Junos® OS for EX Series Ethernet Switches

Interfaces for EX9200 Switches

Release
12.3

Published: 2013-04-03

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Release 12.3

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Supported Platforms

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

- EX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

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

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

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

Requesting Technical Support

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

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

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

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

CHAPTER 1

Aggregated Ethernet Overview

Aggregated Ethernet Interfaces Overview

Link aggregation of Ethernet interfaces is defined in the IEEE 802.3ad standard. The Junos implementation of 802.3ad balances traffic across the member links within an aggregated Ethernet bundle based on the Layer 3 information carried in the packet. This implementation uses the same load-balancing algorithm used for per-flow load balancing.

NOTE: For information about configuring circuit cross-connects over aggregated Ethernet, see Circuit and Translational Cross-Connects Overview.

Platform Support for Aggregated Ethernet Interfaces

You configure an aggregated Ethernet virtual link by specifying the link number as a physical device and then associating a set of ports that have the same speed and are in full-duplex mode. The physical interfaces can be Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, Gigabit Ethernet IQ, 10-Gigabit Ethernet IQ, Gigabit Ethernet IQ2 and IQ2-E, or 10-Gigabit Ethernet IQ2 and IQ2-E. Generally, you cannot use a combination of these interfaces within the same aggregated link; however, you can combine Gigabit Ethernet and Gigabit Ethernet IQ interfaces in a single aggregated Ethernet bundle.

The following routers support a maximum of 16 physical interfaces per single aggregated Ethernet bundle:

- M120
- M320
- All MX Series 3D Universal Edge Routers
- All T Series routers

All other routers support a maximum of 8 physical interfaces per aggregated Ethernet bundle.

On M Series and T Series routers, you can create a maximum of 1024 logical interfaces on an aggregated Ethernet interface.

Aggregated Ethernet interfaces can use interfaces from different FPCs, DPCs, PICs, or MPCs.

Configuration Guidelines for Aggregated Ethernet Interfaces

Simple filters are not supported for interfaces in aggregated Ethernet bundles:

- On M Series routers, simple filters are supported in Gigabit Ethernet Enhanced Intelligent Queuing interfaces only, except when the interface is part of an aggregated Ethernet bundle.
- On MX Series routers, simple filters are supported in Enhanced Queuing Dense Port Concentrator (EQ DPC) interfaces only, except when the interface is part of an aggregated Ethernet bundle.

For more information about simple filters, see the Junos OS Class of Service Configuration Guide.

On the aggregated bundle, no IQ-specific capabilities such as MAC accounting, VLAN rewrites, and VLAN queuing are available. For more information about IQ-specific capabilities, see Gigabit Ethernet Accounting and Policing Overview.

Use the **show interfaces *aggregate-interface* extensive** and **show interfaces *aggregate.logical-interface*** commands to show the bandwidth of the aggregate. Also, the SNMP object identifier**ifSpeed/ifHighSpeed** shows the corresponding bandwidth on the aggregate logical interface if it is configured properly.

Aggregated Ethernet interfaces can be either tagged or untagged, with LACP enabled or disabled. Aggregated Ethernet interfaces on MX Series routers support the configuration of **flexible-vlan-tagging**, **native-vlan-id**, and on dual-tagged frames, which consist of the following configuration statements:

- **inner-tag-protocol-id**
- **inner-vlan-id**
- **pop-pop**
- **pop-swap**
- **push-push**
- **swap-push**
- **swap-swap**

In all cases, you must set the number of aggregated Ethernet interfaces on the chassis. You can also set the link speed and the minimum links in a bundle.

Related Documentation

- **inner-tag-protocol-id**
- **inner-vlan-id**

- **pop-pop**
- **pop-swap**
- **push-push**
- **swap-push**
- **swap-swap**
- Gigabit Ethernet Accounting and Policing Overview
- Junos® OS Ethernet Interfaces

Load Balancing and Ethernet Link Aggregation Overview

You can create a link aggregation group (LAG) for a group of Ethernet ports. Layer 2 bridging traffic is load balanced across the member links of this group, making the configuration attractive for congestion concerns as well as for redundancy. You can configure up to 480 LAG bundles on a Juniper Networks MX Series Ethernet Services Router. Each LAG bundle contains up to 16 links.

By default, the hash key mechanism to load-balance frames across LAG interfaces is based on Layer 2 fields (such as frame source and destination address) as well as the input logical interface (unit). The default LAG algorithm is optimized for Layer 2 switching. You can also configure the load balancing hash key for Layer 2 traffic to use fields in the Layer 3 and Layer 4 headers using the **payload** statement, see "Configuring Load Balancing on a LAG Link" on page 34.In a Layer 2 switch, one link is overutilized and other links are underutilized.

Related Documentation

- Configuring Load Balancing on a LAG Link on page 34
- Load Balancing on a LAG Link on page 35
- payload

CHAPTER 2

IP-Directed Broadcast Overview

Understanding Targeted Broadcast

Targeted broadcast is a process of flooding a target subnet with Layer 3 broadcast IP packets originating from a different subnet. The intent of targeted broadcast is to flood the target subnet with the broadcast packets on a LAN interface without broadcasting to the entire network. Targeted broadcast is configured with various options on the egress interface of the router or switch and the IP packets are broadcast only on the LAN (egress) interface. Targeted broadcast helps you implement remote administration tasks such as backups and wake-on LAN (WOL) on a LAN interface, and supports virtual routing and forwarding (VRF) instances.

Regular Layer 3 broadcast IP packets originating from a subnet are broadcast within the same subnet. When these IP packets reach a different subnet, they are forwarded to the Routing Engine (to be forwarded to other applications). Because of this, remote administration tasks such as backups cannot be performed on a particular subnet through another subnet. As a workaround you can enable targeted broadcast, to forward broadcast packets that originate from a different subnet.

Layer 3 broadcast IP packets have a destination IP address that is a valid broadcast address for the target subnet. These IP packets traverse the network in the same way as unicast IP packets until they reach the destination subnet. In the destination subnet, if the receiving router has targeted broadcast enabled on the egress interface, the IP packets are forwarded to an egress interface and the Routing Engine or to an egress interface only. The IP packets are then translated into broadcast IP packets which flood the target subnet only through the LAN interface (if there is no LAN interface, the packets are discarded), and all hosts on the target subnet receive the IP packets. If targeted broadcast is not enabled on the receiving router, the IP packets are treated as regular Layer 3 broadcast IP packets and are forwarded to the Routing Engine. If targeted broadcast is enabled without any options, the IP packets are discarded.

Targeted broadcast can be configured to forward the IP packets only to an egress interface, which is helpful when the router is flooded with packets to process, or to both an egress interface and the Routing Engine.

NOTE: Any firewall filter that is configured on the Routing Engine loopback interface (lo0) cannot be applied to IP packets that are forwarded to the Routing Engine as a result of a targeted broadcast. This is because broadcast packets are forwarded as flood next hop and not as local next hop traffic, and you can only apply a firewall filter to local next hop routes for traffic directed towards the Routing Engine.

Related Documentation

- Configuring Targeted Broadcast on page 43
- targeted-broadcast on page 99

CHAPTER 3

Reverse Path Forwarding

Understanding Unicast Reverse Path Forwarding

IP spoofing can occur during a denial-of-service (DoS) attack. IP spoofing allows an intruder to pass IP packets to a destination as genuine traffic, when in fact the packets are not actually meant for the destination. This type of spoofing is harmful because it consumes the destination's resources.

A unicast reverse-path-forwarding (RPF) check is a tool to reduce forwarding of IP packets that might be spoofing an address. A unicast RPF check performs a route table lookup on an IP packet's source address, and checks the incoming interface. The router or switch determines whether the packet is arriving from a path that the sender would use to reach the destination. If the packet is from a valid path, the router or switch forwards the packet to the destination address. If it is not from a valid path, the router or switch discards the packet. Unicast RPF is supported for the IPv4 and IPv6 protocol families, as well as for the virtual private network (VPN) address family.

NOTE: **Reverse path forwarding is not supported on the interfaces you configure as tunnel sources. This affects only the transit packets exiting the tunnel.**

Related Documentation

- Example: Configuring Unicast Reverse-Path-Forwarding Check

Understanding Multicast Reverse Path Forwarding

Unicast forwarding decisions are typically based on the destination address of the packet arriving at a router. The unicast routing table is organized by destination subnet and mainly set up to forward the packet toward the destination.

In multicast, the router or switch forwards the packet away from the source to make progress along the distribution tree and prevent routing loops. The router's or switch's multicast forwarding state runs more logically by organizing tables based on the reverse

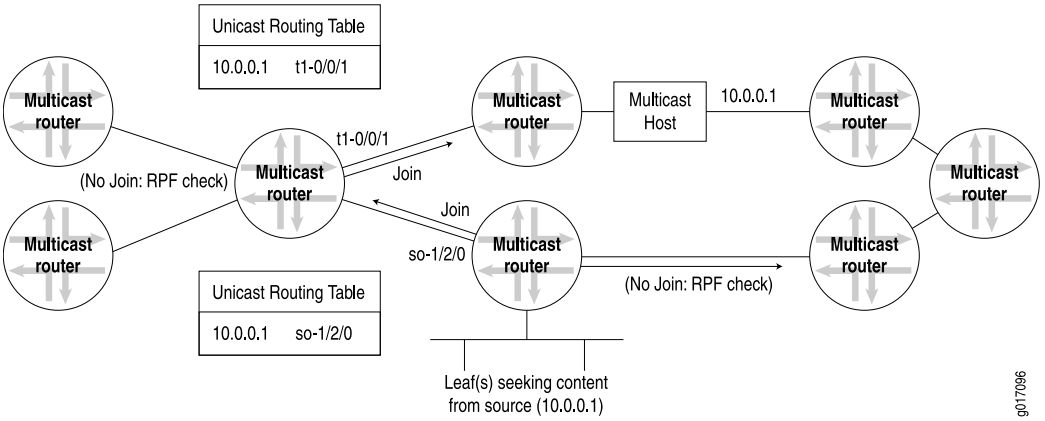
path, from the receiver back to the root of the distribution tree. This process is known as *reverse-path forwarding* (*RPF*).

The router or switch adds a branch to a distribution tree depending on whether the request for traffic from a multicast group passes the reverse-path-forwarding check (RPF check). Every multicast packet received must pass an RPF check before it is eligible to be replicated or forwarded on any interface.

The RPF check is essential for every router's multicast implementation. When a multicast packet is received on an interface, the router or switch interprets the source address in the multicast IP packet as the destination address for a unicast IP packet. The source multicast address is found in the unicast routing table, and the outgoing interface is determined. If the outgoing interface found in the unicast routing table is the same as the interface that the multicast packet was received on, the packet passes the RPF check. Multicast packets that fail the RPF check are dropped because the incoming interface is not on the *shortest path* back to the source.

Figure 1 on page 10 shows how multicast routers can use the unicast routing table to perform an RPF check and how the results obtained at each router determine where join messages are sent.

Figure 1: Multicast Routers and the RPF Check



Routers and switches can build and maintain separate tables for RPF purposes. The router must have some way to determine its RPF interface for the group, which is the interface topologically closest to the root. For greatest efficiency, the distribution tree follows the shortest-path tree topology. The RPF check helps to construct this tree.

RPF Table

The RPF table plays the key role in the multicast router or switch. The RPF table is consulted for every RPF check, which is performed at intervals on multicast packets entering the multicast router. Distribution trees of all types rely on the RPF table to form properly, and the multicast forwarding state also depends on the RPF table.

RPF checks are performed only on unicast addresses to find the upstream interface for the multicast source or RP.

The routing table used for RPF checks can be the same routing table used to forward unicast IP packets, or it can be a separate routing table used only for multicast RPF checks. In either case, the RPF table contains only unicast routes, because the RPF check is performed on the source address of the multicast packet, not the multicast group destination address, and a multicast address is forbidden from appearing in the source address field of an IP packet header. The unicast address can be used for RPF checks because there is only one source host for a particular stream of IP multicast content for a multicast group address, although the same content could be available from multiple sources.

If the same routing table used to forward unicast packets is also used for the RPF checks, the routing table is populated and maintained by the traditional unicast routing protocols such as BGP, IS-IS, OSPF, and the Routing Information Protocol (RIP). If a dedicated multicast RPF table is used, this table must be populated by some other method. Some multicast routing protocols (such as the Distance Vector Multicast Routing Protocol [DVMRP]) essentially duplicate the operation of a unicast routing protocol and populate a dedicated RPF table. Others, such as PIM, do not duplicate routing protocol functions and must rely on some other routing protocol to set up this table, which is why PIM is *protocol independent*.

Some traditional routing protocols such as BGP and IS-IS now have extensions to differentiate between different sets of routing information sent between routers and switches for unicast and multicast. For example, there is multiprotocol BGP (MBGP) and multitopology routing in IS-IS (M-IS-IS). IS-IS routes can be added to the RPF table even when special features such as traffic engineering and "shortcuts" are turned on. Multicast Open Shortest Path First (MOSPF) also extends OSPF for multicast use, but goes further than MBGP or M-IS-IS and makes MOSPF into a complete multicast routing protocol on its own. When these routing protocols are used, routes can be tagged as multicast RPF routers and used by the receiving router differently than the unicast routing information.

Using the main unicast routing table for RPF checks provides simplicity. A dedicated routing table for RPF checks allows a network administrator to set up separate paths and routing policies for unicast and multicast traffic, allowing the multicast network to function more independently of the unicast network.

By default, PIM uses **inet.0** as its reverse-path forwarding (RPF) routing table group. PIM uses an RPF routing table group to resolve its RPF neighbor for a particular multicast source address and for the RP address. PIM can optionally use **inet.2** as its RPF routing table group. The **inet.2** routing table is organized more efficiently for RPF checks.

Once configured, the RPF routing table must be applied to a PIM as a routing table group.

PART 2

Configuration

CHAPTER 4

Configuration

Configuring a Layer 2 Virtual Switch

A Layer 2 virtual switch, which isolates a LAN segment with its spanning-tree protocol instance and separates its VLAN ID space, filters and forwards traffic only at the data link layer. Each VLAN consists of a set of logical ports that participate in Layer 2 learning and forwarding. A virtual switch represents a Layer 2 network.

Two main types of interfaces are used in virtual switch hierarchies:

- Layer 2 logical interface—This type of interface uses the VLAN-ID as a virtual circuit identifier and the scope of the VLAN-ID is local to the interface port. This type of interface is often used in service-provider-centric applications.
- Access or trunk interface—This type of interface uses a VLAN-ID with global significance. The access or trunk interface is implicitly associated with VLANs based on VLAN membership. Access or trunk interfaces are typically used in enterprise-centric applications.

NOTE: The difference between access interfaces and trunk interfaces is that access interfaces can be part of one VLAN only and the interface is normally attached to an end-user device (packets are implicitly associated with the configured VLAN). In contrast, trunk interfaces multiplex traffic from multiple VLANs and usually interconnect switches.

To configure a Layer 2 virtual switch, include the following statements:

```
[edit]
routing-instances {
  routing-instance-name (
    instance-type virtual-switch;
    vlans vlan-name{
      vlan-id (all | none | number);
        [...configure optional VLAN parameters]
    }
  }
}
```

To enable a virtual switch, you must specify **virtual-switch** as the **instance-type**.

The VLANs that are specified with the **vlan-id** statement are included in the virtual switch.

You can configure other optional VLAN parameters in the virtual switch.

Related Documentation

- Configuring a Layer 2 Virtual Switch with a Layer 2 Trunk Port on page 16

Configuring a Layer 2 Virtual Switch with a Layer 2 Trunk Port

You can associate one or more Layer 2 trunk interfaces with a virtual switch.

A virtual switch configured with a Layer 2 trunk port also supports IRB within a VLAN. IRB provides simultaneous support for Layer 2 bridging and Layer 3 IP routing on the same interface. Only an interface configured with the **interface-mode (access | trunk)** statement can be associated with a virtual switch. An access interface enables you to accept packets with no VLAN identifier.

In addition, you can configure Layer 2 learning and forwarding properties for the virtual switch.

To configure a virtual switch with a Layer 2 trunk interface, include the following statements:

```
[edit]
routing-instances {
  routing-instance-name {
    instance-type virtual-switch;
    interface interface-name;
    vlans name{
      vlan-id (all | none | number);
        [...configure optional VLAN parameters]
    }
  }
}
```

Related Documentation

- Configuring a Layer 2 Virtual Switch on page 15

Understanding Layer 2 Virtual Switches Instances

At Layer 2, you can group one or more VLANs into a single routing instance to form a virtual switch instance. A virtual switch instance is composed of VLANs. The virtual switch instance isolates a LAN segment and contains most Layer 2 functions, such as spanning-tree protocol instances and VLAN ID spaces, into it's own smaller, logical network. Splitting Layer 2 traffic using virtual switch instances allows you to more logically organize your Layer 2 traffic into multiple "virtual" Layer 2 networks.

A default virtual switch, called default-switch, is automatically created when a virtual switch is configured. All Layer 2 traffic not assigned to a VLAN in a virtual switch automatically becomes part of the default virtual switch.

You can configure a virtual switch to participate only in Layer 2 bridging and optionally to perform Layer 3 routing. In addition, you can configure spanning-tree protocols (STPs) within the virtual switch to prevent forwarding loops. For more information about how to configure Layer 2 logical ports on an interface, see the Junos® OS Network Interfaces.

You can associate one or more logical interfaces configured as trunk interfaces with a virtual switch. A trunk interface, or Layer 2 trunk port, enables you to configure a logical interface to represent multiple VLANs on the physical interface. For more information about how to configure trunk interfaces, see the Junos® OS Network Interfaces.

You can also configure Layer 2 forwarding and learning properties for the virtual switch.

Related Documentation

- Configuring a Layer 2 Virtual Switch on page 15
- Configuring a Layer 2 Virtual Switch with a Layer 2 Trunk Port on page 16
- Configuring a Layer 2 Control Protocol Routing Instance

Configuring VLAN Encapsulation

To configure encapsulation on an interface, enter the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
encapsulation type;
```

The following list contains important notes regarding encapsulation:

- Ethernet interfaces in VLAN mode can have multiple logical interfaces. In CCC and VPLS modes, VLAN IDs from 1 through 511 are reserved for normal VLANs, and VLAN IDs 512 through 4094 are reserved for CCC or VPLS VLANs. For 4-port Fast Ethernet interfaces, you can use VLAN IDs 512 through 1024 for CCC or VPLS VLANs.
- For encapsulation type **flexible-ethernet-services**, all VLAN IDs are valid.
- For some encapsulation types, including flexible Ethernet services, Ethernet VLAN CCC, and VLAN VPLS, you can also configure the encapsulation type that is used inside the VLAN circuit itself. To do this, include the **encapsulation** statement:

  ```
  encapsulation (vlan-ccc | vlan-tcc | vlan-vpls);
  ```

  You can include this statement at the following hierarchy levels:

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

- You cannot configure a logical interface with VLAN CCC or VLAN VPLS encapsulation unless you also configure the physical device with the same encapsulation or with flexible Ethernet services encapsulation. In general, the logical interface must have a VLAN ID of 512 or higher; if the VLAN ID is 511 or lower, it will be subject to the normal destination filter lookups in addition to source address filtering. However if you configure flexible Ethernet services encapsulation, this VLAN ID restriction is removed.

In general, you configure an interface's encapsulation at the **[edit interfaces *interface-name*]** hierarchy level.

Example: Configuring VLAN Encapsulation on a Gigabit Ethernet Interface

Configure VLAN CCC encapsulation on a Gigabit Ethernet interface:

```
interfaces ge-2/1/0 {
  vlan-tagging;
  encapsulation vlan-ccc;
  unit 0 {
    encapsulation vlan-ccc;
    vlan-id 600;
  }
}
```

Example: Configuring VLAN Encapsulation on an Aggregated Ethernet Interface

Configure VLAN CCC encapsulation on an aggregated Gigabit Ethernet interface:

```
interfaces ae0 {
  vlan-tagging;
  encapsulation vlan-vpls;
  unit 0 {
    vlan-id 100;
```

```
    }
}
```

Related Documentation

- 802.1Q VLANs Overview
- Junos® OS Ethernet Interfaces

Rewriting the Inner and Outer VLAN Tags

On Ethernet IQ, IQ2 and IQ2-E interfaces, on MX Series router Gigabit Ethernet, Tri-Rate Ethernet copper, and 10-Gigabit Ethernet interfaces, and on aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, to replace both the inner and the outer VLAN tags of the incoming frame with a user-specified VLAN tag value, include the **swap-swap** statement in the input VLAN map or output VLAN map:

```
swap-swap;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map]**
- **[edit interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map]**
- **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map]**
- **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map]**

See Configuring Inner and Outer TPIDs and VLAN IDs and Configuring Inner and Outer TPIDs and VLAN IDs for information about configuring inner and outer VLAN ID values and inner and outer TPID values required for VLAN maps.

