Vlan id : No
```

```
inet6 Hash settings-

inet6 packet fields
 Next Hdr : Yes
 Destination L4 Port : Yes
 Source L4 Port : Yes
 Destination IPv6 Addr : Yes
 Source IPv6 Addr : Yes
 Vlan id : No
```

#### show forwarding-options enhanced-hash-key (Layer 2 Header Hash Mode)

```
user@switch> show forwarding-options enhanced-hash-key
Slot 0
```

##### Current Hash Settings

```

Hash-Mode : layer2-header
```

##### layer2 Hash settings-

```

layer2 packet fields
 Ether Type : Yes
 Destination MAC Address : Yes
 Source MAC Address : Yes
 VLAN ID : No
```

#### show forwarding-options enhanced-hash-key (Fabric Load Balancing Options)

```
user@switch> show forwarding-options enhanced-hash-key
<some output removed for brevity>
```

##### Fabric Load Balancing Options

```

Load Balancing Method : Flowlet
Fabric Link Scale : 40960 (mbps)
Inactivity Interval : 16 (us)
Hash Region Size/Trunk : 1024 (buckets)
```



## CHAPTER 26

# Uplink Failure Detection Operational Command

- `show uplink-failure-detection`

## show uplink-failure-detection

|                                 |                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show uplink-failure-detection</code><br><code>&lt;group group-name&gt;</code>                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Command introduced in Junos OS Release 11.1 for EX Series switches.                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Display information about the uplink-failure-detection group, the member interfaces, and their status.                                                                                                                                                                                                              |
| <b>Options</b>                  | <b>none</b> —Display information about all groups configured for uplink failure detection.<br><b>group group-name</b> —(Optional) Display information about the specified group only.                                                                                                                               |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Overview of Uplink Failure Detection on page 153</a></li> <li>• <a href="#">Configuring Interfaces for Uplink Failure Detection on page 155</a></li> <li>• <a href="#">Example: Configuring Interfaces for Uplink Failure Detection on page 156</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show uplink-failure-detection on page 444</a>                                                                                                                                                                                                                                                           |
| <b>Output Fields</b>            | <a href="#">Table 45 on page 444</a> lists the output fields for the <b>show uplink-failure-detection</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                          |

**Table 45: show uplink-failure-detection Output Fields**

| Field Name     | Field Description                                                                                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Group          | Name of the group.                                                                                                                                                                                                            |
| Uplink         | The uplink interface or interfaces configured as link-to-monitor.<br><b>NOTE:</b> The asterisk (*) indicates that the link is up.                                                                                             |
| Downlink       | The downlink interface or interfaces configured as link-to-disable.<br><b>NOTE:</b> The asterisk (*) indicates that the link is up.                                                                                           |
| Failure Action | Status of uplink failure detection: <ul style="list-style-type: none"> <li>• Active—The switch has detected an uplink failure and has brought the downlink down.</li> <li>• Inactive—The uplink or uplinks are up.</li> </ul> |

## Sample Output

### show uplink-failure-detection

```
user@switch> show uplink-failure-detection
```

Group : group1  
Uplink : ge-0/0/0\*  
Downlink : ge-0/0/1\*  
Failure Action : Inactive

Group : group2  
Uplink : ge-0/0/3.0  
Downlink : ge-0/0/4.0  
Failure Action : Active