Related Documentation

- input-vlan-map
- output-vlan-map
- swap-swap
- unit
- Junos® OS Ethernet Interfaces

Rewriting the VLAN Tag on Tagged Frames

To rewrite the VLAN tag on all tagged frames entering the interface to a specified VLAN ID and TPID, include the **swap**, **tag-protocol-id**, and **vlan-id** statements in the input VLAN map:

```
input-vlan-map {
    swap;
    vlan-id number;
    tag-protocol-id tpid;
```

```
}
```

To rewrite the VLAN tag on all tagged frames exiting the interface to a specified VLAN ID and TPID, include the **swap** and **tag-protocol-id** statements in the output VLAN map:

```
output-vlan-map {
    swap;
    vlan-id number;
    tag-protocol-id tpid;
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map]**
- **[edit logical-systems** *logical-system-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map]**

You cannot include both the **swap** statement and the **vlan-id** statement in the output VLAN map configuration. If you include the **swap** statement in the configuration, the VLAN ID in outgoing frames is rewritten to the VLAN ID bound to the logical interface. For more information about binding a VLAN ID to the logical interface, see 802.1Q VLANs Overview.

The swap operation works on the outer tag only, whether or not you include the **stacked-vlan-tagging** statement in the configuration. For more information, see Examples: Stacking and Rewriting Gigabit Ethernet IQ VLAN Tags.

Related Documentation

- input-vlan-map
- output-vlan-map
- swap
- vlan-id
- tag-protocol-id
- unit
- For more information about binding a VLAN ID to the logical interface, see 802.1Q VLANs Overview.
- For more information about the swap operation, see Examples: Stacking and Rewriting Gigabit Ethernet IQ VLAN Tags.
- Junos® OS Ethernet Interfaces

Binding VLAN IDs to Logical Interfaces

The following sections describe how to configure logical interfaces to receive and forward VLAN-tagged frames:

- Binding VLAN IDs to Logical Interfaces Overview on page 21
- Binding a VLAN ID to a Logical Interface on page 21

- Binding a Range of VLAN IDs to a Logical Interface on page 22
- Binding a List of VLAN IDs to a Logical Interface on page 23

Binding VLAN IDs to Logical Interfaces Overview

To configure a logical interface to receive and forward VLAN-tagged frames, you must bind a VLAN ID, a range of VLAN IDs, or a list of VLAN IDs to the logical interface. Table 3 on page 21 lists the configuration statements you use to bind VLAN IDs to logical interfaces, organized by scope of the VLAN IDs used to match incoming packets:

Table 3: Configuration Statements Used to Bind VLAN IDs to Logical Interfaces

Scope of VLAN ID Matching	Type of VLAN Framing Supported on the Logical Interface	
	Single-Tag Framing	Dual-Tag Framing
VLAN ID	**vlan-id** *vlan-id*;	**vlan-tags outer** *tpid*.<*vlan-id*> **inner** *tpidvlan-id*;
VLAN ID Range	**vlan-id-range** *vlan-id–vlan-id*;	**vlan-tags outer** *tpid.vlan-id* **inner-range** *tpid.vlan-id–vlan-id*;
VLAN ID List	**vlan-id-list [***vlan-id vlan-id–vlan-id***];**	**vlan-tags outer <***tpid.***>***vlan-id* **inner-list [***vlan-id vlan-id–vlan-id***];**

You can include all of the statements at the following hierarchy levels:

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

NOTE: **The inner-list option of the vlan-tags statement does not support Tag Protocol ID (TPID) values.**

Binding a VLAN ID to a Logical Interface

A logical interface that you have associated (bound) to a particular VLAN ID will receive and forward incoming frames that contain a matching VLAN ID.

Binding a VLAN ID to a Single-Tag Logical Interface

To bind a VLAN ID to a single-tag logical interface, include the **vlan-id** statement:

vlan-id *vlan-id*;

You can include the statement at the following hierarchy levels:

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

To configure an Ethernet interface to support single-tag logical interfaces, include the **vlan-tagging** statement at the **[edit interfaces *ethernet-interface-name*]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Binding a VLAN ID to a Dual-Tag Logical Interface

To bind a VLAN ID to a dual-tag logical interface, include the **vlan-tags** statement:

vlan-tags inner <*tpid*.>*vlan-id* outer <*tpid*.>*vlan-id*;

You can include the statement at the following hierarchy levels:

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

To configure an Ethernet interface to support dual-tag logical interfaces, include the **stacked-vlan-tagging** statement at the **[edit interfaces *ethernet-interface-name*]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Binding a Range of VLAN IDs to a Logical Interface

A VLAN range can be used by service providers to interconnect multiple VLANs belonging to a particular customer over multiple sites. Using a VLAN ID range conserves switch resources and simplifies configuration.

Binding a Range of VLAN IDs to a Single-Tag Logical Interface

To bind a range of VLAN IDs to a single-tag logical interface, include the **vlan-id-range** statement:

vlan-id-range *vlan-id-vlan-id*;

You can include the statement at the following hierarchy levels:

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

To configure an Ethernet interface to support single-tag logical interfaces, include the **vlan-tagging** statement at the **[edit interfaces *ethernet-interface-name*]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Binding a Range of VLAN IDs to a Dual-Tag Logical Interface

To bind a range of VLAN IDs to a dual-tag logical interface, include the **vlan-tags** statement. Use the **inner–list** option to specify the VLAN IDs as an inclusive range by separating the starting VLAN ID and ending VLAN ID with a hyphen.

vlan-tags inner–list [*vlan-id vlan-id–vlan-id*] outer <*tpid*.>*vlan-id*;

You can include the statement at the following hierarchy levels:

- **[edit interfaces *ethernet-interface-name* unit *logical-unit-number*]**

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

To configure an Ethernet interface to support dual-tag logical interfaces, include the **stacked-vlan-tagging** statement at the **[edit interfaces** *ethernet-interface-name***]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Example: Binding Ranges VLAN IDs to Logical Interfaces

The following example configures two different ranges of VLAN IDs on two different logical ports:

```
[edit interfaces]
ge-3/0/0 {
  unit 0 {
    encapsulation vlan-bridge;
    vlan-id-range 500-600;
  }
}
ge-3/0/1 {
  flexible-vlan-tagging;
    unit 0 {
      encapsulation vlan-bridge;
      vlan-id-range 200-300;
    }
    unit 1 {
      encapsulation vlan-bridge;
      vlan-tags outer 1000 inner-range 100-200;
    }
}
```

Binding a List of VLAN IDs to a Logical Interface

In Junos OS Release 9.5 and later, on MX Series routers and in Junos OS Release 12.2R2 and later on EX Series switches, you can bind a list of VLAN IDs to a single logical interface, eliminating the need to configure a separate logical interface for every VLAN or VLAN range. A logical interface that accepts packets tagged with any VLAN ID specified in a VLAN ID list is called a *VLAN-bundled* logical interface.

You can use VLAN-bundled logical interfaces to configure circuit cross-connects between Layer 2 VPN routing instances or Layer 2 circuits. Using VLAN-bundled logical interfaces simplifies configuration and reduces use of system resources such as logical interfaces, next hops, and circuits.

As an alternative to configuring multiple logical interfaces (one for each VLAN ID and one for each range of VLAN IDs), you can configure a single VLAN-bundled logical interface based on a list of VLAN IDs.

NOTE: The vlan-id option is not supported to achieve VLAN normalization on VPLS instances that are configured with vlan-id-list. However, you can use the vlan-maps option to achieve VLAN normalization.

Binding a List of VLAN IDs to a Single-Tag Logical Interface

To bind a list of VLAN IDs to a single-tag logical interface, include the **vlan-id-list** statement. Specify the VLAN IDs in the list individually by using a space to separate each ID, as an inclusive list by separating the starting VLAN ID and ending VLAN ID with a hyphen, or as a combination of both.

vlan-id-list [*vlan-id vlan-id–vlan-id*];

You can include the statement at the following hierarchy levels:

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

To configure an Ethernet interface to support single-tag logical interfaces, include the **vlan-tagging** statement at the **[edit interfaces** *ethernet-interface-name***]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Binding a List of VLAN IDs to a Dual-Tag Logical Interface

To bind a list of VLAN IDs to a dual-tag logical interface, include the **vlan-tags** statement. Use the **inner-list** option to specify the VLAN IDs individually by using a space to separate each ID, as an inclusive list by separating the starting VLAN ID and ending VLAN ID with a hyphen, or as a combination of both:

vlan-tags inner-list [*vlan-id vlan-id–vlan-id*] outer <*tpid*>*vlan-id*;

NOTE: The inner-list option of the vlan-tags statement does not support Tag Protocol ID (TPID) values.

You can include the statement at the following hierarchy levels:

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

To configure an Ethernet interface to support dual-tag logical interfaces, include the **stacked-vlan-tagging** statement at the **[edit interfaces** *ethernet-interface-name***]** hierarchy level. To support mixed tagging, include the **flexible-vlan-tagging** statement instead.

Example: Binding Lists of VLAN IDs to Logical Interfaces

The following example configures two different lists of VLAN IDs on two different logical ports:

```
[edit interfaces]
ge-1/1/0 {
   vlan-tagging; # Only for single-tagging
   encapsulation flexible-ethernet-services;
   unit 10 {
      encapsulation vlan-ccc;
```

```
      vlan-id-list [20 30–40 45];
    }
  }
  ge-1/1/1 {
    flexible-vlan-tagging; # Only for mixed tagging
    encapsulation flexible-ethernet-services;
    unit 10 {
      encapsulation vlan-ccc;
      vlan-id-list [1 10 20 30–40];
    }
    unit 20 {
      encapsulation vlan-ccc;
      vlan-tags outer 200 inner-list [50–60 80 90–100];
    }
  }
```

In the example configuration above, **ge-1/1/0** supports single-tag logical interfaces, and **ge-1/1/1** supports mixed tagging. The single-tag logical interfaces **ge-1/1/0.10** and **ge-1/1/1.20** each bundle lists of VLAN IDs. The dual-tag logical interface **ge-1/1/1.20** bundles lists of inner VLAN IDs.

TIP: You can group a range of identical interfaces into an interface range and then apply a common configuration to that interface range. For example, in the above example configuration, both interfaces ge-1/1/0 and ge-1/1/1 have the same physical encapsulation type of **flexible-ethernet-services**. Thus you can define an interface range with the interfaces ge-1/1/0 and ge-1/1/1 as its members and apply the encapsulation type flexible-ethernet-services to that defined interface range. For more information about interface ranges, see Configuring Interface Ranges.

Related Documentation

- 802.1Q VLANs Overview
- Configuring Interface Ranges
- Junos® OS Ethernet Interfaces

Configuring a Logical Interface for Access Mode

Enterprise network administrators can configure a single logical interface to accept untagged packets and forward the packets within a specified VLAN. A logical interface configured to accept untagged packets is called an *access interface* or *access port*.

```
interface-mode access;
```

You can include this statement at the following hierarchy levels:

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

When an untagged or tagged packet is received on an access interface, the packet is accepted, the VLAN ID is added to the packet, and the packet is forwarded within the VLAN that is configured with the matching VLAN ID.

The following example configures a logical interface as an access port with a VLAN ID of 20 on routers and switches that support the enhanced Layer 2 software:

```
[edit interfaces ge-1/2/0]
unit 1 {
  family ethernet-switching {
    interface-mode access;
    vlan members 20;
  }
}
```

Related Documentation

- 802.1Q VLANs Overview
- Junos® OS Ethernet Interfaces

Configuring Junos OS for Supporting Aggregated Devices

Junos OS supports the aggregation of physical devices into defined virtual links, such as the link aggregation of Ethernet interfaces defined by the IEEE 802.3ad standard.

Tasks for configuring aggregated devices are:

Configuring Virtual Links for Aggregated Devices

To define virtual links, you need to specify the associations between physical and logical devices within the **[edit interfaces]** hierarchy, and assign the correct number of logical

devices by including the **device-count** statement at the **[edit chassis aggregated-devices ethernet]** and **[edit chassis aggregated-devices sonet]** hierarchy levels:

```
[edit chassis]
aggregated-devices {
  ethernet {
    device-count number;
  }
  sonet {
    device-count number;
  }
}
```

The maximum number of Ethernet logical interfaces that you can configure is 128. On M Series and T Series routers, you can configure a maximum number of 128 aggregated interfaces. On MX Series routers, you can configure a maximum of 480 aggregated interfaces. The aggregated interfaces are numbered from **ae0** through **ae127** for M Series and T Series routers, and the aggregated interfaces (LAG bundles) are numbered from **ae0** through **ae479** on MX Series routers. The maximum number of SONET/SDH logical interfaces is 16. The aggregated SONET/SDH interfaces are numbered from **as0** through **as15**.

Configuring LACP Link Protection at the Chassis Level

Link Aggregation Control Protocol (LACP) is one method of bundling several physical interfaces to form one logical interface. You can configure both VLAN-tagged and untagged aggregated Ethernet with or without LACP enabled. LACP exchanges are made between actors and partners. An actor is the local interface in an LACP exchange. A partner is the remote interface in an LACP exchange.

LACP link protection enables you to force active and standby links within an aggregated Ethernet. You configure LACP link protection by using the **link-protection** and **system-priority** statements at either the chassis or interface level and by configuring port priority at the interface level using the **system-priority** statement. Configuring LACP parameters at the chassis level results in all aggregated Ethernet interfaces using the defined values unless overridden by the LACP configuration on a specific interface.

```
[edit chassis]
aggregated-devices {
  ethernet {
    lacp {
      link-protection {
        non-revertive;
      }
      system-priority priority;
    }
  }
}
```

NOTE: LACP link protection also uses port priority. You can configure port priority at the Ethernet interface **[gigether-options]** hierarchy level using the **port-priority** statement. If you choose not to configure port priority, LACP link protection uses the default value for port priority (127).

Enabling LACP Link Protection

To enable LACP link protection for aggregated Ethernet interfaces on the chassis, use the **link-protection** statement at the **[edit chassis aggregated-devices ethernet lacp]** hierarchy level:

```
[edit chassis aggregated-devices ethernet lacp]
link-protection {
   non-revertive;
}
```

By default, LACP link protection reverts to a higher-priority (lower-numbered) link when that higher-priority link becomes operational or a link is added to the aggregator that is determined to be higher in priority. However, you can suppress link calculation by adding the **non-revertive** statement to the LACP link protection configuration. In nonrevertive mode, after a link is active and collecting and distributing packets, the subsequent addition of a higher-priority (better) link does not result in a switch, and the current link remains active.

CAUTION: If both ends of an aggregator have LACP link protection enabled, make sure to configure both ends of the aggregator to use the same mode. Mismatching LACP link protection modes can result in lost traffic.

Configuring System Priority

To configure LACP system priority for aggregated Ethernet interfaces on the chassis, use the **system-priority** statement at the **[edit chassis aggregated-devices ethernet lacp]** hierarchy level:

```
[edit chassis aggregated-devices ethernet lacp]
system-priority priority;
```

The system priority is a 2-octet binary value that is part of the LACP system ID. The LACP system ID consists of the system priority as the two most-significant octets and the interface MAC address as the six least-significant octets. The system with the numerically lower value for system priority has the higher priority. By default, system priority is 127, with a range of 0 through 65,535.

Configuring the Maximum Links Limit

To configure the maximum links limit, use the **maximum-links** statement at the **[edit chassis aggregated-devices]** hierarchy level:

```
[edit chassis aggregated-devices]
```

maximum-links *maximum-links-limit*;

Related Documentation

- Configuring an Aggregated Ethernet Interface
- Junos® OS Ethernet Interfaces
- Configuring Aggregated Ethernet Interfaces on PTX Series Packet Transport Switches

Configuring an Aggregated Ethernet Interface

You can associate a physical interface with an aggregated Ethernet interface.

To configure an aggregated Ethernet interface:

1. Specify that you want to configure the link aggregation group interface.

   user@host# **edit interfaces** ***interface-name***

2. Configure the aggregated Ethernet interface.

   [edit interfaces *interface-name*]
   user@host# **set ether-options 802.3ad ae*x***

You specify the interface instance number ***x*** to complete the link association; ***x*** can be from 0 through 480, for a total of 480 aggregated interfaces on MX Series routers or EX9200 switches. You must also include a statement defining **ae*x*** at the **[edit interfaces]** hierarchy level. You can optionally specify other physical properties that apply specifically to the aggregated Ethernet interfaces; for details, see Ethernet Interfaces Overview.

NOTE: In general, aggregated Ethernet bundles support the features available on all supported interfaces that can become a member link within the bundle. As an exception, Gigabit Ethernet IQ features and some newer Gigabit Ethernet features are not supported in aggregated Ethernet bundles.

Gigabit Ethernet IQ and SFP interfaces can be member links, but IQ- and SFP-specific features are not supported on the aggregated Ethernet bundle even if all the member links individually support those features.

You need to configure the correct link speed for the aggregated Ethernet interface to eliminate any warning message.

NOTE: Before you commit an aggregated Ethernet configuration, ensure that link mode is not configured on any member interface of the aggregated Ethernet bundle; otherwise, the configuration commit check fails.

Related Documentation

- Configuring an Aggregated Ethernet Interface on page 29
- Configuring the Number of Aggregated Ethernet Interfaces on the Device (Enhanced Layer 2 Software CLI Procedure) on page 30
- Deleting an Aggregated Ethernet Interface on page 30

- Aggregated Ethernet Interfaces Overview on page 3
- Junos® OS Ethernet Interfaces

Deleting an Aggregated Ethernet Interface

There are two approaches to deleting an aggregated Ethernet interface:

- You can delete an aggregated Ethernet interface from the interface configuration. The Junos OS removes the configuration statements related to **ae*x*** and sets this interface to down state.
- You can also permanently remove the aggregated Ethernet interface from the device configuration by deleting it from the device-count on the routing device.

To delete an aggregated Ethernet interface:

1. Delete the aggregated Ethernet configuration.

   This step changes the interface state to down and removing the configuration statements related to **ae*x***.

   ```
   [edit]
   user@host# delete interfaces aex
   ```

2. Delete the interface from the device count.

   ```
   [edit]
   user@host# delete chassis aggregated-devices ethernet device-count
   ```

Related Documentation

- Configuring an Aggregated Ethernet Interface
- Configuring the Number of Aggregated Ethernet Interfaces on the Device
- Aggregated Ethernet Interfaces Overview on page 3
- Junos® OS Ethernet Interfaces

Configuring the Number of Aggregated Ethernet Interfaces on the Device (Enhanced Layer 2 Software CLI Procedure)

By default, no aggregated Ethernet interfaces are created. You must set the number of aggregated Ethernet interfaces on the routing device before you can configure them.

On MX Series routers and EX9200 switches, you can configure a maximum of 480 aggregated interfaces. The aggregated interfaces(LAG bundles) are numbered from **ae0** through **ae479** on MX Series routers and EX9200 switches.

1. Specify that you want to access the aggregated Ethernet configuration on the device.

   ```
   user@host# edit chassis aggregated-devices ethernet
   ```

2. Set the number of aggregated Ethernet interfaces.

   ```
   [edit chassis aggregated-devices ethernet]
   ```

user@host# **set device-count** *number*

You must also specify the constituent physical links by including the **802.3ad** statement at the **[edit interfaces** *interface-name* **ether-options]** or **[edit interfaces** *interface-name* **ether-options]** hierarchy level.

Related Documentation

- For information about physical links, see Configuring an Aggregated Ethernet Interface on page 29
- Junos® OS Ethernet Interfaces
- For information about configuring aggregated devices, see the Junos OS System Basics Configuration Guide.

Example: Configuring Aggregated Ethernet Interfaces

Aggregated Ethernet interfaces can use interfaces from different FPCs, DPCs, or PICs. The following configuration is sufficient to get an aggregated Gigabit Ethernet interface up and running.

```
[edit chassis]
aggregated-devices {
   ethernet {
      device-count 15;
   }
}

[edit interfaces]
ge-1/3/0 {
   gigether-options {
      802.3ad ae0;
   }
}
ge-2/0/1 {
   gigether-options {
      802.3ad ae0;
   }
}
ae0 {
   aggregated-ether-options {
      link-speed 1g;
      minimum-links 1;
   }
   }
   vlan-tagging;
   unit 0 {
      vlan-id 1;
      family inet {
         address 14.0.100.50/24;
      }
   }
   unit 1 {
      vlan-id 1024;
      family inet {
         address 14.0.101.50/24;
```

```
    }
  }
  unit 2 {
    vlan-id 1025;
    family inet {
      address 14.0.102.50/24;
    }
  }
  unit 3 {
    vlan-id 4094;
    family inet {
      address 14.0.103.50/24;
    }
  }
}
```

Related Documentation

- Junos® OS Ethernet Interfaces
- Configure 'link-speed' for Gigabit Ethernet based Aggregate Ethernet interface bundles

Configuring Tagged Aggregated Ethernet Interfaces

To specify aggregated Ethernet interfaces, include the **vlan-tagging** statement at the **[edit interfaces ae*x*]** hierarchy level:

```
[edit interfaces aex]
vlan-tagging;
```

You must also include the **vlan-id** statement:

```
vlan-id number;
```

You can include this statement at the following hierarchy levels:

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

For more information about the **vlan-tagging** and **vlan-id** statements, see 802.1Q VLANs Overview.

Related Documentation

- vlan-id
- vlan-tagging on page 104

Configuring Untagged Aggregated Ethernet Interfaces

When you configure an untagged Aggregated Ethernet interface, the existing rules for untagged interfaces apply. These rules are as follows:

- You can configure only one logical interface (unit 0) on the port. The logical unit 0 is used to send and receive LACP or marker protocol data units (PDUs) to and from the individual links.
- You cannot include the **vlan-id** statement in the configuration of the logical interface.

Configure an untagged aggregated Ethernet interface by omitting the **vlan-tagging** and **vlan-id** statements from the configuration:

```
[edit interfaces]
ge-1/1/1 {
  ether-options {
    802.3ad ae0;
  }
}
ae0 {
  # vlan-tagging; OMIT FOR UNTAGGED AE CONFIGURATIONS
  unit 0 {
    # vlan-id 100; OMIT FOR UNTAGGED AE CONFIGURATIONS
    family inet {
      address 13.1.1.2/24 {
        vrrp-group 0 {
          virtual-address 13.1.1.4;
          priority 200;
        }
      }
    }
  }
}
```

Related Documentation

- For more information about configuring LACP, see Configuring Aggregated Ethernet LACP on page 37.
- Junos® OS Ethernet Interfaces

Configuring Aggregated Ethernet Minimum Links

On aggregated Ethernet interfaces, you can configure the minimum number of links that must be up for the bundle as a whole to be labeled **up**. By default, only one link must be up for the bundle to be labeled **up**.

To configure the minimum number of links:

1. Specify that you want to configure the aggregated Ethernet options.

   user@host# **edit interfaces** *interface-name* **aggregated-ether-options**

2. Configure the minimum number of links.

[edit interfaces *interface-name* aggregated-ether-options]
user@host# **set minimum-links** *number*

On M120, M320, MX Series, T Series, and TX Matrix routers with Ethernet interfaces, and EX 9200 switches, the valid range for **minimum-links** *number* is 1 through 16. When the maximum value (16) is specified, all configured links of a bundle must be up for the bundle to be labeled **up**.

On all other routers and on EX Series switches, other than EX8200 switches, the range of valid values for **minimum-links** *number* is 1 through 8. When the maximum value (8) is specified, all configured links of a bundle must be up for the bundle to be labeled **up**.

On EX8200 switches, the range of valid values for **minimum-links** *number* is 1 through 12. When the maximum value (12) is specified, all configured links of a bundle must be up for the bundle to be labeled **up**.

If the number of links configured in an aggregated Ethernet interface is less than the minimum link value configured under the **aggregated-ether-options** statement, the configuration commit fails and an error message is displayed.

Related Documentation

- aggregated-ether-options
- minimum-links
- Junos® OS Ethernet Interfaces

Configuring Load Balancing on a LAG Link

You can configure the load balancing hash key for Layer 2 traffic to use fields in the Layer 3 and Layer 4 headers inside the frame payload for load-balancing purposes using the **payload** statement. You can configure the statement to look at **layer-3** (and **source-ip-only** or **destination-ip-only** packet header fields) or **layer-4** fields. You configure this statement at the **[edit forwarding-options hash-key family multiservice]** hierarchy level.

You can configure Layer 3 or Layer 4 options, or both. The **source-ip-only** or **destination-ip-only** options are mutually exclusive. The **layer-3-only** statement is not available on MX Series routers.

NOTE: For Dense Port Concentrators (DPC), any change in the hash key configuration requires a reboot for the changes to take effect. For Modular Port Concentrators (MPC) the reboot is not required.

For more information about link aggregation group (LAG) configuration, see the Junos® OS Network Interfaces.

Related Documentation

- Load Balancing and Ethernet Link Aggregation on page 5
- Load Balancing on a LAG Link on page 35

Example: Configuring Load Balancing on a LAG Link

This example configures the load-balancing hash key to use the source Layer 3 IP address option and Layer 4 header fields as well as the source and destination MAC addresses for load balancing on a link aggregation group (LAG) link:

```
[edit]
forwarding-options {
  hash-key {
    family multiservice {
      source-mac;
      destination-mac;
      payload {
        ip {
          layer-3 {
            source-ip-only;
          }
          layer-4;
        }
      }
    }
  }
}
```

Related Documentation

- Load Balancing and Ethernet Link Aggregation on page 5
- Configuring Load Balancing on a LAG Link on page 34

Configuring Multichassis Link Aggregation

On MX Series routers and EX Series switches, multichassis link aggregation (MC-LAG) enables a device to form a logical LAG interface with two or more other devices. MC-LAG provides additional benefits over traditional LAG in terms of node level redundancy, multi-homing support, and loop-free Layer 2 network without running Spanning Tree Protocol (STP). MC-LAG can be configured for VPLS routing instance, CCC application, and Layer 2 circuit encapsulation types.

The MC-LAG devices use Inter-Chassis Communication Protocol (ICCP) to exchange the control information between two MC-LAG network devices.

On one end of MC-LAG is a MC-LAG client device that has one or more physical links in a link aggregation group (LAG). This client device does not need to be aware of MC-LAG. On the other side of MC-LAG are two MC-LAG network devices. Each of these network devices has one or more physical links connected to a single client device. The network devices coordinate with each other to ensure that data traffic is forwarded properly.

MC-LAG includes the following functionality:

- Active standby mode is supported using Link Aggregation Control Protocol (LACP)
- MC-LAG operates only between two chassis.

- Layer 2 circuit functions are supported with **ether-ccc** encapsulation.
- VPLS functions are supported with **ether-vpls** and **vlan-vpls**.

NOTE: Ethernet connectivity fault management (CFM) specified in IEEE 802.1ag standard for Operation, Administration, and Management (OAM) is *not* supported on MC-LAG interfaces.

To enable MC-LAG, include the **mc-ae** statement at the **[edit interfaces ae*X* aggregated-ether-options]** hierarchy level along with either the **ethernet-bridge**, **encapsulation ethernet-ccc**, **encapsulation ethernet-vpls**, or **flexible-ethernet-services** statement at the **[edit interfaces ae*X*]** hierarchy level. You also need to configure the **lacp** statement and the **admin-key** and **system-id** statements at the **[edit interfaces ae*X* aggregated-ether-options] hierarchy level**:

```
[edit interfaces ae X]
encapsulation (ethernet-bridge | ethernet-ccc | ethernet-vpls | flexible-ethernet-services);
aggregated-ether-options {
  lacp {
    active;
    admin-key number;
    system-id mac-address;
    system-priority number;
  }
  mc-ae {
    chassis-id chassis-id;
    events {
      iccp-peer-down {
        force-icl-down;
        prefer-status-control-active;
      }
    }
    mc-ae-id mc-ae-id;
    mode (active-active | active-standby);
    redundancy-group group-id;
    status-control (active | standby);
  }
}
```

NOTE: When you configure the **prefer-status-control-active** statement, you must also configure the **status-control active** statement. If you configure the **status-control standby** statement with the **prefer-status-control-active** statement, the system issues a warning.

To delete a MC-LAG interface from the configuration, issue the **delete interfaces ae*X* aggregated-ether-options mc-ae** command at the **[edit]** hierarchy level in configuration mode:

```
[edit]
user@host# delete interfaces aeX aggregated-ether-options mc-ae
```

Related Documentation

- Active-Active Bridging and VRRP over IRB Functionality on MX Series Routers Overview
- Configuring Active-Active Bridging and VRRP over IRB in Multichassis Link Aggregation
- show interfaces mc-ae
- Junos® OS Ethernet Interfaces

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 both VLAN-tagged and untagged aggregated Ethernet with or without LACP enabled.

For Multichassis Link Aggregation (MC-LAG), you must specify the **system-id** and **admin key**. MC-LAG peers use the same **system-id** while sending the LACP messages. The **system-id** can be configured on the MC-LAG network device and synchronized between peers for validation.

LACP exchanges are made between actors and partners. An actor is the local interface in an LACP exchange. A partner is the remote interface in an LACP exchange.

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 aggregate bundle without user intervention
- Link monitoring to check whether both ends of the bundle are connected to the correct group

The Junos OS implementation of LACP provides link monitoring but not automatic addition and deletion of links.

The LACP mode can be active or passive. 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. If either the actor or partner is active, they do exchange LACP packets. By default, LACP is turned off on aggregated Ethernet interfaces. If LACP is configured, it is in passive mode by default. To initiate transmission of LACP packets and response to LACP packets, you must configure LACP in active mode.

To enable LACP active mode, include the **lacp** statement at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level, and specify the **active** option:

```
[edit interfaces interface-name aggregated-ether-options]
lacp {
  active;
}
```

NOTE: The LACP process exists in the system only if you configure the system in either active or passive LACP mode.

To restore the default behavior, include the **lacp** statement at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level, and specify the **passive** option:

```
[edit interfaces interface-name aggregated-ether-options]
lacp {
  passive;
}
```

Starting with Junos OS release 12.2, you can also configure LACP to override the IEEE 802.3ad standard and to allow the standby link always to receive traffic. Overriding the default behavior facilitates subsecond failover.

To override the IEEE 802.3ad standard and facilitate subsecond failover, include the **fast-failover** statement at the **[edit interfaces *interface-name* aggregated-ether-options lacp]** hierarchy level.

For more information, see the following sections:

Configuring the LACP Interval

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:

```
[edit interfaces interface-name aggregated-ether-options lacp]
periodic interval;
```

The interval can be fast (every second) or slow (every 30 seconds). You can configure different periodic rates on active and passive interfaces. When you configure the active and passive interfaces at different rates, the transmitter honors the receiver's rate.

NOTE: Source address filtering does not work when LACP is enabled.

Percentage policers are not supported on aggregated Ethernet interfaces with the CCC protocol family configured. For more information about percentage policers, see the Routing Policy Configuration Guide.

Generally, LACP is supported on all untagged aggregated Ethernet interfaces. For more information, see Configuring Untagged Aggregated Ethernet Interfaces.

Configuring LACP Link Protection

NOTE: When using LACP link protection, you can configure only two member links to an aggregated Ethernet interface: one active and one standby.

To force active and standby links within an aggregated Ethernet, you can configure LACP link protection and system priority at the aggregated Ethernet interface level using the **link-protection** and **system-priority** statements. Configuring values at this level results in only the configured interfaces using the defined configuration. LACP interface configuration also enables you to override global (chassis) LACP settings.

LACP link protection also uses port priority. You can configure port priority at the Ethernet interface **[ether-options]** hierarchy level using the **port-priority** statement. If you choose not to configure port priority, LACP link protection uses the default value for port priority (127).

NOTE: LACP link protection supports per-unit scheduling configuration on aggregated Ethernet interfaces.

To enable LACP link protection for an aggregated Ethernet interfaces, use the **link-protection** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
link-protection;
   disable;
   revertive;
   non-revertive;
}
```

By default, LACP link protection reverts to a higher-priority (lower-numbered) link when that higher-priority link becomes operational or a link is added to the aggregator that is determined to be higher in priority. However, you can suppress link calculation by adding the **non-revertive** statement to the LACP link protection configuration. In nonrevertive mode, once a link is active and collecting and distributing packets, the subsequent addition of a higher-priority (better) link does not result in a switch and the current link remains active.

If LACP link protection is configured to be nonrevertive at the global (**[edit chassis]** hierarchy) level, you can add the **revertive** statement to the LACP link protection configuration to override the nonrevertive setting for the interface. In revertive mode, the addition of a higher-priority link to the aggregator results in LACP performing a priority recalculation and switching from the current active link to the new active link.

CAUTION: If both ends of an aggregator have LACP link protection enabled, make sure to configure both ends of the aggregator to use the same mode. Mismatching LACP link protection modes can result in lost traffic.

We strongly recommend you to use LACP on both ends of the aggregator, when you connect an aggregated Ethernet interface with two member interfaces to any other vendor device. Otherwise, the vendor device (say a Layer 2 switch, or a router), will not be able to manage the traffic coming from the two link aggregated Ethernet bundle. As a result, you might observe the vendor device sending back the traffic to the backup member link of the aggregated Ethernet interface.

Currently, MX-MPC2-3D, MX-MPC2-3D-Q, MX-MPC2-3D-EQ, MX-MPC1-3D, MX-MPC1-3D-Q, and MPC-3D-16XGE-SFPP do not drop traffic coming back to the backup link, whereas DPCE-R-Q-20GE-2XGE, DPCE-R-Q-20GE-SFP, DPCE-R-Q-40GE-SFP, DPCE-R-Q-4XGE-XFP, DPCE-X-Q-40GE-SFP, and DPCE-X-Q-4XGE-XFP drop traffic coming to the backup link.

Configuring LACP System Priority

To configure LACP system priority for aggregated Ethernet interfaces on the interface, use the **system-priority** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
system-priority;
```

The system priority is a 2-octet binary value that is part of the LACP system ID. The LACP system ID consists of the system priority as the two most-significant octets and the interface MAC address as the six least-significant octets. The system with the numerically lower value for system priority has the higher priority. By default, system priority is 127, with a range of 0 to 65,535.

Configuring LACP System Identifier

To configure the LACP system identifier for aggregated Ethernet interfaces, use the **system-id** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
system-id system-id;
```

The user-defined system identifier in LACP enables two ports from two separate devices to act as though they were part of the same aggregate group.

The system identifier is a 48-bit (6-byte) globally unique field. It is used in combination with a 16-bit system-priority value, which results in a unique LACP system identifier.

Configuring LACP administrative Key

To configure an administrative key for LACP, include the **admin-key *number*** statement at the **edit interfaces ae*x* aggregated-ether-options** lacp**]** hierarchy level:

```
[edit interfaces ae x aggregated-ether-options-lacp]
admin-key number;
```

NOTE: You must configure MC-LAG to configure the admin-key statement. For more information about MC-LAG, see "Configuring Multichassis Link Aggregation" on page 35.

Configuring LACP Port Priority

To configure LACP port priority for aggregated Ethernet interfaces, use the **port-priority** statement at the **[edit interfaces *interface-name* ether-options 802.3ad ae*X* lacp]** or **[edit interfaces *interface-name* ether-options 802.3ad ae*X* lacp]** hierarchy levels:

```
[edit interfaces interface-name ether-options 802.3ad aeX lacp]
port-priority priority;
```

The port priority is a 2-octet field that is part of the LACP port ID. The LACP port ID consists of the port priority as the two most-significant octets and the port number as the two least-significant octets. The system with the numerically lower value for port priority has the higher priority. By default, port priority is 127, with a range of 0 to 65,535.

Port aggregation selection is made by each system based on the highest port priority and are assigned by the system with the highest priority. Ports are selected and assigned starting with the highest priority port of the highest priority system and working down in priority from there.

NOTE: Port aggregation selection (discussed above) is performed for the active link when LACP link protection is enabled. Without LACP link protection, port priority is not used in port aggregation selection.

Tracing LACP Operations

To trace the operations of the LACP process, include the **traceoptions** statement at the **[edit protocols lacp]** hierarchy level:

```
[edit protocols lacp]
traceoptions {
   file <filename> <files number> <size size> <world-readable | no-world-readable>;
   flag flag;
   no-remote-trace;
}
```

You can specify the following flags in the **protocols lacp traceoptions** statement:

- **all**—All LACP tracing operations
- **configuration**—Configuration code
- **packet**—Packets sent and received
- **process**—LACP process events
- **protocol**—LACP protocol state machine
- **routing-socket**—Routing socket events
- **startup**—Process startup events

For general information about tracing, see the tracing and logging information in the Junos OS System Basics Configuration Guide.

LACP Limitations

LACP can link together multiple different physical interfaces, but only features that are supported across all of the linked devices will be supported in the resulting link aggregation group (LAG) bundle. For example, different PICs can support a different number of forwarding classes. If you use link aggregation to link together the ports of a PIC that supports up to 16 forwarding classes with a PIC that supports up to 8 forwarding classes, the resulting LAG bundle will only support up to 8 forwarding classes. Similarly, linking together a PIC that supports WRED with a PIC that does not support it will result in a LAG bundle that does not support WRED.

Example: Configuring Aggregated Ethernet LACP

Configure aggregated Ethernet LACP over a VLAN-tagged interface:

LACP with VLAN-Tagged Aggregated Ethernet

```
[edit interfaces]
ge--1/1/1 {
    ether-options {
        802.3ad ae0;
    }
}
ae0 {
    aggregated-ether-options {
        lacp {
            active;
        }
    }
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.1.1.2/24 {
                vrrp-group 0 {
                    virtual-address 10.1.1.4;
                    priority 200;
                }
```

```
        }
      }
    }
  }
```

Configure aggregated Ethernet LACP over an untagged interface:

LACP with Untagged Aggregated Ethernet

```
[edit interfaces]
ge-1/1/1 {
  ether-options-options {
    802.3ad ae0;
  }
}
ae0 {
  aggregated-ether-options {
    lacp {
      active;
    }
  }
  unit 0 {
    family inet {
      address 10.1.1.2/24 {
        vrrp-group 0 {
          virtual-address 10.1.1.4;
          priority 200;
        }
      }
    }
  }
}
```

Related Documentation

- lacp on page 84
- link-protection on page 86
- traceoptions
- Junos® OS Ethernet Interfaces

Configuring Targeted Broadcast

You can configure targeted broadcast with different options to forward the IP packets destined for a Layer 3 broadcast address to 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.

To enable targeted broadcast:

1. Configure the physical interface:

   ```
   [edit]
   user@host# edit interfaces interface-name
   ```

2. Configure the logical unit number:

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

```
user@host# edit unit logical-unit-number
```

3. Configure the protocol family **inet**:

```
[edit interfaces interface-name unit logical-unit-number]
user@host# edit family inet
```

4. Configure targeted broadcast:

```
[edit interfaces interface-name unit logical-unit-number family inet]
user@host# edit targeted-broadcast
```

5. Specify one of the following options:

   - To send packets to the egress interface and to the Routing Engine:

```
[edit interfaces interface-name unit logical-unit-number family inet
  targeted-broadcast]
user@host# set forward-and-send-to-re
```

   - To send packets to only the egress interface:

```
[edit interfaces interface-name unit logical-unit-number family inet
  targeted-broadcast]
user@host# set forward-only
```

6. Verify the configuration. The following example configures targeted broadcast to both the egress interface and the Routing Engine:

```
[edit interfaces interface-name unit logical-unit-number family inet targeted-broadcast]
user@host# up
user@host# show
targeted-broadcast {
  forward-and-send-to-re;
  }
}
```

Related Documentation

- targeted-broadcast on page 99
- Understanding Targeted Broadcast on page 7

Configuring Unicast RPF

For interfaces that carry IPv4 or IPv6 traffic, you can reduce the impact of denial of service (DoS) attacks by configuring unicast reverse path forwarding (RPF). Unicast RPF helps determine the source of attacks and rejects packets from unexpected source addresses on interfaces where unicast RPF is enabled.

NOTE: If you want to configure unicast RPF, your router must be equipped with the Internet Processor II application-specific integrated circuit (ASIC).

If you enable unicast RPF on live traffic, some packets are dropped while the packet forwarding components are updating.

For transit packets exiting the router through the tunnel, forwarding path features, such as RPF, forwarding table filtering, source class usage, and destination class usage are not supported on the interfaces you configure as the output interface for tunnel traffic. For firewall filtering, you must allow the output tunnel packets through the firewall filter applied to input traffic on the interface that is the next-hop interface towards the tunnel destination.

The following sections describe unicast RPF in detail:

Configuring Unicast RPF Strict Mode

In strict mode, unicast RPF checks whether the incoming packet has a source address that matches a prefix in the routing table, and whether the interface expects to receive a packet with this source address prefix.

If the incoming packet fails the unicast RPF check, the packet is not accepted on the interface. When a packet is not accepted on an interface, unicast RPF counts the packet and sends it to an optional fail filter. If the fail filter is not configured, the default action is to silently discard the packet.

The optional fail filter allows you to apply a filter to packets that fail the unicast RPF check. You can define the fail filter to perform any filter operation, including accepting, rejecting, logging, sampling, or policing.

When unicast RPF is enabled on an interface, Bootstrap Protocol (BOOTP) packets and Dynamic Host Configuration Protocol (DHCP) packets are not accepted on the interface. To allow the interface to accept BOOTP packets and DHCP packets, you must apply a fail filter that accepts all packets with a source address of **0.0.0.0** and a destination address of **255.255.255.255.** For a configuration example, see "Example: Configuring Unicast RPF" on page 49.

For more information about unicast RPF, see the Junos OS Routing Protocols Configuration Guide. For more information about defining fail filters, see the Routing Policy Configuration Guide.

To configure unicast RPF, include the **rpf-check** statement:

```
rpf-check <fail-filter filter-name>;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6)]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6)]**

Using unicast RPF can have several consequences when implemented with traffic filters:

- RPF fail filters are evaluated after input filters and before output filters.
- If you configure a filter counter for packets dropped by an input filter, and you want to know the total number of packets dropped, you must also configure a filter counter for packets dropped by the RPF check.
- To count packets that fail the RPF check and are accepted by the RPF fail filter, you must configure a filter counter.
- If an input filter forwards packets anywhere other than the **inet.0** or **inet6.0** routing tables, the unicast RPF check is not performed.
- If an input filter forwards packets anywhere other than the routing instance the input interface is configured for, the unicast RPF check is not performed.

Configuring Unicast RPF Loose Mode

By default, unicast RPF uses strict mode. Unicast RPF loose mode is similar to unicast RPF strict mode and has the same configuration restrictions. The only check in loose mode is whether the packet has a source address with a corresponding prefix in the routing table; loose mode does not check whether the interface expects to receive a packet with a specific source address prefix. If a corresponding prefix is not found, unicast RPF loose mode does not accept the packet. As in strict mode, loose mode counts the failed packet and optionally forwards it to a fail filter, which either accepts, rejects, logs, samples, or polices the packet.

To configure unicast RPF loose mode, include the **mode**:

```
mode loose;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check <fail-filter *filter-name*>]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check <fail-filter *filter-name*>]**

Configuring Unicast RPF Loose Mode with Ability to Discard Packets

Starting with Junos OS Release 12.1, unicast RPF loose mode has the ability to discard packets with the source address pointing to the discard interface. This feature is supported

on MX Series routers and on T Series routers with Type 1 FPCs, Type 2 FPCs, and Type 3 FPCs. Using unicast RPF loose mode, along with Remote Triggered Black Hole (RTBH) filtering, provides an efficient way to discard packets coming from known attack sources. BGP policies in edge routers ensure that packets with untrusted source addresses have their next hop set to a discard route. When a packet arrives at the router with an untrusted source address, unicast RPF performs a route lookup of the source address. Because the source address route points to a discard next hop, the packet is dropped and a counter is incremented. This feature is supported on both IPv4 (**inet**) and IPv6 (**inet6**) address families.

To configure unicast RPF loose mode with the ability to discard packets, include the **rpf-loose-mode-discard family inet** statement at the **[edit forwarding-options]** hierarchy level:

```
rpf-loose-mode-discard {
  family {
    inet;
  }
}
```

Unicast RPF and Default Routes

When the active route cannot be chosen from the routes in a routing table, the router chooses a default route. A default route is equivalent to an IP address of 0.0.0.0/0. If you configure a default route, and you configure unicast RPF on an interface that the default route uses, unicast RPF behaves differently than it does otherwise. For information about configuring default routes, see the Junos OS Routing Protocols Configuration Guide.

To determine whether the default route uses an interface, enter the **show route** command:

```
user@host> show route address
```

address is the next-hop address of the configured default route. The default route uses the interfaces shown in the output of the **show route** command.

The following sections describe how unicast RPF behaves when a default route uses an interface and when a default route does not use an interface:

- Unicast RPF Behavior with a Default Route on page 47
- Unicast RPF Behavior Without a Default Route on page 48

Unicast RPF Behavior with a Default Route

If you configure a default route that uses an interface configured with unicast RPF, unicast RPF behaves as follows:

- Loose mode—All packets are automatically accepted. For this reason, we recommend that you not configure unicast RPF loose mode on interfaces that the default route uses.
- Strict mode—The packet is accepted when either of the following is true:
  - The source address of the packet matches any of the routes (either default or learned) that can be originated from the interface. Note that routes can have multiple

destinations associated with them; therefore, if one of the destinations matches the incoming interface of the packet, the packet is accepted.

- The source address of the packet does not match any of the routes.

The packet is not accepted when either of the following is true:

- The source address of the packet does not match a prefix in the routing table.
- The interface does not expect to receive a packet with this source address prefix.

Unicast RPF Behavior Without a Default Route

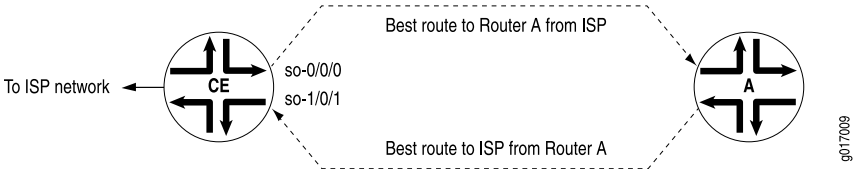
If you do not configure a default route, or if the default route does not use an interface configured with unicast RPF, unicast RPF behaves as described in "Configuring Unicast RPF Strict Mode" on page 45 and "Configuring Unicast RPF Loose Mode" on page 46. To summarize, unicast RPF without a default route behaves as follows:

- Strict mode—The packet is not accepted when either of the following is true:
  - The packet has a source address that does not match a prefix in the routing table.
  - The interface does not expect to receive a packet with this source address prefix.
- Loose mode—The packet is not accepted when the packet has a source address that does not match a prefix in the routing table.

Unicast RPF with Routing Asymmetry

In general, we recommend that you not enable unicast RPF on interfaces that are internal to the network because internal interfaces are likely to have *routing asymmetry*. Routing asymmetry means that a packet's outgoing and return paths are different. Routers in the core of the network are more likely to have asymmetric reverse paths than routers at the customer or provider edge. Figure 2 on page 48 shows unicast RPF in an environment with routing asymmetry.

Figure 2: Unicast RPF with Routing Asymmetry



In Figure 2 on page 48, if you enable unicast RPF on interface **so-0/0/0**, traffic destined for Router A is not rejected. If you enable unicast RPF on interface **so-1/0/1**, traffic from Router A is rejected.

If you need to enable unicast RPF in an asymmetric routing environment, you can use fail filters to allow the router to accept incoming packets that are known to be arriving by specific paths. For an example of a fail filter that accepts packets with a specific source and destination address, see "Example: Configuring Unicast RPF" on page 49.

Configuring Unicast RPF on a VPN

You can configure unicast RPF on a VPN interface by enabling unicast RPF on the interface and including the **interface** statement at the **[edit routing-instances *routing-instance-name*]** hierarchy level.

You can configure unicast RPF only on the interfaces you specify in the routing instance. This means the following:

- For Layer 3 VPNs, unicast RPF is supported on the CE router interface.
- Unicast RPF is not supported on core-facing interfaces.
- For virtual-router routing instances, unicast RPF is supported on all interfaces you specify in the routing instance.
- If an input filter forwards packets anywhere other than the routing instance the input interface is configured for, the unicast RPF check is not performed.

For more information about VPNs and virtual-router routing instances, see the Junos OS VPNs Configuration Guide. For more information about FBF, see the Junos OS Routing Protocols Configuration Guide.

Example: Configuring Unicast RPF on a VPN

Configure unicast RPF on a Layer 3 VPN interface:

```
[edit interfaces]
so-0/0/0 {
   unit 0 {
      family inet {
         rpf-check;
      }
   }
}
[edit routing-instance]
VPN-A {
   interface so-0/0/0.0;
}
```

Example: Configuring Unicast RPF

Configure unicast RPF strict mode, and apply a fail filter that allows the interface to accept BOOTP packets and DHCP packets. The filter accepts all packets with a source address of **0.0.0.0** and a destination address of **255.255.255.255**.

```
[edit firewall]
filter rpf-special-case-dhcp-bootp {
   term allow-dhcp-bootp {
      from {
         source-address {
            0.0.0.0/32;
         }
         address {
            255.255.255.255/32;
```

```
        }
      }
      then {
        count rpf-dhcp-bootp-traffic;
        accept;
      }
    }
    term default {
      then {
        log;
        reject;
      }
    }
}
[edit]
interfaces {
  so-0/0/0 {
    unit 0 {
      family inet {
        rpf-check fail-filter rpf-special-case-dhcp-bootp;
      }
    }
  }
}
```

Related Documentation

- unicast-reverse-path on page 102
- Example: Configuring Unicast Reverse-Path-Forwarding Check

CHAPTER 5

Configuration Statements

[edit chassis] Hierarchy Level

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
      lacp {
        link-protection {
          non-revertive;
        }
        system-priority;
      }
    }
    sonet {
      device-count number;
    }
    maximum-links maximum-links-limit;
  }
  alarm {
    ds1 {
      ais (ignore | red | yellow);
      ylw (ignore | red | yellow);
    }
    ethernet {
      link-down (ignore | red | yellow);
    }
    integrated-services {
      failure (ignore | red | yellow);
    }
    management-ethernet {
```

```
    link-down (ignore | red | yellow);
  }
  relay
    input {
      port port-number {
        mode (close | open);
        trigger (ignore | red | yellow;
      }
    }
    output{
      port port-number {
        input-relay input-relay;
        mode (close | open);
        temperature;
      }
    }
  serial {
    cts-absent (ignore | red | yellow);
    dcd-absent (ignore | red | yellow);
    dsr-absent (ignore | red | yellow);
    loss-of-rx-clock (ignore | red | yellow);
    loss-of-tx-clock (ignore | red | yellow);
    tm-absent (ignore | red | yellow);
  }
  services {
    hw-down (ignore | red | yellow);
    linkdown (ignore | red | yellow);
    pic-hold-reset (ignore | red | yellow);
    pic-reset (ignore | red | yellow);
    rx-errors (ignore | red | yellow);
    sw-down (ignore | red | yellow);
    tx-errors (ignore | red | yellow);
  }
  sonet {
    (ais-l | ais-p | ber-sd | ber-sf | locd | lol | lop-p | los | pll | plm-p | rfi-l | rfl-p | uneq-p)
      (ignore | red | yellow);
  }
  t3 {
    (ais | exz | ferf | idle | lcv | lof | los | pll | ylw) (ignore | red | yellow);
  }
}
cluster {
  control-link-recovery;
    control-ports {
    fpc slot-number port port-number;
  }
  heartbeat-interval milliseconds;
  heartbeat-threshold number;
  redundancy-group {
    ... the redundancy-group subhierarchy appears at the end of the [edit chassis cluster]
      hierarchy ...
  }
reth-count number;
  traceoptions {
    file <filename > <files number> <match regular-expression> <size maximum-file-size>
      <world-readable | no-world-readable>;
```

```
    flag flag;
    level severity;
    no-remote-trace;
  }
  redundancy-group group-number {
    gratuitous-arp-count number;
    hold-down-interval seconds;
    interface-monitor {
      interface-name weight number;
    }
    ip-monitoring {
      family {
        inet {
          ipv4-address {
            interface reth index.logical-unit-number secondary-ip-address ipv4-address;
            weight number;
          }
        }
      }
      global-threshold number;
      global-weight number;
      retry-count count;
      retry-interval interval;
    }
    node node-number priority priority-number;
    preempt;
  }
config-button {
  no-clear;
  no-rescue;
}
container-devices {
  device-count number;
}
craft-lockout;
disable-power-management;
disk-partition partition-name (/config |/var) {
  level (full | high) {
    free-space threshold-value (mb | percent);
  }
}
enhanced-policer;
extended-statistics;
fabric {
  degraded {
    action-fpc-restart-disable;
    degraded-fabric-detection-enable
    degraded-fpc-bad-plane-threshold number-bad-planes;
    }
  redundancy-mode (increased-bandwidth | redundant);
}
filter;
fpc slot-number {
  ... the fpc subhierarchy appears after the main [edit chassis] hierarchy ...
}
fpc-feb-connectivity {
```

```
    fpc slot-number feb (slot-number | none);
}
fpc-resync;
fru-poweron-sequence sequence;
lcc index {
    ... the lcc subhierarchy appears after the main [edit chassis] hierarchy ...
}
maximum-ecmp value;
memory-enhanced {
    filter;
    route;
    vpn-label;
}
network-services (ethernet | enhanced-ethernet | ip | enhanced-ip);
(packet-scheduling | no-packet-scheduling);
pem {
    minimum number;
}
policer-drop-probability-low;
ppp-subscriber-services (disable | enable);
redundancy {
    cfeb slot (always | preferred);
    failover {
        on-disk-failure;
        on-loss-of-keepalives;
    }
    feb {
        redundancy-group group-name {
            description description;
            feb slot-number <backup | primary>;
            no-auto-failover;
        }
    }
    graceful-switchover;
    keepalive-time seconds;
    routing-engine slot-number (backup | disabled | master);
    sfm slot-number (always | preferred);
    ssb slot-number (always | preferred);
}
route-memory-enhanced;
route-localization {
    inet (chassis);
    inet6;
}
routing-engine {
    bios {
        no-auto-upgrade;
    }
    on-disk-failure disk-failure-action (halt | reboot);
}
sfm slot-number {
    power off;
}
sib {
    minimum number;
}
```

```
(source-route | no-source-route);
state [
  cb-upgrade [on | off];
}
synchronization {  # for M Series and T Series routers
  primary (external-a | external-b);
  secondary (external-a | external-b);
  signal-type (e1 | t1);
  switching-mode (non-revertive | revertive);
  transmitter-enable;
  validation-interval seconds;
  y-cable-line-termination;
}
synchronization {  # for MX80 and MX240 routers
  clock-mode (auto-select | free-run);
  esmc-transmit {
    interfaces (all | interface-name);
  }
  hold-interval {
    configuration-change seconds;
    restart seconds;
    switchover seconds;
  }
  network-option (option-1 | option-2);
  quality-mode-enable;
  selection-mode (configured-quality|received-quality);
  source {
    (external-a | external-b) {
      priority number;
      quality-level (prc | prs |sec | smc | ssu-a | ssu-b | st2 | st3 | st3e | st4 | stu | tnc);
      request (force-switch | lockout);
    }
    interfaces interface-name {
      priority number;
      quality-level (prc | prs |sec | smc | ssu-a | ssu-b | st2 | st3 | st3e | st4 | stu | tnc);
      request (force-switch | lockout);
      wait-to-restore minutes;
    }
  }
  switchover-mode (revertive | non-revertive);
}
synchronization {  # for ACX Series routers
  clock-mode (auto-select | free-run);
  esmc-transmit {
    interfaces (all | interface-name);
  }
  hold-interval {
    configuration-change seconds;
    restart seconds;
    switchover seconds;
  }
  network-option (option-1 | option-2);
  quality-mode-enable;
  selection-mode (configured-quality | received-quality);
  source {
    (bits | gps) {
```

```
            priority number;
            quality-level (prc | prs |sec | smc | ssu-a | ssu-b | st2 | st3 | st3e | st4 | stu | tnc);
            request (force-switch | lockout);
          }
          interfaces interface-name {
            priority number;
            quality-level (prc | prs |sec | smc | ssu-a | ssu-b | st2 | st3 | st3e | st4 | stu | tnc);
            request (force-switch | lockout);
            wait-to-restore minutes;
          }
        }
        switchover-mode(non-revertive | revertive);
      }
      system-domains {
        protected-system-domains psdnumerical-index {
          control-plane-bandwidth-percent percent;
          control-slot-numbers [ slot-numbers ];
          control-system-id control-system-id;
          description description;
          fpcs [ slot-numbers ];
        }
        root-domain-id root-domain-id;
      }
      vrf-mtu-check;
    }

    chassis {
      fpc slot-number {
        number-of-ports active-ports;
        offline;
        pic slot-number {
          ... the pic subhierarchy appears after the main [edit chassis fpc slot-number] hierarchy
            ...
        }
        port-mirror-instance port-mirror-instance-name;
        power (off  | on);
        sampling-instance instance-name;
      }

      fpc slot-number {
        pic slot-number {
          adaptive-services {
            service-package (layer-2 | layer-3 | ...the following extension-provider subhierarchy
              ...);
            extension-provider {
              control-cores number;
              data-cores number;
              data-flow-affinity {
                hash-key (layer-3 | layer-4);
              }
              channelization;
              forwarding-db-size megabytes;
              object-cache-size megabytes;
              package package-name;
              policy-db-size megabytes;
              syslog {
```

```
        facility {
          severity;
          destination (pic-console | routing-engine);
        }
      }
      wired-process-mem-size megabytes;
    }
  }
  aggregated-devices {
    ima {
      device-count number;
    }
  }
  aggregate-ports;
  atm-cell-relay-accumulation;
  atm-l2circuit-mode (aal5 | cell | trunk trunk);
  ce1 {
    e1 port-number {
      channel-group group-number timeslots slot-number;
    }
  }
  ct3 {
    port port-number {
      t1 link-number {
        channel-group group-number timeslots slot-number;
      }
    }
  }
  ethernet {
    pic-mode (enhanced-switching | routing | switching);
  }
  fibre-channel {
    port port-number;
    port-range port-range-low port-range-high
  }
  egress-policer-overhead bytes;
  forwarding-mode {
    sa-multicast;
    vlan-steering {
    vlan-rule (high-low | odd-even);
    }
  }
  framing (e1 | e3 | sdh | sonet | t1 | t3);
  idle-cell-format {
    itu-t;
    payload-pattern payload-pattern-byte;
  }
  ingress-policer-overhead bytes;
  inline-services {
    bandwidth (1g | 10g);
  }
  linerate-mode;
  max-queues-per-interface (4 | 8);
  mlfr-uni-nni-bundles number;
  no-concatenate;
  no-multi-rate;
```

```
        port port-number {
          framing (e1 | e3 | sdh | sonet | t1 | t3);
          forwarding-mode {
            sa-multicast;
          }
          speed ( oc3-stm1 | oc12-stm4 | oc48-stm16);
        }
        port-mirror-instance port-mirror-instance-name;
        q-pic-large-buffer {
          (large-scale | small-scale);
        }
        red-buffer-occupancy {
          weighted-averaged <instant-usage-weight-exponent weight-value>;
        }
        shdsl {
          pic-mode (1-port-atm | 2-port-atm);
        }
        sparse-dlcis;
        traffic-manager {
          egress-shaping-overhead number;
          ingress-shaping-overhead number;
          mode {
            egress-only;
            ingress-and-egress;
            session-shaping;
          }
        }
        tunnel-queuing;
        tunnel-services {
          bandwidth (1g | 10g | 20g | 40g);
          tunnel-only;
        }
        vtmapping (itu-t | klm);
      }
    }
}

chassis {
  lcc index {
    fpc slot-number {
      ... the fpc subhierarchy appears after the main [edit chassis lcc index] hierarchy ...
    }
    offline;
    online-expected;
  }
}

lcc index {
  fpc slot-number {
    pic slot-number {
      ... the pic subhierarchy appears after the main [edit chassis lcc index fpc slot-number]
        hierarchy ...
    }
    power (off  | on);
    sampling-instance instance-name;
  }
```

```
fpc slot-number {
  pic slot-number {
    aggregate-ports;
    atm-cell-relay-accumulation;
    atm-l2circuit-mode (aal5 | cell | trunk trunk);
    framing (e1 | e3 | sdh | sonet | t1 | t3);
    idle-cell-format {
      itu-t;
      payload-pattern payload-pattern-byte;
    }
    linerate-mode;
    max-queues-per-interface (4 | 8);
    no-concatenate;
    no-mcast-replication;
    no-pre-classifier;
    port port-number {
      framing (e1 | e3 | sdh | sonet | t1 | t3);
    }
    q-pic-large-buffer {
      (large-scale | small-scale);
    }
    red-buffer-occupancy {
      weighted-averaged <instant-usage-weight-exponent weight-value>;
    }
    shdsl {
      pic-mode (1-port-atm | 2-port-atm);
    }
    traffic-manager {
      egress-shaping-overhead bytes;
      ingress-shaping-overhead bytes;
      mode {
        egress-only;
        ingress-and-egress;
      }
    }
  }
 }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies

[edit dynamic-profiles] Hierarchy Level

```
dynamic-profiles {
  profile-name {
    class-of-service
    ... statements from those in [edit class-of-service] Hierarchy Level.
    firewall
    ... statements from those in [edit firewall] Hierarchy Level.
    interfaces
    ... statements from those in [edit interfaces] Hierarchy Level.
    policy-options
    ... statements from those in [edit policy-options] Hierarchy Level.
```

```
    predefined-variable-defaults variable-name default-value
    profile-variable-set variable-set-name dynamic-variable-name substitute-variable-name
    protocols
    ... statements from those in [edit protocols] Hierarchy Level.
    routing-instances
    ... statements from those in [edit routing-instances] Hierarchy Level.
    routing-options
    ... statements from those in [edit routing-options] Hierarchy Level.
    services
    ... statements from those in [edit services] Hierarchy Level.
      variables {
        variable-name {
          default-value default-value;
          equals expression;
          mandatory;
          }
          uid;
          uid-reference;
        }
      }
  }
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit dynamic-profiles routing-instances] Hierarchy Level
- [edit dynamic-profiles routing-options] Hierarchy Level
- [edit dynamic-profiles variables] Hierarchy Level

[edit forwarding-options rpf-loose-mode-discard] Hierarchy Level

```
rpf-loose-mode-discard {
  family {
    inet;
    inet6;
  }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit forwarding-options] Hierarchy Level

[edit interfaces] Hierarchy Level

The following statement hierarchy can also be included at the **[edit logical-systems *logical-system-name*]** hierarchy level.

```
interfaces {
  interface-name {
    ... the "interface-name" subhierarchy appears after the main [edit interfaces] hierarchy
      level ...
  }
  interface-set interface-set-name {
```

```
    interface interface-name {
      (unit unit-number | vlan-tags-outer vlan-tag);
    }
  }
  irb (Interfaces) {
    accounting-profile name;
    description  text;
    disable;

    (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-id {
            (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 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 ];
            vrrp-inherit-from vrrp-group;
          }
        }
        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];
    }
  }
  traceoptions {
    file <filename> <files number> <match regular-expression> <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag <disable>;
    no-remote-trace;
  }
```

```
}

interfaces {
  interface-name {
    disable;
    accounting-profile name;
    aggregated-ether-options {
      ethernet-switch-profile {
        tag-protocol-id [ hexadecimal-identifiers ];
      }
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
        admin-key key;
        fast-failover;
        link-protection {
          disable;
          (revertive | non-revertive);
        }
        periodic (fast | slow);
        system-id mac-address;
        system-priority priority;
      }
      (link-protection | no-link-protection);
      link-speed (100m | 1g | 8g | 10g | 40g | 50g | 80g | 100g | oc192);
      logical-interface-fpc-redundancy;
      (loopback | no-loopback);
      mc-ae {
        chassis-id chassis-id;
        events {
          iccp-peer-down {
            force-icl-down;
            prefer-status-control-active;
          }
        }
        mc-ae-id mc-ae-id;
        mode (active-active | active-standby);
        redundancy-group group-id;
        status-control (active | standby);
      }
      minimum-links number;
      rebalance-periodic {
        start-time time;
        interval number;
      }
      source-address-filter {
        mac-address;
      }
      (source-filtering | no-source-filtering);
    }
    auto-configure {
      remove-when-no-subscribers;
      stacked-vlan-ranges {
        access-profile profile-name;
        authentication {
          password password-string;
```

```
        username-include {
          circuit-type;
          delimiter delimiter-character;
          domain-name domain-name-string;
          interface-name;
          mac-address;
          option-82 ( circuit-id | remote-id);
          radius-realm radius-realm-string;
          user-prefix user-prefix-string;
        }
      }
      dynamic-profile profile-name {
        accept (any | dhcp-v4 | dhcp-v6 | inet | inet6);
        ranges (any | low-tag–high-tag),(any | low-tag–high-tag);
      }
    }
    vlan-ranges {
      access-profile profile-name;
      authentication {
        password password-string;
        username-include {
          circuit-type;
          delimiter delimiter-character;
          domain-name domain-name-string;
          interface-name;
          mac-address;
          option-82;
          radius-realm radius-realm-string;
          user-prefix user-prefix-string;
        }
      }
      dynamic-profile profile-name {
        accept (any | dhcp-v4 | dhcp-v6 | inet | inet6);
        ranges (any | low-tag)–(any | high-tag);
      }
    }
    override tag vlan-tag dynamic-profile profile name;
  }
  encapsulation (ethernet-bridge | ethernet-vpls | extended-vlan-bridge |
    extended-vlan-vpls | flexible-ethernet-services | vlan-vpls);
  ether-options {
    802.3ad {
      aex;
      (backup | primary);
      lacp {
        force-up;
        port-priority
      }
    }
    asynchronous-notification;
    (auto-negotiation | no-auto-negotiation);
    ethernet-switch-profile {
      ethernet-policer-profile {
        input-priority-map {
          ieee802.1p premium [ values ];
        }
```

```
            output-priority-map {
              classifier {
                premium {
                  forwarding-class class-name {
                    loss-priority (high | low);
                  }
                }
              }
            }
            policer cos-policer-name {
              aggregate {
                bandwidth-limit bps;
                burst-size-limit bytes;
              }
              premium {
                bandwidth-limit bps;
                burst-size-limit bytes;
              }
            }
            tag-protocol-id;
          }
          (mac-learn-enable | no-mac-learn-enable);
        }
        (flow-control | no-flow-control);
        ignore-l3-incompletes;
        link-mode (automatic | full-duplex | half-duplex);
        (lloopback | no-loopback);
        keepalives <interval seconds> <down-count number> <up-count number>;
        speed (1g | 10m | 100m | 10m-100m | auto-negotiation);
        source-address-filter {
          mac-address;
        }
        source-filtering | no-source-filtering;
      }
      flexible-vlan-tagging;
      (gratuitous-arp-reply | no-gratuitous-arp-reply);
      hold-time (up milliseconds | down milliseconds);
      interface-transmit-statistics;
      (keepalives <down-count number> <interval seconds> <up-count number> |
        no-keepalives);
      layer2-policer {
        apply-groups [ group-names ];
        apply-groups-except [ group-names ];
      }
      link-mode (automatic | full-duplex);
      mac mac-address;
      mtu bytes;
      multi-chassis-protection peer-ip-address {
        interface interface-name;
      }
      native-vlan-id number;
      no-gratuitous-arp-request;
      optics-options {
        alarm low–light–alarm {
          (link-down | syslog);
        }
```

```
    warning low–light–warning {
      (link-down | syslog);
    }
    wavelength nm;
  }
  passive-monitor-mode;
  per-unit-scheduler;
  speed (10m | 100m | 1g | auto | oc3 | oc12 | oc48);
  stacked-vlan-tagging;
  traceoptions {
    flag flag;
  }
  transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
  }
  (traps | no-traps);
  unidirectional;
  vlan-tagging;
}


interface-name {
  unit logical-unit-number {
    disable;
    accept-source-mac {
      mac-address mac-address {
        policer {
          input policer-name;
          output policer-name;
        }
      }
    }
    account-layer2-overhead (Interface Level) {
      value;
      egress bytes;
      ingress bytes;
    }
    accounting-profile name;
    advisory-options {
      downstream-rate rate;
      upstream-rate rate;
    }
    arp-resp (restricted|unrestricted);
    bandwidth rate;
    clear-dont-fragment-bit;
    copy-tos-to-outer-ip-header;
    demux-destination family;
    encapsulation (vlan-bridge | vlan-vpls);
    epd-threshold cells plp1 cells;
    filter filter-name;
    inner-vlan-id-range start start-id end end-id;
    input-vlan-map {
      (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
      inner-tag-protocol-id tpid;
```

```
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  interface-shared-with psdnumerical-index;
  layer2-policer {
    input-hierarchical-policer policer-name;
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
  }
  multi-chassis-protection peer-ip-address {
    interface interface-name;
  }
  native-inner-vlan-id number;
  output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  peer-interface interface-name;
  peer-unit unit-number;
  plp-to-clp;
  proxy-arp <restricted | unrestricted>;
  rpm {
    (client | server);
    twamp-server;
  }
  swap-by-poppush;
  vlan-id number;
  vlan-id-list [ vlan-id vlan-id-vlan-id ];
  vlan-id-range number-number;
  vlan-tags (inner <tpid.>vlan-id | inner-list [vlan-id vlan-id–vlan-id ] |
    inner-range <tpid.>vlan-id–vlan-id) outer <tpid.>vlan-id;
}

unit logical-unit-number {
  family ethernet-switching {
    filter{
      group filter-group-number;
      (input filter-name | input-list [ filter-names ]);
    (output filter-name | output-list [ filter-names ]);
    (inner-vlan-id-list [ vlan-ids ] | vlan-id number | vlan-id-list [ number
      number–number ]);
    interface-mode (access | trunk);
    policer {
      input policer-name;
      output policer-name;
    }
    vlan-rewrite {
      translate old-vlan-id new-vlan-id;
    }
    vlan {
```

```
        members [ all vlan-identifiers ];
    }
}
family inet {
    filter {
        group filter-group-number;
        (input filter-name | input-list [ filter-names ]);
        (output filter-name | output-list [ filter-names ]);
    }
    input-hierarchical-policer policer-name;
    mac-validate (loose | strict);
    mtu bytes;
    no-neighbor-learn;
    no-redirects;
    policer {
        arp policer-template-name;
        input policer-name;
        output policer-name;
    }
    primary;
    receive-options-packets;
    receive-ttl-exceeded;
    rpf-check {
        fail-filter filter-name;
        mode loose;
    }
    sampling {
        (input | output | input output);
    }
    simple-filter {
        input filter-name;
    }
    targeted-broadcast {
        forward-and-send-to-re;
        forward-only;
    }
    unnumbered-address interface-name <destination address>
        <destination-profile profile-name> <preferred-source-address address>;

}

family inet6 {
    address ipv6-address {
        destination destination-address;
        eui-64;
        ndp ipv6-address <l2-interface interface-name> <(mac mac-address |
            multicast-mac multicast-mac-address) <publish>>;
        preferred;
        primary;
        vrrp-inet6-group group-number {
            (accept-data | no-accept-data);
            fast-interval milliseconds;
            inet6-advertise-interval seconds;
            (no-preempt; | ... the following preempt statement ...)
            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 ip-address-prefix/prefix-length routing-instance instance-name
                priority-cost priority;
            }
            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 {
          group filter-group-number;
          (input filter-name | input-list [ filter-names ]);
          (output filter-name | output-list [ filter-names ]);
        }
        input-hierarchical-policer policer-name;
        mtu bytes;
        nd6-stale-time seconds;
        no-neighbor-learn;
        policer {
          input policer-name;
          output policer-name;
        }
        rpf-check {
          fail-filter filter-name;
          mode loose;
        }
        sampling {
          (input | output | input output);
        }
        unnumbered-address interface-name preferred-source-address address;

      }

      family iso {
        address iso-address;
        mtu bytes;
      }

      family mlfr-end-to-end {
        bundle logical-interface-name;
      }



      family mpls {
```

```
        filter {
          group filter-group-number;
          (input filter-name | input-list [ filter-names ]);
          (output filter-name | output-list [ filter-names ]);
        }
        input-hierarchical-policer policer-name;
        maximum-labels maximum-labels;
        mtu bytes;
        policer {
          input policer-name;
          output policer-name;
        }
      }


      family vpls {
        core-facing;
        filter {
          group filter-group-number;
          (input filter-name | input-list [ filter-names ]);
          (output filter-name | output-list [ filter-names ]);
        }
        policer {
          input policer-name;
          output policer-name;
        }
      }

    }
  }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies

[edit multi-chassis] Hierarchy Level

```
multi-chassis {
  multi-chassis-protection ipv4-address {
    interface interface-name;
  }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies

[edit protocols isis] Hierarchy Level

The following statement hierarchy can also be included at the **[edit protocols isis]** hierarchy level.

```
protocols {
  isis {
```

```
disable;
clns-routing;
context-identifier ip-address</prefix> {
   level (1 | 2) <disable>;
}
export [ policy-names ];
graceful-restart {
   disable;
   helper-disable;
   restart-duration seconds;
}
ignore-attached-bit;
interface interface-name {
   ... the interface subhierarchy appears after the main [edit protocols isis] hierarchy ...
}
label-switched-path name level level metric metric;
level (1 | 2) {
   disable;
   authentication-key key;
   authentication-type authentication;
   external-preference preference;
   no-csnp-authentication;
   no-hello-authentication;
   no-psnp-authentication;
   preference preference;
   prefix-export-limit number;
   wide-metrics-only;
}
loose-authentication-check;
lsp-lifetime seconds;
max-areas number;
no-adjacency-holddown;
no-authentication-check;
no-ipv4-routing;
no-ipv6-routing;
overload {
   advertise-high-metrics;
   timeout seconds;
}
reference-bandwidth reference-bandwidth;
rib-group {
   inet group-name;
   inet6 group-name;
}
spf-options {
   delay milliseconds;
   holddown milliseconds;
   rapid-runs number;
}
topologies {
   ipv4-multicast;
   ipv6-multicast;
   ipv6-unicast;
}
traceoptions {
```



```
    file filename <files number> <size maximum-file-size> <world-readable |
      no-world-readable>;
    flag flag <flag-modifier> <disable>;
  }
  traffic-engineering {
    disable;
    family inet {
      shortcuts {
        multicast-rpf-routes:
      }
    }
    family inet6 {
      shortcuts;
    }
  }
  ignore-lsp-metrics;
}

isis {
  interface interface-name {
    disable;
    bfd-liveness-detection {
      authentication {
        algorithm (keyed-md5 | keyed-sha-1 | meticulous-keyed-md5 |
          meticulous-keyed-sha-1 | simple-password);
        key-chain key-chain-name;
        loose-check;
      }
      detection-time {
        threshold milliseconds;
      }
      minimum-interval milliseconds;
      minimum-receive-interval milliseconds;
      multiplier number;
      no-adaptation;
      transmit-interval {
        minimum-interval milliseconds;
        threshold milliseconds;
      }
      version (1 | automatic);
    }
    checksum;
    csnp-interval (seconds | disable);
    hello-padding (adaptive | loose | strict);
    ldp-synchronization {
      disable;
      hold-time seconds;
    }
    level (1 | 2) {
      disable;
      hello-authentication-key key;
      hello-authentication-type authentication;
      hello-interval seconds;
      hold-time seconds;
      ipv4-multicast-metric number;
      ipv6-multicast-metric number;
```

```
            ipv6-unicast-metric number;
            metric metric;
            passive;
            priority number;
            te-metric metric;
          }
          link-protection;
          lsp-interval milliseconds;
          mesh-group (value | blocked);
          no-adjacency-down-notification;
          no-eligible-backup;
          no-ipv4-multicast;
          no-ipv6-multicast;
          no-ipv6-unicast;
          no-unicast-topology;
          node-link-protection;
          passive;
          point-to-point;
        }
      }
    }
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit protocols] Hierarchy Level

Layer 2 Routing Instances Configuration Hierarchy

Use the **vpls** routing instance type for point-to-multipoint LAN implementations between a set of sites in a VPN.

To configure routing instances for Layer 2 networks, include the following statements:

```
routing-instances {
  routing-instance-name {
    access {
      address-assignment {
        ... same statements as in the address-assignment subhierarchy in [edit access]
            Hierarchy Level ...
      }
      address-protection;
    description text;
    egress-protection {
      context-identifier context-id;
    }
    forwarding-options {
      ...forwarding-options...
    }
    instance-role role;
    instance-type type;
    interface interface-name;
    l2-domain-id-for-l3 id;
    l2vpn-id community;
    layer3-domain-identifier identifier;
    multicast-snooping-options {
```

```
    ... same statements as in [edit multicast-snooping-options] Hierarchy Level EXCEPT
        FOR ...
    traceoptions {...}   # NOT valid at this level
}
no-irb-layer-2-copy;
no-local-switching;
no-vrf-advertise;
no-vrf-propagate-ttl;
pbb-options {
    default-bvlan bvlan;
    peer-instance instance;
    vlan-id vlan-id isid-list [ isid-numbers ]
}
protocols {
    ... the protocols subhierarchy appears after the main [edit routing-instances
        routing-instance-name] hierarchy ...
}
provider-tunnel {
    ... the provider-tunnel subhierarchy appears after the main [edit routing-instances
        routing-instance-name] hierarchy ...
}
route-distinguisher (as-number:number | ip-address:number);
routing-interface interface;
routing-options {
    ... the routing-options subhierarchy appears after the main [edit routing-instances
        routing-instance-name] hierarchy ...
}
service-groups {
    service-group-name {
        pbb-service-options {
            default-isid isid-number;
            isid isid-number vlan-id-list [ vlan-ids ];
            mac-address mac-address;
        }
        service-type type;
    }
}
services {
    mobile-ip {
        ... same statements as in [edit services mobile-ip] Hierarchy Level ...
    }
}
switch-options {
    ... same statements as in [edit switch-options] Hierarchy Level ...
}
vlan-id (id | all | none);
vlan-model one-to-one;
vlan-tags outer <tpid.>vlan-id inner <tpid.>vlan-id;
[edit vlans] Hierarchy Level {
    ... same statements as in [edit vlans] Hierarchy Level ...
}
vrf-advertise-selective {
    family {
        inet-mvpn;
        inet6-mvpn;
    }
```

```
    }
    vrf-export [ policy-names ];
    vrf-import [ policy-names ];
    vrf-propagate-ttl;
    vrf-table-label;
    vrf-target {
      export community-name;
      import community-name;
    }
    protocols {
      ... protocols-configuration ...
    }
    routing-options {
      ... routing-options-configuration ...
    }
    bridge-domains {
      bridge-domain-name {
        domain-type bridge;
        interface interface-name;
        routing-interface routing-interface-name;
        vlan-id (Bridge Domain or VLAN) (none | all | number);
        vlan-tags outer number inner number;
        bridge-options {
          interface-mac-limit limit {
            packet-action drop;
          }
          interface interface-name {
            interface-mac-limit limit {
              packet-action drop;
            }
          }
          mac-statistics;
          mac-table-size limit {
            packet-action drop;
          }
          no-mac-learning;
          static-mac mac-address;
        }
      }
    }
  }
}
```

With the exception of the **instance-type virtual-switch** statement (which configures a virtual-switch routing instance), you can include the statements at the following hierarchy levels:

- **[edit]**
- **[edit logical-systems *logical-system-name*]**

The **instance-type virtual-switch** statement is not supported at the **[edit logical-systems *logical-system-name*]** hierarchy level.

Related Documentation

- Routing Instances Overview

- Layer 2 Routing Instance Types
- Configuring a Layer 2 Virtual Switch on page 15
- Configuring a Layer 2 Control Protocol Routing Instance

bandwidth (Interfaces)

Syntax bandwidth *rate*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure an informational-only bandwidth value for an interface. This statement is valid for all logical interface types except multilink and aggregated interfaces.

NOTE: We recommend that you be careful when setting this value. Any interface bandwidth value that you configure using the **bandwidth** statement affects how the interface cost is calculated for a dynamic routing protocol, such as OSPF. By default, the interface cost for a dynamic routing protocol is calculated using the following formula:

cost = reference-bandwidth/bandwidth,

where bandwidth is the physical interface speed. However, if you specify a value for bandwidth using the **bandwidth** statement, that value is used to calculate the interface cost, rather than the actual physical interface bandwidth.

Options ***rate***—Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation **c**; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.

Range: Not limited.

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

Related Documentation
- Configuring the Interface Bandwidth

chassis-id

Syntax chassis-id *chassis-id*;

Hierarchy Level [editinterfaces aggregated-ether-options mc-ae]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Specify the chassis ID of the multichassis aggregated Ethernet interface device. LACP uses the chassis ID to calculate the port number of the multichassis link aggregation group (MC-LAG) physical member links.

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

filter

Syntax

```
filter {
  group filter-group-number;
  input filter-name;
  input-list [ filter-names ];
  output filter-name;
  output-list [ filter-names ];
}
```

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 9.0 for EX Series switches.

Description

NOTE: On EX Series switches, the **group**, **input-list**, **output-filter** statements are not supported under the [**edit interfaces** *interface-name* **unit** *logical-unit-number* **family inet**], [**edit interfaces** *interface-name* **unit** *logical-unit-number* **family inet6**], and [**edit interfaces** *interface-name* **unit** *logical-unit-number* **family mpls**] hierarchies.

Apply a filter to an interface. You can also use filters for encrypted traffic. When you configure filters, you can configure them under the **family ethernet-switching**, **inet**, **inet6**, **mpls**, or **vpls** only.

Options

group ***filter-group-number***—Define an interface to be part of a filter group. The default filter group number is 0.

Range: 0 through 255

input ***filter-name***—Name of one filter to evaluate when packets are received on the interface.

output ***filter-name***—Name of one filter to evaluate when packets are transmitted on the interface.

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

- Applying a Filter to an Interface
- Junos Services Interfaces Configuration Release 11.2
- Routing Policy Configuration Guide
- Junos OS System Basics Configuration Guide

- Configuring Gigabit Ethernet Interfaces (CLI Procedure)
- Configuring Firewall Filters (CLI Procedure)
- family

flow-control

Syntax (flow-control | no-flow-control);

Hierarchy Level [edit interfaces *interface-name* aggregated-ether-options],
[edit interfaces *interface-name* ether-options],
[edit interfaces *interface-name* fastether-options],
[edit interfaces *interface-name* gigether-options],
[edit interfaces *interface-name* multiservice-options],
[edit interfaces interface-range *name* aggregated-ether-options],
[edit interfaces interface-range *name* ether-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 in EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces only, explicitly enable flow control, which regulates the flow of packets from the router or switch to the remote side of the connection. Enabling flow control is useful when the remote device is a Gigabit Ethernet switch. Flow control is not supported on the 4-port Fast Ethernet PIC.

NOTE: On the Type 5 FPC, to prioritize control packets in case of ingress oversubscription, you must ensure that the neighboring peers support MAC flow control. If the peers do not support MAC flow control, then you must disable flow control.

Default Flow control is enabled.

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

Related Documentation
- Configuring Flow Control
- Configuring Gigabit Ethernet Interfaces (CLI Procedure)

forward-and-send-to-re

Syntax forward-and-send-to-re;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family inet targeted-broadcast],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet targeted-broadcast]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify that IP packets destined for a Layer 3 broadcast address be forwarded to an egress interface and the Routing Engine. The packets are broadcast only if the egress interface is a LAN interface.

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

Related Documentation

- Configuring Targeted Broadcast on page 43
- targeted-broadcast on page 99
- Understanding Targeted Broadcast on page 7

forward-only

Syntax forward-only;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family inet targeted-broadcast],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet targeted-broadcast]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify that IP packets destined for a Layer 3 broadcast address be forwarded to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface.

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

Related Documentation

- Configuring Targeted Broadcast on page 43
- targeted-broadcast on page 99
- Understanding Targeted Broadcast on page 7

gratuitous-arp-reply

Syntax (gratuitous-arp-reply | no-gratuitous-arp-reply);

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 in EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For Ethernet interfaces, enable updating of the ARP cache for replies received in response to gratuitous ARP requests.

Default Updating of the ARP cache is disabled on all Ethernet interfaces.

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

Related Documentation

- Configuring Gratuitous ARP
- no-gratuitous-arp-request on page 89

group (RPF Selection)

Syntax

```
group group-address{
  sourcesource-address{
    next-hop next-hop-address;
  }
  wildcard-source {
    next-hop next-hop-address;
  }
}
```

Hierarchy Level [edit routing-instances *routing-instance-name* edit protocols pim rpf-selection]

Release Information Statement introduced in JUNOS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure the PIM group address for which you configure RPF selectiongroup (RPF Selection).

Default By default, PIM RPF selection is not configured.

Options ***group-address***—PIM group address for which you configure RPF selection.

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

Related Documentation
- Example: Configuring PIM RPF Selection

l2-domain-id-for-l3

Syntax l2-domain-id-for-l3 *id*;

Hierarchy Level [edit routing-instances *instance-name*]

Release Information Statement introduced in Junos OS Release 12.3R2.

Description Specify a Layer 2 domain ID within a routing instance.

Options **id**—Layer 2 identification number.

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

Related Documentation
- Configuring a Layer 2 Virtual Switch on page 15

lacp (Aggregated Ethernet)

Syntax

```
lacp {
  (active | passive);
  admin-key key;
  fast-failover;
  link-protection {
    disable;
    (revertive |non-revertive);
  }
  periodic interval;
  system-id mac-address;
  system-priority priority;
}
```

Hierarchy Level [edit interfaces ae*x* aggregated-ether-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
fast-failover option introduced in Junos OS Release 12.2.

Description For aggregated Ethernet interfaces only, configure Link Aggregation Control Protocol (LACP).

Default If you do not specify LACP as either **active** or *passive*, LACP remains passive.

Options **active**—Initiate transmission of LACP packets.

admin-key *number*—Specify an administrative key for the router or switch.

NOTE: You must also configure Multichassis Link Aggregation (MC-LAG) when you configure the admin-key.

passive—Respond to LACP packets.

fast-failover—Specify to override the IEEE 802.3ad standard and allow the standby link to receive traffic. Overriding the default behavior facilitates subsecond failover.

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 Aggregated Ethernet LACP
- Configuring Aggregated Ethernet LACP (CLI Procedure)

- Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

layer3-domain-identifier

Syntax layer3-domain-identifier *identifier*;

Hierarchy Level [edit routing-instances *instance-name*]

Release Information Statement introduced in Junos OS Release 12.3R2.

Description Specify a Layer 3 domain ID within a routing instance.

Options **id**—Layer 3 identification number.

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

Related Documentation
- Configuring a Layer 2 Virtual Switch on page 15

link-protection

Syntax

```
link–protection {
  disable;
  (revertive |non-revertive);
}
```

Hierarchy Level

[edit interfaces ae*x* aggregated-ether-options]
[edit interfaces ae*x* aggregated-ether-options *lacp*]

Release Information

Statement introduced in Junos OS Release 8.3.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Support for **disable**, **revertive**, and **non-revertive** statements added in Junos OS Release 9.3.

Description

On the router, for aggregated Ethernet interfaces only, configure link protection. In addition to enabling link protection, a primary and a secondary (backup) link must be configured to specify what links egress traffic should traverse. To configure primary and secondary links on the router, include the **primary** and **backup** statements at the **[edit interfaces ge-*fpc/pic/port* gigether-options 802.3ad ae*x*]** hierarchy level or the **[edit interfaces fe-*fpc/pic/port* fastether-options 802.3ad ae*x*]** hierarchy level.

On the switch, you can configure either Junos OS link protection for aggregated Ethernet interfaces or the LACP standards link protection for aggregated Ethernet interfaces.

For Junos OS link protection, specify **link-protection** at the following hierarchy levels:

- **[edit interfaces ge-*fpc/pic/port* ether-options 802.3ad ae*x*]**
- **[edit interfaces xe-*fpc/pic/port* ether-options 802.3ad ae*x*]**

For LACP standards link protection, specify **link-protection** at the following hierarchy levels:

- For global LACP link protection, specify at **[edit chassis aggregated-devices ethernet lacp]**
- For a specific aggregated Ethernet interface, specify at **[edit interfaces aeX aggregated-ether-options lacp]**

Options

The statements are explained separately.

Required Privilege Level

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

Related Documentation

- Configuring Aggregated Ethernet Link Protection
- Configuring LACP Link Protection of Aggregated Ethernet Interfaces (CLI Procedure)

mc-ae-id

Syntax mc-ae-id *mc-ae-id*;

Hierarchy Level [edit interfaces aggregated-ether-options mc-ae]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Specify the multichassis aggregated Ethernet (MC-AE) identification number of the MC-AE that a given aggregated Ethernet interface belongs to. The two peers that host a given multichassis link aggregation group (MC-LAG) must have the same multichassis aggregated Ethernet ID.

Options **Range:** 1 through 65535.

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

mode (QFX Series)

Syntax mode active-active ;

Hierarchy Level [edit interfaces aggregated-ether-options mc-ae]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Configure the multichassis link aggregation group (MC-LAG) to be in active-active mode. In active-active mode, all of the members of the MC-LAG will be active on both routing or switching devices. Only active-active mode is supported at this time.

Options **active-active**—Specify that all of the members of the MC-LAG will be active on both routing or switching devices.

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

Related Documentation

mode (Interfaces)

Syntax mode loose;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check]

Release Information Statement introduced before Junos OS Release 7.4.

Description Check whether the packet has a source address with a corresponding prefix in the routing table. If a corresponding prefix is not found, unicast reverse path forwarding (RPF) loose mode does not accept the packet. Unlike strict mode, loose mode does not check whether the interface expects to receive a packet with a specific source address prefix.

Default If you do not include this statement, unicast RPF is in strict mode.

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

Related Documentation
- Configuring Unicast RPF Strict Mode on page 45

multicast-rpf-routes

Syntax multicast-rpf-routes;

Hierarchy Level [edit logical-systems *logical-system-name* protocols isis traffic-engineering family inet shortcuts],
[edit logical-systems *logical-system-name* routing-instances traffic-engineering family inet shortcuts],
[edit protocols isis traffic-engineering family inet shortcuts],
[edit routing-instances *routing-instance-name* protocols isis traffic-engineering family inet shortcuts]

Release Information Statement introduced in Junos OS Release 9.3.

Description Install unicast IPv4 routes into the multicast routing table (inet.2) for multicast reverse-path-forwarding (RPF) checks.

Traffic engineering shortcuts must be enabled. IPv4 multicast topology must not be enabled. Label-switched paths (LSPs) must not be advertised into IS-IS.

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

Related Documentation
- Example: Enabling IS-IS Traffic Engineering Support

next-hop (PIM RPF Selection)

Syntax next-hop *next-hop-address*;

Hierarchy Level [edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address* source *source-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address* wildcard-source],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses* source *source-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses* wildcard-source]

Release Information Statement introduced in JUNOS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure the specific next-hop address for the PIM group source.

Options ***next-hop-address***—Specific next-hop address for the PIM group source.

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

Related Documentation
- Example: Configuring PIM RPF Selection

no-gratuitous-arp-request

Syntax no-gratuitous-arp-request;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.6 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For Ethernet interfaces, do not respond to gratuitous ARP requests.

Default Gratuitous ARP responses are enabled on all Ethernet interfaces.

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

Related Documentation
- Configuring Gratuitous ARP
- gratuitous-arp-reply on page 82

no-local-switching

Syntax no-local-switching;

Hierarchy Level [edit routing-instances *instance-name*]

Release Information Statement introduced in Junos OS Release 12.3R2.

Description Specify that access ports in this routing instance do not forward packets to each other.

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

Related Documentation

- Configuring a Layer 2 Virtual Switch on page 15

policer (MAC)

Syntax

```
policer {
    input cos-policer-name;
    output cos-policer-name;
}
```

Hierarchy Level

[edit interfaces *interface-name* unit *logical-unit-number* accept-source-mac mac-address *mac-address*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* accept-source-mac mac-address *mac-address*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description

For Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), configure MAC policing.

NOTE: What pics are supported for EX9200?

NOTE:

On MX Series routers with Gigabit Ethernet or Fast Ethernet PICs, the following considerations apply:

- Interface counters do not count the 7-byte preamble and 1-byte frame delimiter in Ethernet frames.
- In MAC statistics, the frame size includes MAC header and CRC before any VLAN rewrite/imposition rules are applied.
- In traffic statistics, the frame size encompasses the L2 header without CRC after any VLAN rewrite/imposition rule.

Options

input *cos-policer-name*—Name of one policer to specify the premium bandwidth and aggregate bandwidth.

output *cos-policer-name*—Name of one policer to specify the premium bandwidth and aggregate bandwidth.

Required Privilege Level

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

Related Documentation

- Configuring MAC Address Filtering

prefix-list (PIM RPF Selection)

Syntax

```
prefix-list prefix-list-addresses {
  source source-address {
    next-hop next-hop-address;
  }
  wildcard-source {
    next-hop next-hop-address;
  }
}
```

Hierarchy Level

[edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address* source *source-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address* wildcard-source],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses* source *source-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses* wildcard-source]

Release Information

Statement introduced in Junos OS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description

(Optional) Configure a list of prefixes (addresses) for multiple PIM groups.

Options

prefix-list-addresses—List of prefixes (addresses) for multiple PIM groups.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- Example: Configuring PIM RPF Selection

redundancy-group

Syntax redundancy-group *group-id*;

Hierarchy Level [edit interfaces aggregated-ether-options mc-ae]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Specify the redundancy group identification number. The Inter-Chassis Control Protocol (ICCP) uses the redundancy group ID to associate the routing or switching devices contained in a redundancy group.

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

Related Documentation
- Configuring Multichassis Link Aggregation on page 35

rpf-check (Dynamic Profiles)

Syntax
```
rpf-check {
  mode loose;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Check whether traffic is arriving on an expected path. You can include this statement with the **inet** protocol family only.

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 Unicast RPF Strict Mode on page 45

rpf-check (interfaces)

Syntax

```
rpf-check {
    fail-filter filter-name;
    mode loose;
}
```

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.

Description

Check whether traffic is arriving on an expected path. You can include this statement with the **inet** or **inet6** protocol family only.

The **mode** statement is explained separately.

Options

fail-filter—A filter to evaluate when packets are received on the interface. If the RPF check fails, this optional filter is evaluated. If the fail filter is not configured, the default action is to silently discard the packet.

Required Privilege Level

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

Related Documentation

- Configuring Unicast RPF Strict Mode on page 45
- Configuring Unicast RPF Loose Mode on page 46
- Example: Configuring Unicast Reverse-Path-Forwarding Check

rpf-check-policy (Routing Options RPF)

Syntax rpf-check-policy [*policy-names*];

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options multicast],
[edit logical-systems *logical-system-name* routing-options multicast],
[edit routing-instances *routing-instance-name* routing-options multicast],
[edit routing-options multicast]

Release Information
Statement introduced in Junos OS Release 8.1.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 11.3 for the QFX Series.
Statement introduced in Junos OS Release 12.3 for ACX Series routers.

Description Apply policies for disabling RPF checks on arriving multicast packets. The policies must be correctly configured.

Options ***policy-names***—Name of one or more multicast RPF check policies.

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

Related Documentation
- Example: Configuring RPF Policies

rpf-loose-mode-discard

Syntax

```
rpf-loose-mode-discard {
  family {
    inet;
    inet6;
  }
}
```

Hierarchy Level [edit forwarding-options]

Release Information Statement introduced in Junos OS Release 12.1.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Configure unicast reverse path forwarding (unicast RPF) loose mode with the ability to discard packets with the source address pointing to the discard next hop.

Options

inet—IPv4 address family.

inet6—IPv6 address family.

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

Related Documentation

- Configuring Unicast RPF on page 44

rpf-selection

Syntax

```
rpf-selection {
  group group-address {
    sourcesource-address {
      next-hop next-hop-address;
    }
    wildcard-source {
      next-hop next-hop-address;
    }
  }
  prefix-list prefix-list-addresses {
    source source-address {
      next-hop next-hop-address;
    }
    wildcard-source {
      next-hop next-hop-address;
    }
  }
```

Hierarchy Level [edit routing-instances *routing-instance-name* protocols pim]

Release Information Statement introduced in JUNOS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure the PIM RPF next-hop neighbor for a specific group and source for a VRF routing instance.

The remaining statements are explained separately.

Default If you omit the **rpf-selection** statement, PIM RPF checks typically choose the best path determined by the unicast protocol for all multicast flows.

Options ***source-address***—Specific source address for the PIM group.

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

Related Documentation

- Example: Configuring PIM RPF Selection

source (PIM RPF Selection)

Syntax

```
source source-address {
  next-hop next-hop-address;
}
```

Hierarchy Level

[edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses*]

Release Information

Statement introduced in JUNOS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description

Configure the source address for the PIM group.

Options

source-address—Specific source address for the PIM group.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- Example: Configuring PIM RPF Selection

status-control

Syntax

```
status-control (active | standby);
```

Hierarchy Level

[edit interfaces aggregated-ether-options mc-ae]

Release Information

Statement introduced in Junos OS Release 12.2 for the QFX Series.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description

Specify whether a peer hosting a multichassis link aggregation group (MC-LAG) is primary or secondary. Primary is considered active, and secondary is considered standby.

Required Privilege Level

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

targeted-broadcast

Syntax

```
targeted-broadcast {
  forward-and-send-to-re;
  forward-only;
}
```

Hierarchy Level

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

Release Information

Statement introduced in Junos OS Release 10.2.

Description

Specify the IP packets destined for a Layer 3 broadcast address 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.

The statements are explained separately.

Default

When this statement is not included, broadcast packets are sent to the Routing Engine only.

Required Privilege Level

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

Related Documentation

- Configuring Targeted Broadcast on page 43
- Understanding Targeted Broadcast on page 7

traceoptions (Individual Interfaces)

Syntax

```
traceoptions {
  file filename <files name> <size size> <world-readable | no-world-readable>;
  flag flag;
  match;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description Define tracing operations for individual interfaces.

To specify more than one tracing operation, include multiple **flag** statements.

The interfaces **traceoptions** statement does not support a trace file. The logging is done by the kernel, so the tracing information is placed in the system **syslog** file in the directory **/var/log**.

Default If you do not include this statement, no interface-specific tracing operations are performed.

Options **file name**—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**. By default, interface process tracing output is placed in the file **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 number of trace files is reached. Then the oldest trace file is overwritten.**dcd**.

match—(Optional) Regular expression for lines to be traced.

no-world-readable—(Optional) Prevent any user from reading the log file.

world-readable—(Optional) Allow any user to read the log file.

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 this size, it is renamed **trace-file.0**. When the **trace-file** again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

flag—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. The following are the interface-specific tracing options.

- **all**—All interface tracing operations
- **event**—Interface events

- **ipc**—Interface interprocess communication (IPC) messages
- **media**—Interface media changes
- **q921**—Trace ISDN Q.921 frames
- **q931**—Trace ISDN Q.931 frames

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

Related Documentation
- Tracing Operations of an Individual Router or Switch Interface

traps

Syntax
(traps | no-traps);

Hierarchy Level
[edit interfaces *interface-name*],
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces interface-range *name*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description
Enable or disable the sending of Simple Network Management Protocol (SNMP) notifications when the state of the connection changes.

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

Related Documentation
- Enabling or Disabling SNMP Notifications on Physical Interfaces
- Enabling or Disabling SNMP Notifications on Logical Interfaces

unicast-reverse-path

Syntax unicast-reverse-path (active-paths | feasible-paths);

Hierarchy Level [edit logical-systems *logical-system-name* routing-options forwarding-table],
[edit routing-instances *routing-instance-name* instance-type *name* routing-options forwarding-table],
[edit routing-options forwarding-table]

Release Information Statement introduced before Junos OS Release 7.4.
Support for routing instances added in Junos OS Release 8.3.
Statement introduced in Junos OS Release 12.3 for ACX Series routers.

Description Control the operation of unicast reverse-path-forwarding check. This statement enables the RPF check to be used when routing is asymmetrical.

Options **active-paths**—Consider only active paths during the unicast reverse-path check.

feasible-paths—Consider all feasible paths during the unicast reverse-path check.

Default: If you omit the **unicast-reverse-path** statement, only the active paths to a particular destination are considered.

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

Related Documentation

- Example: Configuring Unicast Reverse-Path-Forwarding Check
- Enabling Unicast Reverse-Path Forwarding Check for VPNs

unidirectional

Syntax unidirectional;

Hierarchy Level [edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Create two new, unidirectional (transmit-only and receive-only) physical interfaces subordinate to the original parent interface. Unidirectional links are currently supported only on 10-Gigabit Ethernet interfaces on the following hardware:

NOTE: **Which interfaces and pic for EX9200?**

- 4-port 10-Gigabit Ethernet DPC on the MX960 router
- 10–Gigabit Ethernet IQ2 PIC and 10–Gigabit Ethernet IQ2E PIC on the T Series router

Default Disabled.

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

Related Documentation

- Understanding Unidirectional Traffic Flow on Physical Interfaces
- Enabling Unidirectional Traffic Flow on Physical Interfaces

vlan-tagging

Syntax vlan-tagging;

Hierarchy Level [edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.

Description For Fast Ethernet and Gigabit Ethernet interfaces and aggregated Ethernet interfaces configured for VPLS, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.

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

Related Documentation

- Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch
- Example: Configuring BGP Autodiscovery for LDP VPLS
- Configuring a Layer 3 Subinterface (CLI Procedure)
- Configuring Tagged Aggregated Ethernet Interfaces on page 32
- Configuring Interfaces for VPLS Routing
- Enabling VLAN Tagging
- 802.1Q VLANs Overview
- vlan-id

wildcard-source (PIM RPF Selection)

Syntax

```
wildcard-source {
    next-hop next-hop-address;
}
```

Hierarchy Level

[edit routing-instances *routing-instance-name* protocols pim rpf-selection group *group-address*],
[edit routing-instances *routing-instance-name* protocols pim rpf-selection prefix-list *prefix-list-addresses*]

Release Information

Statement introduced in Junos OS Release 10.4.
Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description

Use a wildcard for the multicast source instead of (or in addition to) a specific multicast source.

The remaining statements are explained separately.

Required Privilege Level

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

Related Documentation

- Example: Configuring PIM RPF Selection

PART 3

Administration

CHAPTER 6

Routine Monitoring

Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface

Purpose To monitor statistics for a Fast Ethernet or Gigabit Ethernet interface, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interface** (fe-*fpc/pic/port* | ge-*fpc/pic/port*)

CAUTION: We recommend that you use the **monitor interface fe-*fpc/pic/port*** or **monitor interface ge-*fpc/pic/port*** command only for diagnostic purposes. Do not leave these commands on during normal router or switch operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Sample Output

The following sample output is for a Fast Ethernet interface:

```
user@host> monitor interface fe-2/1/0
Interface: fe-2/1/0, Enabled, Link is Up
Encapsulation: Ethernet, Speed: 100mbps
Traffic statistics:                                          Current Delta
  Input bytes:               282556864218 (14208 bps)               [40815]
  Output bytes:               42320313078 (384 bps)                   [890]
  Input packets:                739373897 (11 pps)                    [145]
  Output packets:               124798688 (1 pps)                      [14]
Error statistics:
  Input errors:                         0                              [0]
  Input drops:                          0                              [0]
  Input framing errors:                 0                              [0]
  Policed discards:               6625892                              [6]
  L3 incompletes:                      75                              [0]
  L2 channel errors:                    0                              [0]
  L2 mismatch timeouts:                 0                              [0]
  Carrier transitions:                  1                              [0]
  Output errors:                        0                              [0]
  Output drops:                         0                              [0]
  Aged packets:                         0                              [0]
Active alarms : None
Active defects: None
Input MAC/Filter statistics:
  Unicast packets               464751787                            [154]
  Packet error count                    0                              [0]
```

Meaning Use the information from this command to help narrow down possible causes of an interface problem.

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

The statistics in the second column are the cumulative statistics since the last time they were cleared using the **clear interfaces statistics** *interface-name* command. The statistics in the third column are the cumulative statistics since the **monitor interface** *interface-name* command was executed.

If the input errors are increasing, verify the following:

1. Check the cabling to the router and have the carrier verify the integrity of the line. To verify the integrity of the cabling, make sure that you have the correct cables for the interface port. Make sure you have single-mode fiber cable for a single-mode interface and multimode fiber cable for a multimode interface.
2. For a fiber-optic connection, measure the received light level at the receiver end and make sure that it is within the receiver specification of the Ethernet interface. See Fiber-Optic Ethernet Interface Specifications for the fiber-optic Ethernet interface specifications.
3. Measure the transmit light level on the Tx port to verify that it is within specification. See Fiber-Optic Ethernet Interface Specifications for the optical specifications.

CHAPTER 7

Operational Commands

Common Output Fields Description

This chapter explains the content of the output fields, which appear in the output of most **show interfaces** commands.

Destination Class Field

For the logical interface, the **Destination class** field provides the names of destination class usage (DCU) counters per family and per class for a particular interface. The counters display packets and bytes arriving from designated user-selected prefixes. For example:

```
                                   Packets                         Bytes
Destination class            (packet-per-second)           (bits-per-second)

             gold                        1928095                   161959980
                                    (        889)                (   597762)
           bronze                              0                           0
                                    (          0)                (        0)
           silver                              0                           0
                                    (          0)                (        0)
```

Enabled Field

For the physical interface, the **Enabled** field provides information about the state of the interface, displaying one or more of the following values:

- **Administratively down, Physical link is Down**—The interface is turned off, and the physical link is inoperable and cannot pass packets even when it is enabled.To change the interface state to **Enabled**, use the following command:

  user@host# set interfaces *interface* enable

  Manually verify the connections to bring the physical link up.

- **Administratively down, Physical link is Up**—The interface is turned off, but the physical link is operational and can pass packets when it is enabled.To change the interface state to **Enabled**, use the following command:

  user@host# set interfaces *interface* enable

- **Enabled, Physical link is Down**—The interface is turned on, but the physical link is inoperable and cannot pass packets. Manually verify the connections to bring the physical link up.
- **Enabled, Physical link is Up**—The interface is turned on, and the physical link is operational and can pass packets.

Filters Field

For the logical interface, the **Filters** field provides the name of the firewall filters to be evaluated when packets are received or transmitted on the interface. The format is **Filters: Input:** ***filter-name*** and **Filters: Output:** ***filter-name***. For example:

```
Filters: Input: sample-all
Filters: Output: cp-ftp
```

Flags Fields

The following sections provide information about flags that are specific to interfaces:

Addresses, Flags Field

The **Addresses, Flags** field provides information about the addresses configured for the protocol family on the logical interface and displays one or more of the following values:

- **Dest-route-down**—The routing process detected that the link was not operational and changed the interface routes to nonforwarding status
- **Is-Default**—The default address of the router used as the source address by SNMP, ping, traceroute, and other network utilities.
- **Is-Preferred**—The default local address for packets originating from the local router and sent to destinations on the subnet.
- **Is-Primary**—The default local address for broadcast and multicast packets originated locally and sent out the interface.
- **Preferred**—This address is a candidate to become the preferred address.
- **Primary**—This address is a candidate to become the primary address.

Device Flags Field

The **Device flags** field provides information about the physical device and displays one or more of the following values:

- **Down**—Device has been administratively disabled.
- **Hear-Own-Xmit**—Device receives its own transmissions.
- **Link-Layer-Down**—The link-layer protocol has failed to connect with the remote endpoint.
- **Loopback**—Device is in physical loopback.
- **Loop-Detected**—The link layer has received frames that it sent, thereby detecting a physical loopback.
- **No-Carrier**—On media that support carrier recognition, no carrier is currently detected.
- **No-Multicast**—Device does not support multicast traffic.
- **Present**—Device is physically present and recognized.
- **Promiscuous**—Device is in promiscuous mode and recognizes frames addressed to all physical addresses on the media.
- **Quench**—Transmission on the device is quenched because the output buffer is overflowing
- **Recv-All-Multicasts**—Device is in multicast promiscuous mode and therefore provides no multicast filtering.
- **Running**—Device is active and enabled.

Family Flags Field

The **Family flags** field provides information about the protocol family on the logical interface and displays one or more of the following values:

- **DCU**—Destination class usage is enabled.
- **Dest-route-down**—The software detected that the link is down and has stopped forwarding the link's interface routes.
- **Down**—Protocol is inactive.
- **Is-Primary**—Interface is the primary one for the protocol.
- **Mac-Validate-Loose**—Interface is enabled with loose MAC address validation.
- **Mac-Validate-Strict**—Interface is enabled with strict MAC address validation.
- **Maximum labels**—Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.
- **MTU-Protocol-Adjusted**—The effective MTU is not the configured value in the software.
- **No-Redirects**—Protocol redirects are disabled.

- **Primary**—Interface can be considered for selection as the primary family address.
- **Protocol-Down**—Protocol failed to negotiate correctly.
- **SCU-in**—Interface is configured for source class usage input.
- **SCU-out**—Interface is configured for source class usage output.
- **send-bcast-packet-to-re**—Interface is configured to forward IPv4 broadcast packets to the Routing Engine.
- **targeted-broadcast**—Interface is configured to forward IPv4 broadcast packets to the LAN interface and the Routing Engine.
- **Unnumbered**—Protocol family is configured for unnumbered Ethernet. An unnumbered Ethernet interface borrows an IPv4 address from another interface, which is referred to as the donor interface.
- **Up**–Protocol is configured and operational.
- **uRPF**—Unicast Reverse Path Forwarding is enabled.

Interface Flags Field

The **Interface flags** field provides information about the physical interface and displays one or more of the following values:

- **Admin-Test**—Interface is in test mode and some sanity checking, such as loop detection, is disabled.
- **Disabled**—Interface is administratively disabled.
- **Down**—A hardware failure has occurred.
- **Hardware-Down**—Interface is nonfunctional or incorrectly connected.
- **Link-Layer-Down**—Interface keepalives have indicated that the link is incomplete.
- **No-Multicast**—Interface does not support multicast traffic.
- **No-receive No-transmit**—Passive monitor mode is configured on the interface.
- **Point-To-Point**—Interface is point-to-point.
- **Pop all MPLS labels from packets of depth**—MPLS labels are removed as packets arrive on an interface that has the **pop-all-labels** statement configured. The depth value can be one of the following:
  - **1**—Takes effect for incoming packets with one label only.
  - **2**—Takes effect for incoming packets with two labels only.
  - **[1 2]**—Takes effect for incoming packets with either one or two labels.
- **Promiscuous**—Interface is in promiscuous mode and recognizes frames addressed to all physical addresses.
- **Recv-All-Multicasts**—Interface is in multicast promiscuous mode and provides no multicast filtering.

- **SNMP-Traps**—SNMP trap notifications are enabled.
- **Up**—Interface is enabled and operational.

Link Flags Field

The **Link flags** field provides information about the physical link and displays one or more of the following values:

- **ACFC**—Address control field compression is configured. The Point-to-Point Protocol (PPP) session negotiates the ACFC option.
- **Give-Up**—Link protocol does not continue connection attempts after repeated failures.
- **Loose-LCP**—PPP does not use the Link Control Protocol (LCP) to indicate whether the link protocol is operational.
- **Loose-LMI**—Frame Relay does not use the Local Management Interface (LMI) to indicate whether the link protocol is operational.
- **Loose-NCP**—PPP does not use the Network Control Protocol (NCP) to indicate whether the device is operational.
- **No-Keepalives**—Link protocol keepalives are disabled.
- **PFC**—Protocol field compression is configured. The PPP session negotiates the PFC option.

Logical Interface Flags Field

The **Logical interface flags** field provides information about the logical interface and displays one or more of the following values:

- **ACFC Encapsulation**—Address control field Compression (ACFC) encapsulation is enabled (negotiated successfully with a peer).
- **Device-down**—Device has been administratively disabled.
- **Disabled**—Interface is administratively disabled.
- **Down**—A hardware failure has occurred.
- **Clear-DF-Bit**—GRE tunnel or IPsec tunnel is configured to clear the Don't Fragment (DF) bit.
- **Hardware-Down**—Interface protocol initialization failed to complete successfully.
- **PFC**—Protocol field compression is enabled for the PPP session.
- **Point-To-Point**—Interface is point-to-point.
- **SNMP-Traps**—SNMP trap notifications are enabled.
- **Up**—Interface is enabled and operational.

Label-Switched Interface Traffic Statistics Field

When you use the **vrf-table-label** statement to configure a VRF routing table, a label-switched interface (LSI) logical interface label is created and mapped to the VRF routing table.

Any routes present in a VRF routing table and configured with the **vrf-table-label** statement are advertised with the LSI logical interface label allocated for the VRF routing table. When packets for this VPN arrive on a core-facing interface, they are treated as if the enclosed IP packet arrived on the LSI interface and are then forwarded and filtered based on the correct table. For more information on the **vrf-table-label** statement, including a list of supported interfaces, see the *Junos VPNs Configuration Guide*.

If you configure the **family mpls** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level and you also configure the **vrf-table-label** statement at the **[edit routing-instances *routing-instance-name*]** hierarchy level, the output for the **show interface *interface-name* extensive** command includes the following output fields about the LSI traffic statistics:

- **Input bytes**—Number of bytes entering the LSI and the current throughput rate in bits per second (bps).
- **Input packets**—Number of packets entering the LSI and the current throughput rate in packets per second (pps).

NOTE: If LSI interfaces are used with VPLS when **no-tunnel-services** is configured or L3VPN when **vrf-table-label** configuration is applied inside the routing-instance, the **Input packets** field associated with the core-facing interfaces may not display the correct value. Only the Input counter is affected because the LSI is used to receive traffic from the remote PEs. Traffic that arrives on an LSI interface might not be counted at both the Traffic Statistics and the Label-switched interface (LSI) traffic statistics levels.

This note applies to the following platforms:

- M Series routers with -E3 FPC model numbers or configured with an Enhanced CFEB (CFEB-E), and M120 routers
- MX Series routers with DPC or ADPC only

The following example shows the LSI traffic statistics that you might see as part of the output of the **show interface *interface-name* extensive** command:

```
Label-switched interface (LSI) traffic statistics:
  Input bytes:              0          0 bps
  Input packets:            0          0 pps
```

Policer Field

For the logical interface, the **Policer** field provides the policers that are to be evaluated when packets are received or transmitted on the interface. The format is **Policer: Input:** ***type-fpc/picport*****-in-policer, Output:** ***type-fpc/pic/port*****-out-policer**. For example:

Policer: Input: at-1/2/0-in-policer, Output: at-2/4/0-out-policer

Protocol Field

For the logical interface, the **Protocol** field indicates the protocol family or families that are configured on the interface, displaying one or more of the following values:

- **aenet**—Aggregated Ethernet. Displayed on Fast Ethernet interfaces that are part of an aggregated Ethernet bundle.
- **ccc**—Circuit cross-connect (CCC). Configured on the logical interface of CCC physical interfaces.
- **inet**—IP version 4 (IPv4). Configured on the logical interface for IPv4 protocol traffic, including Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Internet Control Message Protocol (ICMP), and Internet Protocol Control Protocol (IPCP).
- **inet6**—IP version 6 (IPv6). Configured on the logical interface for IPv6 protocol traffic, including Routing Information Protocol for IPv6 (RIPng), Intermediate System-to-Intermediate System (IS-IS), and BGP.
- **iso**—International Organization for Standardization (ISO). Configured on the logical interface for IS-IS traffic.
- **mlfr-uni-nni**—Multilink Frame Relay (MLFR) FRF.16 user-to-network network-to-network (UNI NNI). Configured on the logical interface for link services bundling.
- **mlfr-end-to-end**—Multilink Frame Relay end-to-end. Configured on the logical interface for multilink bundling.
- **mlppp**—Multilink Point-to-Point Protocol (MLPPP). Configured on the logical interface for multilink bundling.
- **mpls**—Multiprotocol Label Switching (MPLS). Configured on the logical interface for participation in an MPLS path.
- **pppoe**— Point-to-Point Protocol over Ethernet (PPPoE). Configured on Ethernet interfaces enabled to support multiple protocol families.
- **tcc**—Translational cross-connect (TCC). Configured on the logical interface of TCC physical interfaces.
- **tnp**—Trivial Network Protocol (TNP). Used to communicate between the Routing Engine and the router's packet forwarding components. The Junos OS automatically configures this protocol family on the router's internal interfaces only.
- **vpls**—Virtual private LAN service (VPLS). Configured on the logical interface on which you configure VPLS.

RPF Failures Field

For the logical interface, the **RPF Failures** field provides information about the amount of incoming traffic (in packets and bytes) that failed a unicast reverse path forwarding (RPF) check on a particular interface. The format is **RPF Failures: Packets: xx,Bytes: yy**. For example:

```
RPF Failures: Packets: 0, Bytes:0
```

Source Class Field

For the logical interface, the **Source class** field provides the names of source class usage (SCU) counters per family and per class for a particular interface. The counters display packets and bytes arriving from designated user-selected prefixes. For example:

```
                                Packets                Bytes
Source class                    (packet-per-second)    (bits-per-second)

                    gold        1928095                161959980
                    (           889)                   (597762)
                    bronze      0                      0
                    (           0)                     (0)
                    silver      0                      0
                    (           0)                     (0)
```

clear interfaces statistics

Syntax clear interfaces statistics (all | *interface-name*)

Release Information Command introduced before Junos OS Release 7.4.

Description Set interface statistics to zero. If you issue the **clear interfaces statistics** ***interface-name*** command and then perform a graceful Routing Engine switchover, the interface statistics are not cleared on the new master. Reissue the command to clear the interface statistics again.

Options **all**—Set statistics on all interfaces to zero.

interface-name—Set statistics on a particular interface to zero.

Required Privilege Level clear

List of Sample Output clear interfaces statistics on page 119

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear interfaces statistics

```
user@host> clear interfaces statistics
```

show interfaces (10-Gigabit Ethernet)

Syntax

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

Release Information

Command introduced in Junos OS Release 8.0.

Description

(M320, M120, MX Series, and T Series routers and EX Series switches only) Display status information about the specified 10-Gigabit Ethernet interface.

Options

xe-*fpc/pic/port*—Display standard information about the specified 10-Gigabit Ethernet interface.

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

descriptions—(Optional) Display interface description strings.

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

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

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, IQ2) on page 135
show interfaces extensive (10-Gigabit Ethernet, WAN PHY Mode) on page 138
show interfaces extensive (10-Gigabit Ethernet, DWDM OTN PIC) on page 140
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode) on page 143
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Transmit-Only) on page 143
show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Receive-Only) on page 145

Output Fields

See Table 4 on page 121 for the output fields for the **show interfaces** (10–Gigabit Ethernet) command.

Table 4: show interfaces Gigabit Ethernet Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under "Common Output Fields Description" on page 111.	All levels
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	Maximum transmission unit size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Loopback status: **Enabled** or **Disabled**. If loopback is enabled, type of loopback: **Local** or **Remote**.	All levels
Source filtering	Source filtering status: **Enabled** or **Disabled**.	All levels
LAN-PHY mode	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
WAN-PHY mode	10-Gigabit Ethernet interface operating in Wide Area Network Physical Layer Device (WAN PHY) mode. WAN PHY allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and other devices intended for SONET/SDH.	All levels
Unidirectional	Unidirectional link mode status for 10-Gigabit Ethernet interface: **Enabled** or **Disabled** for parent interface; **Rx-only** or **Tx-only** for child interfaces.	All levels
Flow control	Flow control status: **Enabled** or **Disabled**.	All levels
Auto-negotiation	(Gigabit Ethernet interfaces) Autonegotiation status: **Enabled** or **Disabled**.	All levels
Remote-fault	(Gigabit Ethernet interfaces) Remote fault status: • **Online**—Autonegotiation is manually configured as online. • **Offline**—Autonegotiation is manually configured as offline.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under "Common Output Fields Description" on page 111.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under "Common Output Fields Description" on page 111.	All levels

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link flags	Information about the link. Possible values are described in the "Links Flags" section under "Common Output Fields Description" on page 111.	All levels
Wavelength	(10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm).	All levels
Frequency	(10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz).	All levels
CoS queues	Number of CoS queues configured.	**detail extensive** none
Schedulers	(Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces only) Number of CoS schedulers configured.	**extensive**
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Current address	Configured MAC address.	**detail extensive** none
Hardware address	Hardware MAC address.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second:timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps). The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.	None specified
Output Rate	Output rate in bps and pps. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Egress accounting overhead	Layer 2 overhead in bytes that is accounted in the interface statistics for egress traffic.	**detail extensive**
Ingress accounting overhead	Layer 2 overhead in bytes that is accounted in the interface statistics for ingress traffic.	**detail extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Output bytes**—Number of bytes transmitted on the interface. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes. For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 4 on page 121.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** statement. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **FIFO errors**—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. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Collisions**—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. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **FIFO errors**—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. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters (Egress)	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Ingress queues	Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces.	**extensive**
Queue counters (Ingress)	CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Active alarms and Active defects	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 router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**. • **None**—There are no active defects or alarms. • **Link**—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.	**detail extensive** none
OTN alarms	Active OTN alarms identified on the interface.	**detail extensive**
OTN defects	OTN defects received on the interface.	**detail extensive**
OTN FEC Mode	The FECmode configured on the interface. • **efec**—Enhanced forward error correction (EFEC) is configured to defect and correct bit errors. • **gfec**—G.709 Forward error correction (GFEC) mode is configured to detect and correct bit errors. • **none**—FEC mode is not configured.	**detail extensive**
OTN Rate	OTN mode. • **fixed-stuff-bytes**—Fixed stuff bytes 11.0957 Gbps. • **no-fixed-stuff-bytes**—No fixed stuff bytes 11.0491 Gbps. • **pass-through**—Enable OTN passthrough mode. • **no-pass-through**—Do not enable OTN passthrough mode.	**detail extensive**
OTN Line Loopback	Status of the line loopback, if configured for the DWDM OTN PIC. Its value can be: **enabled** or **disabled**.	**detail extensive**
OTN FEC statistics	The forward error correction (FEC) counters for the DWDM OTN PIC. • **Corrected Errors**—The count of corrected errors in the last second. • **Corrected Error Ratio**—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits.	**detail extensive**
OTN FEC alarms	OTN FEC excessive or degraded error alarms triggered on the interface. • **FEC Degrade**—OTU FEC Degrade defect. • **FEC Excessive**—OTU FEC Excessive Error defect.	**detail extensive**
OTN OC	OTN OC defects triggered on the interface. • **LOS**—OC Loss of Signal defect. • **LOF**—OC Loss of Frame defect. • **LOM**—OC Loss of Multiframe defect. • **Wavelength Lock**—OC Wavelength Lock defect.	**detail extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
OTN OTU	OTN OTU defects detected on the interface • **AIS**—OTN AIS alarm. • **BDI**—OTN OTU BDI alarm. • **IAE**—OTN OTU IAE alarm. • **TTIM**—OTN OTU TTIM alarm. • **SF**—OTN ODU bit error rate fault alarm. • **SD**—OTN ODU bit error rate defect alarm. • **TCA-ES**—OTN ODU ES threshold alarm. • **TCA-SES**—OTN ODU SES threshold alarm. • **TCA-UAS**—OTN ODU UAS threshold alarm. • **TCA-BBE**—OTN ODU BBE threshold alarm. • **BIP**—OTN ODU BIP threshold alarm. • **BBE**—OTN OTU BBE threshold alarm. • **ES**—OTN OTU ES threshold alarm. • **SES**—OTN OTU SES threshold alarm. • **UAS**—OTN OTU UAS threshold alarm.	**detail extensive**
Received DAPI	Destination Access Port Interface (DAPI) from which the packets were received.	**detail extensive**
Received SAPI	Source Access Port Interface (SAPI) from which the packets were received.	**detail extensive**
Transmitted DAPI	Destination Access Port Interface (DAPI) to which the packets were transmitted.	**detail extensive**
Transmitted SAPI	Source Access Port Interface (SAPI) to which the packets were transmitted.	**detail extensive**
PCS statistics	(10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device. • **Bit errors**—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode. • **Errored blocks**—Loss of block lock. The number of errored blocks when PCS receiver is operating in normal mode.	**detail extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
MAC statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC subsystem, including the following: • **Total octets** and **total packets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see Table 5 on page 135 • **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets. • **CRC/Align errors**—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). • **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning. • **MAC control frames**—Number of MAC control frames. • **MAC pause frames**—Number of MAC control frames with **pause** operational code. • **Oversized frames**—Number of frames that exceed 1518 octets. • **Jabber frames**—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. • **Fragment frames**—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. • **VLAN tagged frames**—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. • **Code violations**—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.”	**extensive**
OTN Received Overhead Bytes	APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08	**extensive**
OTN Transmitted Overhead Bytes	APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Filter statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem. The filtering is done by the content-addressable memory (CAM) on the PIC. The filter examines a packet's source and destination MAC addresses to determine whether the packet should enter the system or be rejected. • **Input packet count**—Number of packets received from the MAC hardware that the filter processed. • **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address. • **Input DA rejects**—Number of packets that the filter rejected because the destination MAC address of the packet is not on the accept list. It is normal for this value to increment. When it increments very quickly and no traffic is entering the router from the far-end system, either there is a bad ARP entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local router (which the router is rejecting). • **Input SA rejects**—Number of packets that the filter rejected because the source MAC address of the packet is not on the accept list. The value in this field should increment only if source MAC address filtering has been enabled. If filtering is enabled, if the value increments quickly, and if the system is not receiving traffic that it should from the far-end system, it means that the user-configured source MAC addresses for this interface are incorrect. • **Output packet count**—Number of packets that the filter has given to the MAC hardware. • **Output packet pad count**—Number of packets the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware. Usually, padding is done only on small ARP packets, but some very small IP packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist or it is misconfigured. • **Output packet error count**—Number of packets with an indicated error that the filter was given to transmit. These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment. • **CAM destination filters, CAM source filters**—Number of entries in the CAM dedicated to destination and source MAC address filters. There can only be up to 64 source entries. If source filtering is disabled, which is the default, the values for these fields should be 0.	**extensive**
PMA PHY	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **PHY Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
WIS section	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • S**ES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**
WIS line	(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
WIS path	(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output

Autonegotiation information	Information about link autonegotiation.
	• **Negotiation status:**
	  • **Incomplete**—Ethernet interface has the speed or link mode configured.
	  • **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
	  • **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner:**
	  • **Link mode**—Depending on the capability of the attached Ethernet device, either **Full-duplex** or **Half-duplex**.
	  • **Flow control**—Types of flow control supported by the remote Ethernet device. For Fast Ethernet interfaces, the type is **None**. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), and **Symmetric/Asymmetric** (link partner supports both **PAUSE** on receive and transmit or only **PAUSE** receive).
	  • **Remote fault**—Remote fault information from the link partner—**Failure** indicates a receive link error. **OK** indicates that the link partner is receiving. **Negotiation error** indicates a negotiation error. **Offline** indicates that the link partner is going offline.
	• **Local resolution**—Information from the link partner:
	  • **Flow control**—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), and **Symmetric/Asymmetric** (link partner supports both **PAUSE** on receive and transmit or only **PAUSE** receive).
	  • **Remote fault**—Remote fault information. **Link OK** (no error detected on receive), **Offline** (local interface is offline), and **Link Failure** (link error detected on receive).
		extensive

Received path trace, Transmitted path trace	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number.	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
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. Possible values are described in the "Logical Interface Flags" section under "Common Output Fields Description" on page 111.	All levels

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
VLAN-Tag	Rewrite profile applied to incoming or outgoing frames on the outer (**Out**) VLAN tag or for both the outer and inner (**In**) VLAN tags. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **pop**—The outer VLAN tag of the incoming frame is removed. • **swap**—The outer VLAN tag of the incoming frame is overwritten with the user specified VLAN tag information. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **push-push**—Two VLAN tags are pushed in from the incoming frame. • **swap-push**—The outer VLAN tag of the incoming frame is replaced by a user-specified VLAN tag value. A user-specified outer VLAN tag is pushed in front. The outer tag becomes an inner tag in the final frame. • **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user specified VLAN tag value. • **pop-swap**—The outer VLAN tag of the incoming frame is removed, and the inner VLAN tag of the incoming frame is replaced by the user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame. • **pop-pop**—Both the outer and inner VLAN tags of the incoming frame are removed.	**brief detail extensive** none
Demux:	IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following: • Source Family Inet • Destination Family Inet	**detail extensive** none
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family. Possible values are described in the "Protocol Field" section under "Common Output Fields Description" on page 111.	**detail extensive** none
MTU	Maximum transmission unit size on the logical interface.	**detail extensive** none
Maximum labels	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	**detail extensive** none
Traffic statistics	Number and rate of bytes and packets received and transmitted on the specified interface set. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set. The value in this field also includes the Layer 2 overhead bytes for ingress or egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Input packets, Output packets**—Number of packets received and transmitted on the interface set.	**detail extensive**
IPv6 transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.	**extensive**
Local statistics	Number and rate of bytes and packets destined to the router.	**extensive**

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	Number and rate of bytes and packets transiting the switch. NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the **Output bytes** and **Output packets** interface counters. However, correct values display for both of these egress statistics when per-unit scheduling is enabled for the Gigabit Ethernet IQ2 physical interface, or when a single logical interface is actively using a shared scheduler.	**extensive**
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive** none
Flags	Information about protocol family flags. Possible values are described in the "Family Flags" section under "Common Output Fields Description" on page 111.	**detail extensive**
Donor interface	(Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address.	**detail extensive** none
Preferred source address	(Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface.	**detail extensive** none
Input Filters	Names of any input filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parenthesis next to all interfaces.	**detail extensive**
Output Filters	Names of any output filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parenthesis next to all interfaces.	**detail extensive**
Mac-Validate Failures	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under "Common Output Fields Description" on page 111.	**detail extensive** none
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed.	**brief**
Flags	Information about address flag (possible values are described in the "Addresses Flags" section under "Common Output Fields Description" on page 111.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interlace.	**detail extensive** none

Table 4: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

For Gigabit Ethernet IQ PICs, traffic and MAC statistics output varies. Table 5 on page 135 describes the traffic and MAC statistics for two sample interfaces, each of which is sending traffic in packets of 500 bytes (including 478 bytes for the Layer 3 packet, 18 bytes for the Layer 2 VLAN traffic header, and 4 bytes for cyclic redundancy check [CRC] information). In Table 5 on page 135, the **ge-0/3/0** interface is the inbound physical interface, and the **ge-0/0/0** interface is the outbound physical interface. On both interfaces, traffic is carried on logical unit **.50** (VLAN 50).

Table 5: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type

Interface Type	Sample Command	Byte and Octet Counts Include	Comments
Inbound physical interface	**show interfaces ge-0/3/0 extensive**	Traffic statistics: Input bytes: 496 bytes per packet, representing the Layer 2 packet MAC statistics: Received octets: 500 bytes per packet, representing the Layer 2 packet + 4 bytes	The additional 4 bytes are for the CRC.
Inbound logical interface	**show interfaces ge-0/3/0.50 extensive**	Traffic statistics: Input bytes: 478 bytes per packet, representing the Layer 3 packet	
Outbound physical interface	**show interfaces ge-0/0/0 extensive**	Traffic statistics: Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes MAC statistics: Received octets: 478 bytes per packet, representing the Layer 3 packet	For input bytes, the additional 12 bytes includes 6 bytes for the destination MAC address + 4 bytes for VLAN + 2 bytes for the Ethernet type.
Outbound logical interface	**show interfaces ge-0/0/0.50 extensive**	Traffic statistics: Input bytes: 478 bytes per packet, representing the Layer 3 packet	

Sample Output

show interfaces extensive

```
user@host> show interfaces xe-5/0/0 extensive
Physical interface: xe-5/0/0, Enabled, Physical link is Up
  Interface index: 177, SNMP ifIndex: 99, Generation: 178
```

(10-Gigabit Ethernet, LAN PHY Mode, IQ2)

```
  Link-level type: Ethernet, MTU: 1518, LAN-PHY mode, Speed: 10Gbps, Loopback:
None, Source filtering: Enabled,
  Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Schedulers     : 1024
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:14:f6:b9:f1:f6, Hardware address: 00:14:f6:b9:f1:f6
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :           6970332384                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:             81050506                    0 pps
   Output packets:                    0                    0 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :           6970299398                    0 bps
   Input  packets:             81049992                    0 pps
   Drop   bytes  :                    0                    0 bps
   Drop   packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0,
    MTU errors: 0, Resource errors: 0
  Ingress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort             81049992             81049992                    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                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                              0
```

```
  Errored blocks                          0
MAC statistics:                        Receive         Transmit
  Total octets                      6970332384                0
  Total packets                       81050506                0
  Unicast packets                     81050000                0
  Broadcast packets                         506               0
  Multicast packets                           0               0
  CRC/Align errors                            0               0
  FIFO errors                                 0               0
  MAC control frames                          0               0
  MAC pause frames                            0               0
  Oversized frames                            0
  Jabber frames                               0
  Fragment frames                             0
  VLAN tagged frames                          0
  Code violations                             0
Filter statistics:
  Input packet count                  81050506
  Input packet rejects                      506
  Input DA rejects                            0
  Input SA rejects                            0
  Output packet count                                         0
  Output packet pad count                                     0
  Output packet error count                                   0
  CAM destination filters: 0, CAM source filters: 0
Packet Forwarding Engine configuration:
  Destination slot: 5
CoS information:
  Direction : Output
  CoS transmit queue          Bandwidth              Buffer Priority   Limit
                          %           bps     %         usec
  0 best-effort          95     950000000    95         0          low     none
  3 network-control       5      50000000     5         0          low     none

  Direction : Input
  CoS transmit queue          Bandwidth              Buffer Priority   Limit
                          %           bps     %         usec
  0 best-effort          95     950000000    95         0          low     none
  3 network-control       5      50000000     5         0          low     none

Logical interface xe-5/0/0.0 (Index 71) (SNMP ifIndex 95) (Generation 195)
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]  Encapsulation: ENET2
  Egress accounting overhead: 100
  Ingress accounting overhead: 90
  Traffic statistics:
   Input  bytes  :                    0
   Output bytes  :                   46
   Input  packets:                    0
   Output packets:                    1
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Local statistics:
   Input  bytes  :                    0
   Output bytes  :                   46
   Input  packets:                    0
   Output packets:                    1
  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: 253, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.1.1/24, Local: 192.1.1.1, Broadcast: 192.1.1.255,
Generation: 265
    Protocol multiservice, MTU: Unlimited, Generation: 254, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

show interfaces extensive

```
user@host> show interfaces xe-1/0/0 extensive
Physical interface: xe-1/0/0, Enabled, Physical link is Up
  Interface index: 141, SNMP ifIndex: 34, Generation: 47
```

(10-Gigabit Ethernet, WAN PHY Mode)

```
Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, Loopback: Disabled
WAN-PHY mode
Source filtering: Disabled, Flow control: Enabled
Device flags   : Present Running
Interface flags: SNMP-Traps 16384
Link flags     : None
CoS queues     : 4 supported
Hold-times     : Up 0 ms, Down 0 ms
Current address: 00:05:85:a2:10:9d, Hardware address: 00:05:85:a2:10:9d
Last flapped   : 2005-07-07 11:22:34 PDT (3d 12:28 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                    0                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                    0                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS Link CRC errors: 0, HS Link FIFO overflows: 0,
  Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0,
  Aged packets: 0, FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0,
  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets     Dropped packets
  0 best-effort                    0                    0                   0
  1 expedited-fo                   0                    0                   0
  2 assured-forw                   0                    0                   0
  3 network-cont                   0                    0                   0
Active alarms : LOL, LOS, LBL
Active defects: LOL, LOS, LBL, SEF, AIS-L, AIS-P
PCS statistics             Seconds       Count
  Bit errors                     0           0
  Errored blocks                 0           0
MAC statistics:                       Receive         Transmit
  Total octets                              0                0
  Total packets                             0                0
  Unicast packets                           0                0
  Broadcast packets                         0                0
  Multicast packets                         0                0
  CRC/Align errors                          0                0
  FIFO errors                               0                0
  MAC control frames                        0                0
  MAC pause frames                          0                0
  Oversized frames                          0
  Jabber frames                             0
  Fragment frames                           0
  VLAN tagged frames                        0
  Code violations                           0
Filter statistics:
  Input packet count                        0
  Input packet rejects                      0
  Input DA rejects                          0
  Input SA rejects                          0
  Output packet count                                        0
  Output packet pad count                                    0
  Output packet error count                                  0
  CAM destination filters: 0, CAM source filters: 0
PMA PHY:              Seconds        Count  State
  PLL lock                  0            0  OK
```

```
   PHY light             63159            1  Light Missing
WIS section:
  BIP-B1                     0            0
  SEF                   434430       434438  Defect Active
  LOS                   434430            1  Defect Active
  LOF                   434430            1  Defect Active
  ES-S                  434430
  SES-S                 434430
  SEFS-S                434430
WIS line:
  BIP-B2                     0            0
  REI-L                      0            0
  RDI-L                      0            0  OK
  AIS-L                 434430            1  Defect Active
  BERR-SF                    0            0  OK
  BERR-SD                    0            0  OK
  ES-L                  434430
  SES-L                 434430
  UAS-L                 434420
  ES-LFE                     0
  SES-LFE                    0
  UAS-LFE                    0
WIS path:
  BIP-B3                     0            0
  REI-P                      0            0
  LOP-P                      0            0  OK
  AIS-P                 434430            1  Defect Active
  RDI-P                      0            0  OK
  UNEQ-P                     0            0  OK
  PLM-P                      0            0  OK
  ES-P                  434430
  SES-P                 434430
  UAS-P                 434420
  ES-PFE                     0
  SES-PFE                    0
  UAS-PFE                    0
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Transmitted path trace: orissa so-1/0/0
  6f 72 69 73 73 61 20 73 6f 2d 31 2f 30 2f 30 00   orissa so-1/0/0.
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                          %           bps     %    bytes
    0 best-effort        95     950000000    95        0          low     none
    3 network-control     5      50000000     5        0          low     none
```

show interfaces extensive

```
user@host> show interfaces ge-7/0/0 extensive
Physical interface: ge-7/0/0, Enabled, Physical link is Down
  Interface index: 143, SNMP ifIndex: 508, Generation: 208
```

(10-Gigabit Ethernet, DWDM OTN PIC)

```
Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
Flow control: Enabled
Device flags   : Present Running Down
Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
Link flags     : None
Wavelength     : 1550.12 nm, Frequency: 193.40 THz
CoS queues     : 8 supported, 8 maximum usable queues
Hold-times     : Up 0 ms, Down 0 ms
Current address: 00:05:85:70:2b:72, Hardware address: 00:05:85:70:2b:72
Last flapped   : 2011-04-20 15:48:54 PDT (18:39:49 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                    0                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                    0                    0 pps
 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, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  FIFO errors: 0, Resource errors: 0
Output errors:
 Carrier transitions: 2, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Egress queues: 8 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont
Queue number:         Mapped forwarding classes
  0                   best-effort
  1                   expedited-forwarding
  2                   assured-forwarding
  3                   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
```

```
  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
OTN alarms            :   None
OTN defects           :   None
OTN FEC Mode       : GFEC
OTN Rate               : Fixed Stuff Bytes 11.0957Gbps
OTN Line Loopback : Enabled
OTN FEC statistics :
  Corrected Errors                                        0
  Corrected Error Ratio (          0 sec average)     0e-0
OTN FEC alarms:          Seconds        Count  State
  FEC Degrade                  0            0  OK
  FEC Excessive                0            0  OK
OTN OC:                  Seconds        Count  State
  LOS                          2            1  OK
  LOF                      67164            2  Defect Active
  LOM                      67164           71  Defect Active
  Wavelength Lock              0            0  OK
OTN OTU:
  AIS                          0            0  OK
  BDI                      65919         4814  Defect Active
  IAE                      67158            1  Defect Active
  TTIM                         7            1  OK
  SF                       67164            2  Defect Active
  SD                       67164            3  Defect Active
  TCA-ES                       0            0  OK
  TCA-SES                      0            0  OK
  TCA-UAS                     80           40  OK
  TCA-BBE                      0            0  OK
  BIP                          0            0  OK
  BBE                          0            0  OK
  ES                           0            0  OK
  SES                          0            0  OK
  UAS                        587            0  OK
  Received DAPI:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  Received SAPI:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  Transmitted DAPI:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  Transmitted SAPI:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
OTN Received Overhead Bytes:
  APS/PCC0: 0x02, APS/PCC1: 0x42, APS/PCC2: 0xa2, APS/PCC3: 0x48
  Payload Type: 0x03
OTN Transmitted Overhead Bytes:
  APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00
  Payload Type: 0x03
Filter statistics:
```

```
    Input packet count                      0
    Input packet rejects                    0
    Input DA rejects                        0
    Input SA rejects                        0
    Output packet count                                    0
    Output packet pad count                                0
    Output packet error count                              0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 7
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 best-effort            95     9500000000    95              0      low
none
    3 network-control         5      500000000     5              0      low
none
    ...
```

show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode)

```
user@host> show interfaces xe-7/0/0 extensive
Physical interface: xe-7/0/0, Enabled, Physical link is Up
  Interface index: 173, SNMP ifIndex: 212, Generation: 174
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
Unidirectional: Enabled,
  Loopback: None, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
...
```

show interfaces extensive (10-Gigabit Ethernet, LAN PHY

```
user@host> show interfaces xe-7/0/0–tx extensive
Physical interface: xe-7/0/0-tx, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 137, Generation: 177
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
```

Mode, Unidirectional Mode, Transmit-Only)

```
Unidirectional: Tx-Only
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:73:e4:83, Hardware address: 00:05:85:73:e4:83
  Last flapped   : 2007-06-01 09:08:19 PDT (3d 02:31 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :      322891152287160           9627472888 bps
   Input  packets:                    0                    0 pps
   Output packets:         328809727380              1225492 pps

...

  Filter statistics:
    Output packet count           328810554250
    Output packet pad count                  0
    Output packet error count                0
...

  Logical interface xe-7/0/0-tx.0 (Index 73) (SNMP ifIndex 138) (Generation 139)

    Flags: SNMP-Traps Encapsulation: ENET2
    Egress accounting overhead: 100
    Ingress accounting overhead: 90
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :      322891152287160
     Input  packets:                    0
     Output packets:         328809727380
     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  :      322891152287160           9627472888 bps
     Input  packets:                    0                    0 pps
     Output packets:         328809727380              1225492 pps
     IPv6 transit statistics:
      Input  bytes  :                    0
      Output bytes  :                    0
      Input  packets:                    0
      Output packets:                    0
    Protocol inet, MTU: 1500, Generation: 147, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.11.12/24, Local: 10.11.12.13, Broadcast: 10.11.12.255,
Generation: 141
    Protocol multiservice, MTU: Unlimited, Generation: 148, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

show interfaces extensive (10-Gigabit Ethernet, LAN PHY

```
user@host> show interfaces xe-7/0/0—rx extensive
Physical interface: xe-7/0/0-rx, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 118, Generation: 175
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,
```

Mode, Unidirectional Mode, Receive-Only)

```
Unidirectional: Rx-Only
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:73:e4:83, Hardware address: 00:05:85:73:e4:83
  Last flapped   : 2007-06-01 09:08:22 PDT (3d 02:31 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :      322857456303482           9627496104 bps
   Output bytes  :                   0                    0 bps
   Input  packets:         328775413751              1225495 pps
   Output packets:                   0                    0 pps

...

  Filter statistics:
    Input packet count            328775015056
    Input packet rejects                     1
    Input DA rejects                         0

...

  Logical interface xe-7/0/0-rx.0 (Index 72) (SNMP ifIndex 120) (Generation 138)

    Flags: SNMP-Traps Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :      322857456303482
     Output bytes  :                   0
     Input  packets:         328775413751
     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  :      322857456303482           9627496104 bps
     Output bytes  :                   0                    0 bps
     Input  packets:         328775413751              1225495 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: 145, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.1.1/24, Local: 192.1.1.1, Broadcast: 192.1.1.255,
Generation: 139
    Protocol multiservice, MTU: Unlimited, Generation: 146, Route table: 0
      Flags: None
      Policer: Input: __default_arp_policer__
```

show interfaces (Discard)

Syntax
show interfaces dsc
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
Display status information about the specified discard interface.

Options
dsc—Display standard information about the specified discard interface.

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

descriptions—(Optional) Display interface description strings.

media—This option is not relevant for the discard interface and always shows a value of 0.

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

statistics—(Optional) This option is not relevant for the discard interface and always shows a value of 0.

Required Privilege Level
view

Related Documentation
- show interfaces (ATM)
- show interfaces routing

List of Sample Output
show interfaces dsc on page 151
show interfaces dsc brief on page 151
show interfaces dsc detail on page 151
show interfaces dsc extensive on page 151

Output Fields
Table 6 on page 147 lists the output fields for the **show interfaces** (discard) command. Output fields are listed in the approximate order in which they appear.

Table 6: Discard show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface, whether the interface is enabled, and the state of the physical interface: **Up** or **Down**.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none

Table 6: Discard show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Type	Type of interface. **Software-Pseudo** indicates a standard software interface with no associated hardware device.	All levels
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	**brief detail extensive**
Speed	Speed at which the interface is running.	**brief detail extensive**
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under "Common Output Fields Description" on page 111.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under "Common Output Fields Description" on page 111.	All levels
Link type	Encapsulation being used on the physical interface.	**detail extensive**
Link flags	Information about the link. Possible values are described in the "Link Flags" section under "Common Output Fields Description" on page 111.	**detail extensive**
Physical info	Information about the physical interface.	**detail extensive**
Hold-times	Current interface hold-time up and hold-time down. Value is in milliseconds.	**detail extensive**
Current address, Hardware address	Configured MAC address and hardware MAC address.	**detail extensive**
Alternate link address	Backup address of the link.	**detail extensive**
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

Table 6: Discard show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface: • **Errors**—Sum of incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**detail extensive**
Output errors	(Extensive only) Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**detail extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive**
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive**
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 6: Discard show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under "Common Output Fields Description" on page 111.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**All levels**
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**

Sample Output

show interfaces dsc

```
user@host> show interfaces dsc
Physical interface: dsc, Enabled, Physical link is Up
  Interface index: 5, SNMP ifIndex: 5
  Type: Software-Pseudo, MTU: Unlimited
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : Never
    Input packets : 0
    Output packets: 0

  Logical interface dsc.0 (Index 66) (SNMP ifIndex 235)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Unspecified
    Protocol inet, MTU: Unlimited
      Flags: None
```

show interfaces dsc brief

```
user@host> show interfaces dsc brief
Physical interface: dsc, Enabled, Physical link is Up
  Type: Software-Pseudo, Link-level type: Unspecified, MTU: Unlimited, Clocking:
 Unspecified, Speed: Unspecified
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps

  Logical interface dsc.0
    Flags: Point-To-Point SNMP-Traps Encapsulation: Unspecified
    inet
```

show interfaces dsc detail

```
user@host> show interfaces dsc detail
Physical interface: dsc, Enabled, Physical link is Up
  Interface index: 5, SNMP ifIndex: 5, Generation: 9
  Type: Software-Pseudo, Link-level type: Unspecified, MTU: Unlimited, Clocking:
 Unspecified, Speed: Unspecified
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link type      : Unspecified
  Link flags     : None
  Physical info  : Unspecified
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: Unspecified, Hardware address: Unspecified
  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

  Logical interface dsc.0 (Index 66) (SNMP ifIndex 235) (Generation 6)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Unspecified
    Protocol inet, MTU: Unlimited, Generation: 14, Route table: 0
      Flags: None
```

show interfaces dsc

```
user@host> show interfaces dsc extensive
Physical interface: dsc, Enabled, Physical link is Up
```

extensive

```
 Interface index: 5, SNMP ifIndex: 5, Generation: 9
 Type: Software-Pseudo, Link-level type: Unspecified, MTU: Unlimited, Clocking:
Unspecified, Speed: Unspecified
 Device flags   : Present Running
 Interface flags: Point-To-Point SNMP-Traps
 Link type      : Unspecified
 Link flags     : None
 Physical info  : Unspecified
 Hold-times     : Up 0 ms, Down 0 ms
 Current address: Unspecified, Hardware address: Unspecified
 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
 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
 Logical interface dsc.0 (Index 66) (SNMP ifIndex 235) (Generation 6)
   Flags: Point-To-Point SNMP-Traps Encapsulation: Unspecified
   Protocol inet, MTU: Unlimited, Generation: 14, Route table: 0
```

show interfaces (Gigabit Ethernet)

Syntax

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

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series, T Series, and MX Series routers and EX Series switches only) Display status information about the specified Gigabit Ethernet interface.

Options

ge-*fpc/pic/port*—Display standard information about the specified Gigabit Ethernet interface.

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

descriptions—(Optional) Display interface description strings.

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

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

statistics—(Optional) Display static interface statistics.

Additional Information

In a logical system, this command displays information only about the logical interfaces and not about the physical interfaces.

Required Privilege Level

view

Related Documentation

- Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration

List of Sample Output

show interfaces (Gigabit Ethernet) on page 169
show interfaces (Gigabit Ethernet on MX Series Routers) on page 169
show interfaces extensive (Gigabit Ethernet on MX Series Routers showing interface transmit statistics configuration) on page 170
show interfaces brief (Gigabit Ethernet) on page 171
show interfaces detail (Gigabit Ethernet) on page 171
show interfaces extensive (Gigabit Ethernet IQ2) on page 172
show interfaces (Gigabit Ethernet Unnumbered Interface) on page 175
show interfaces (ACI Interface Set Configured) on page 176

Output Fields

Table 7 on page 154 describes the output fields for the **show interfaces** (Gigabit Ethernet) command. Output fields are listed in the approximate order in which they appear. For Gigabit Ethernet IQ and IQE PICs, the traffic and MAC statistics vary by interface type. For more information, see Table 8 on page 167.

Table 7: show interfaces Gigabit Ethernet Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under "Common Output Fields Description" on page 111.	All levels
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	Maximum transmission unit size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Loopback status: **Enabled** or **Disabled**. If loopback is enabled, type of loopback: **Local** or **Remote**.	All levels
Source filtering	Source filtering status: **Enabled** or **Disabled**.	All levels
LAN-PHY mode	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
WAN-PHY mode	10-Gigabit Ethernet interface operating in Wide Area Network Physical Layer Device (WAN PHY) mode. WAN PHY allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and other devices intended for SONET/SDH.	All levels
Unidirectional	Unidirectional link mode status for 10-Gigabit Ethernet interface: **Enabled** or **Disabled** for parent interface; **Rx-only** or **Tx-only** for child interfaces.	All levels
Flow control	Flow control status: **Enabled** or **Disabled**.	All levels
Auto-negotiation	(Gigabit Ethernet interfaces) Autonegotiation status: **Enabled** or **Disabled**.	All levels
Remote-fault	(Gigabit Ethernet interfaces) Remote fault status: • **Online**—Autonegotiation is manually configured as online. • **Offline**—Autonegotiation is manually configured as offline.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under "Common Output Fields Description" on page 111.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under "Common Output Fields Description" on page 111.	All levels

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link flags	Information about the link. Possible values are described in the "Links Flags" section under "Common Output Fields Description" on page 111.	All levels
Wavelength	(10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm).	All levels
Frequency	(10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz).	All levels
CoS queues	Number of CoS queues configured.	**detail extensive** none
Schedulers	(Gigabit Ethernet intelligent queuing 2 [IQ2] interfaces only) Number of CoS schedulers configured.	**extensive**
Hold-times	Current interface hold-time up and hold-time down, in milliseconds (ms).	**detail extensive**
Current address	Configured MAC address.	**detail extensive** none
Hardware address	Hardware MAC address.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second:timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None
Output Rate	Output rate in bps and pps.	None
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Egress accounting overhead	Layer 2 overhead in bytes that is accounted in the interface statistics for egress traffic.	**detail extensive**
Ingress accounting overhead	Layer 2 overhead in bytes that is accounted in the interface statistics for ingress traffic.	**detail extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Output bytes**—Number of bytes transmitted on the interface. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes. For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 31 under the show interfaces (10-Gigabit Ethernet) command.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** statement. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **FIFO errors**—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. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Collisions**—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. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **FIFO errors**—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. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters (Egress)	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Ingress queues	Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces.	**extensive**
Queue counters (Ingress)	CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Active alarms and Active defects	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 router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**. • **None**—There are no active defects or alarms. • **Link**—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.	**detail extensive** none
Interface transmit statistics	(On MX Series devices) Status of the **interface-transmit-statistics** configuration: Enabled or Disabled. • **Enabled**—When the **interface-transmit-statistics** statement is included in the configuration. If this is configured, the interface statistics show the actual transmitted load on the interface. • **Disabled**—When the **interface-transmit-statistics** statement is not included in the configuration. If this is not configured, the interface statistics show the offered load on the interface.	**detail extensive**
OTN FEC statistics	The forward error correction (FEC) counters provide the following statistics: • **Corrected Errors**—The count of corrected errors in the last second. • **Corrected Error Ratio**—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits.	**detail extensive**
PCS statistics	(10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device. • **Bit errors**—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode. • **Errored blocks**—Loss of block lock. The number of errored blocks when the PCS receiver is operating in normal mode.	**detail extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
MAC statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC subsystem, including the following: • **Total octets** and **total packets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see Table 31 under the show interfaces (10-Gigabit Ethernet) command. • **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets. • **CRC/Align errors**—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). • **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning. • **MAC control frames**—Number of MAC control frames. • **MAC pause frames**—Number of MAC control frames with **pause** operational code. • **Oversized frames**—There are two possible conditions regarding the number of oversized frames: ◦ Packet length exceeds 1518 octets, or ◦ Packet length exceeds MRU • **Jabber frames**—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. • **Fragment frames**—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. • **VLAN tagged frames**—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. NOTE: The 20-port Gigabit Ethernet MIC (MIC-3D-20GE-SFP) does not have hardware counters for VLAN frames. Therefore, the **VLAN tagged frames** field displays 0 when the **show interfaces** command is executed on a 20-port Gigabit Ethernet MIC. In other words, the number of VLAN tagged frames cannot be determined for the 20-port Gigabit Ethernet MIC. • **Code violations**—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.”	**extensive**
OTN Received Overhead Bytes	APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08	**extensive**
OTN Transmitted Overhead Bytes	APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Filter statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem. The filtering is done by the content-addressable memory (CAM) on the PIC. The filter examines a packet's source and destination MAC addresses to determine whether the packet should enter the system or be rejected. • **Input packet count**—Number of packets received from the MAC hardware that the filter processed. • **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address. • **Input DA rejects**—Number of packets that the filter rejected because the destination MAC address of the packet is not on the accept list. It is normal for this value to increment. When it increments very quickly and no traffic is entering the router from the far-end system, either there is a bad ARP entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local router (which the router is rejecting). • **Input SA rejects**—Number of packets that the filter rejected because the source MAC address of the packet is not on the accept list. The value in this field should increment only if source MAC address filtering has been enabled. If filtering is enabled, if the value increments quickly, and if the system is not receiving traffic that it should from the far-end system, it means that the user-configured source MAC addresses for this interface are incorrect. • **Output packet count**—Number of packets that the filter has given to the MAC hardware. • **Output packet pad count**—Number of packets the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware. Usually, padding is done only on small ARP packets, but some very small IP packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist or it is misconfigured. • **Output packet error count**—Number of packets with an indicated error that the filter was given to transmit. These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment. • **CAM destination filters, CAM source filters**—Number of entries in the CAM dedicated to destination and source MAC address filters. There can only be up to 64 source entries. If source filtering is disabled, which is the default, the values for these fields should be 0.	**extensive**
PMA PHY	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **PHY Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
WIS section	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**
WIS line	(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
WIS path	(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. Any state other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output

Autonegotiation information	Information about link autonegotiation.
	• **Negotiation status:**
	  • **Incomplete**—Ethernet interface has the speed or link mode configured.
	  • **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
	  • **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner status**—**OK** when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
	• **Link partner**—Information from the remote Ethernet device:
	  • **Link mode**—Depending on the capability of the link partner, either **Full-duplex** or **Half-duplex**.
	  • **Flow control**—Types of flow control supported by the link partner. For Gigabit Ethernet interfaces, types are **Symmetric** (link partner supports **PAUSE** on receive and transmit), **Asymmetric** (link partner supports **PAUSE** on transmit), **Symmetric/Asymmetric** (link partner supports **PAUSE** on receive and transmit or only **PAUSE** on transmit), and **None** (link partner does not support flow control).
	  • **Remote fault**—Remote fault information from the link partner—**Failure** indicates a receive link error. **OK** indicates that the link partner is receiving. **Negotiation error** indicates a negotiation error. **Offline** indicates that the link partner is going offline.
	• **Local resolution**—Information from the local Ethernet device:
	  • **Flow control**—Types of flow control supported by the local device. For Gigabit Ethernet interfaces, advertised capabilities are **Symmetric/Asymmetric** (local device supports **PAUSE** on receive and transmit or only **PAUSE** on receive) and **None** (local device does not support flow control). Depending on the result of the negotiation with the link partner, local resolution flow control type will display **Symmetric** (local device supports **PAUSE** on receive and transmit), **Asymmetric** (local device supports **PAUSE** on receive), and **None** (local device does not support flow control).
	  • **Remote fault**—Remote fault information. **Link OK** (no error detected on receive), **Offline** (local interface is offline), and **Link Failure** (link error detected on receive).
		extensive

Received path trace, Transmitted path trace	(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number.	**extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
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. Possible values are described in the "Logical Interface Flags" section under "Common Output Fields Description" on page 111.	All levels

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
VLAN-Tag	Rewrite profile applied to incoming or outgoing frames on the outer (**Out**) VLAN tag or for both the outer and inner (**In**) VLAN tags. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **pop**—The outer VLAN tag of the incoming frame is removed. • **swap**—The outer VLAN tag of the incoming frame is overwritten with the user-specified VLAN tag information. • **push**—An outer VLAN tag is pushed in front of the existing VLAN tag. • **push-push**—Two VLAN tags are pushed in from the incoming frame. • **swap-push**—The outer VLAN tag of the incoming frame is replaced by a user-specified VLAN tag value. A user-specified outer VLAN tag is pushed in front. The outer tag becomes an inner tag in the final frame. • **swap-swap**—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user-specified VLAN tag value. • **pop-swap**—The outer VLAN tag of the incoming frame is removed, and the inner VLAN tag of the incoming frame is replaced by the user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame. • **pop-pop**—Both the outer and inner VLAN tags of the incoming frame are removed.	**brief detail extensive** none
Demux	IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following: • Source Family Inet • Destination Family Inet	**detail extensive** none
Encapsulation	Encapsulation on the logical interface.	All levels
ACI VLAN: Dynamic Profile	Name of the dynamic profile that defines the agent circuit identifier (ACI) interface set. If configured, the ACI interface set enables the underlying Ethernet interface to create dynamic VLAN subscriber interfaces based on ACI information.	**brief detail extensive** none
Protocol	Protocol family. Possible values are described in the "Protocol Field" section under "Common Output Fields Description" on page 111.	**detail extensive** none
MTU	Maximum transmission unit size on the logical interface.	**detail extensive** none
Dynamic Profile	(MX Series routers with Trio MPCs only) Name of the dynamic profile that was used to create this interface configured with a Point-to-Point Protocol over Ethernet (PPPoE) family.	**detail extensive** none
Service Name Table	(MX Series routers with Trio MPCs only) Name of the service name table for the interface configured with a PPPoE family.	**detail extensive** none
Max Sessions	(MX Series routers with Trio MPCs only) Maximum number of PPPoE logical interfaces that can be activated on the underlying interface.	**detail extensive** none

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Duplicate Protection	(MX Series routers with Trio MPCs only) State of PPPoE duplicate protection: **On** or **Off**. When duplicate protection is configured for the underlying interface, a dynamic PPPoE logical interface cannot be activated when an existing active logical interface is present for the same PPPoE client.	**detail extensive** none
Maximum labels	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	**detail extensive** none
Traffic statistics	Number and rate of bytes and packets received and transmitted on the specified interface set. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set. The value in this field also includes the Layer 2 overhead bytes for ingress or egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Input packets, Output packets**—Number of packets received and transmitted on the interface set.	**detail extensive**
IPv6 transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.	**extensive**
Local statistics	Number and rate of bytes and packets destined to the router.	**extensive**
Transit statistics	Number and rate of bytes and packets transiting the switch. NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the **Output bytes** and **Output packets** interface counters. However, correct values display for both of these egress statistics when per-unit scheduling is enabled for the Gigabit Ethernet IQ2 physical interface, or when a single logical interface is actively using a shared scheduler.	**extensive**
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive** none
Flags	Information about protocol family flags. Possible values are described in the "Family Flags" section under "Common Output Fields Description" on page 111.	**detail extensive**
Donor interface	(Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address.	**detail extensive** none
Preferred source address	(Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface.	**detail extensive** none
Input Filters	Names of any input filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parentheses next to all interfaces.	**detail extensive**

Table 7: show interfaces Gigabit Ethernet Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output Filters	Names of any output filters applied to this interface. If you specify a precedence value for any filter in a dynamic profile, filter precedence values appear in parentheses next to all interfaces.	**detail extensive**
Mac-Validate Failures	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under "Common Output Fields Description" on page 111.	**detail extensive** none
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed.	**brief**
Flags	Information about the address flag. Possible values are described in the "Addresses Flags" section under "Common Output Fields Description" on page 111.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 8: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type

Interface Type	Sample Command	Byte and Octet Counts Include	Comments
Inbound physical interface	**show interfaces ge-0/3/0 extensive**	Traffic statistics: Input bytes: 496 bytes per packet, representing the Layer 2 packet MAC statistics: Received octets: 500 bytes per packet, representing the Layer 2 packet + 4 bytes	The additional 4 bytes are for the CRC.
Inbound logical interface	**show interfaces ge-0/3/0.50 extensive**	Traffic statistics: Input bytes: 478 bytes per packet, representing the Layer 3 packet	

Table 8: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type *(continued)*

Interface Type	Sample Command	Byte and Octet Counts Include	Comments
Outbound physical interface	**show interfaces ge-0/0/0 extensive**	Traffic statistics: Input bytes: 490 bytes per packet, representing the Layer 3 packet + 12 bytes MAC statistics: Received octets: 478 bytes per packet, representing the Layer 3 packet	For input bytes, the additional 12 bytes include 6 bytes for the destination MAC address plus 4 bytes for VLAN plus 2 bytes for the Ethernet type.
Outbound logical interface	**show interfaces ge-0/0/0.50 extensive**	Traffic statistics: Input bytes: 478 bytes per packet, representing the Layer 3 packet	

Sample Output

show interfaces (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Interface index: 167, SNMP ifIndex: 35
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:05:85:4a:e9:7c, Hardware address: 00:05:85:4a:e9:7c
  Last flapped   : 2006-08-10 17:25:10 PDT (00:01:08 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-3/0/2.0 (Index 72) (SNMP ifIndex 69)
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [ 0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530) Out(swap-push
    0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    Egress accounting overhead: 100
    Ingress accounting overhead: 90
    Input packets : 0
    Output packets: 0
    Protocol ccc, MTU: 1522
      Flags: Is-Primary
```

show interfaces (Gigabit Ethernet on MX Series Routers)

```
user@host> show interfaces ge-2/2/2
Physical interface: ge-2/2/2, Enabled, Physical link is Up
  Interface index: 156, SNMP ifIndex: 188
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, MAC-REWRITE Error: None,
 Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 4 maximum usable queues
  Schedulers     : 0
  Current address: 00:1f:12:b7:d7:c0, Hardware address: 00:1f:12:b7:d6:76
  Last flapped   : 2008-09-05 16:44:30 PDT (3d 01:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Logical interface ge-2/2/2.0 (Index 82) (SNMP ifIndex 219)
    Flags: SNMP-Traps 0x20000000 Encapsulation: Ethernet-Bridge
    Egress accounting overhead: 100
    Ingress accounting overhead: 90
    Input packets : 0
    Output packets: 0
     Protocol aenet, AE bundle: ae0.0    Link Index: 4
```

show interfaces extensive (Gigabit Ethernet on MX Series Routers showing interface transmit

```
user@host> show interfaces ge-2/1/2 extensive | match "output|interface"
Physical interface: ge-2/1/2, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 530, Generation: 154
  Interface flags: SNMP-Traps Internal: 0x4000
   Output bytes  :         240614363944            772721536 bps
   Output packets:           3538446506              1420444 pps
    Direction : Output
```

statistics configuration)

```
  Interface transmit statistics: Enabled

  Logical interface ge-2/1/2.0 (Index 331) (SNMP ifIndex 955) (Generation 146)
     Output bytes  :         195560312716            522726272 bps
     Output packets:           4251311146              1420451 pps
```

show interfaces brief (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2 brief
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None

  Logical interface ge-3/0/2.0
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [ 0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530) Out(swap-push
    0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    ccc

  Logical interface ge-3/0/2.32767
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
```

show interfaces detail (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2 detail
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Interface index: 167, SNMP ifIndex: 35, Generation: 177
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:05:85:4a:e9:7c, Hardware address: 00:05:85:4a:e9:7c
  Last flapped   : 2006-08-09 17:17:00 PDT (01:31:33 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
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Drop   bytes  :                    0                    0 bps
   Drop   packets:                    0                    0 pps
  Ingress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0
```

```
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Active alarms  : None
  Active defects : None

  Logical interface ge-3/0/2.0 (Index 72) (SNMP ifIndex 69) (Generation 140)
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530)
Out(swap-push 0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    Egress accounting overhead: 100
    Ingress accounting overhead: 90
    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 ccc, MTU: 1522, Generation: 149, Route table: 0
      Flags: Is-Primary

  Logical interface ge-3/0/2.32767 (Index 71) (SNMP ifIndex 70)
  (Generation 139)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  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
```

show interfaces extensive

```
user@host> show interfaces ge-7/1/3 extensive
Physical interface: ge-7/1/3, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 70, Generation: 171
```

(Gigabit Ethernet IQ2)

```
Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4004000
Link flags     : None
CoS queues     : 8 supported, 4 maximum usable queues
Schedulers     : 256
Hold-times     : Up 0 ms, Down 0 ms
Current address: 00:14:f6:30:5e:74, Hardware address: 00:14:f6:30:5e:74
Last flapped   : 2007-11-07 21:31:41 PST (02:03:33 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :          38910844056                 7952 bps
 Output bytes  :              7174605                 8464 bps
 Input  packets:            418398473                   11 pps
 Output packets:                78903                   12 pps
 IPv6 transit statistics:
  Input  bytes  :                   0
  Output bytes  :                   0
  Input  packets:                   0
  Output packets:                   0
Ingress traffic statistics at Packet Forwarding Engine:
 Input  bytes  :          38910799145                 7952 bps
 Input  packets:            418397956                   11 pps
 Drop   bytes  :                   0                    0 bps
 Drop   packets:                   0                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  FIFO errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Ingress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort            418390823            418390823                    0

  1 expedited-fo                 0                    0                    0

  2 assured-forw                 0                    0                    0

  3 network-cont              7133                 7133                    0

Egress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort               1031                 1031                    0

  1 expedited-fo                 0                    0                    0

  2 assured-forw                 0                    0                    0

  3 network-cont             77872                77872                    0

Active alarms  : None
Active defects : None
MAC statistics:                      Receive         Transmit
  Total octets                  38910844056          7174605
```

```
    Total packets                    418398473            78903
    Unicast packets                408021893366             1026
    Broadcast packets                       10               12
    Multicast packets                418398217            77865
    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  OTN Received Overhead Bytes:
    APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58
    Payload Type: 0x08
  OTN Transmitted Overhead Bytes:
    APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00
    Payload Type: 0x08
  Filter statistics:
    Input packet count               418398473
    Input packet rejects                   479
    Input DA rejects                       479
    Input SA rejects                         0
    Output packet count                              78903
    Output packet pad count                              0
    Output packet error count                            0
    CAM destination filters: 0, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete
    Link partner:
        Link mode: Full-duplex, Flow control: Symmetric/Asymmetric,
        Remote fault: OK
    Local resolution:
        Flow control: Symmetric, Remote fault: Link OK
  Packet Forwarding Engine configuration:
    Destination slot: 7
  CoS information:
    Direction : Output
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                                %            bps     %           usec
    0 best-effort              95      950000000    95              0
low    none
    3 network-control           5       50000000     5              0
low    none
    Direction : Input
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                                %            bps     %           usec
    0 best-effort              95      950000000    95              0
low    none
    3 network-control           5       50000000     5              0
low    none

  Logical interface ge-7/1/3.0 (Index 70) (SNMP ifIndex 85) (Generation 150)
    Flags: SNMP-Traps Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :               812400
     Output bytes  :              1349206
     Input  packets:                 9429
     Output packets:                 9449
     IPv6 transit statistics:
      Input  bytes  :                   0
```

```
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Local statistics:
   Input  bytes  :                812400
   Output bytes  :               1349206
   Input  packets:                  9429
   Output packets:                  9449
  Transit statistics:
   Input  bytes  :                   0                 7440 bps
   Output bytes  :                   0                 7888 bps
   Input  packets:                   0                   10 pps
   Output packets:                   0                   11 pps
   IPv6 transit statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Protocol inet, MTU: 1500, Generation: 169, Route table: 0
    Flags: Is-Primary, Mac-Validate-Strict
    Mac-Validate Failures: Packets: 0, Bytes: 0
    Addresses, Flags: Is-Preferred Is-Primary
    Input Filters: F1-ge-3/0/1.0-in, F3-ge-3/0/1.0-in
    Output Filters: F2-ge-3/0/1.0-out (53)
    Destination: 10.74.2/24, Local: 10.74.2.2, Broadcast: 10.74.2.255,
      Generation: 196
  Protocol multiservice, MTU: Unlimited, Generation: 170, Route table: 0
    Flags: Is-Primary
    Policer: Input: __default_arp_policer__
```

NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics displayed in the **show interfaces** command output might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the interface counters. For detailed information, see the description of the logical interface **Transit statistics** fields in Table 7 on page 154.

show interfaces (Gigabit Ethernet

```
user@host> show interfaces ge-3/2/0
Physical interface: ge-3/2/0, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 50
```

Unnumbered Interface)

```
Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Link flags     : None
CoS queues     : 8 supported, 4 maximum usable queues
Current address: 00:14:f6:11:26:f8, Hardware address: 00:14:f6:11:26:f8
Last flapped   : 2006-10-27 04:42:23 PDT (08:01:52 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 624 bps (1 pps)
Active alarms  : None
Active defects : None

Logical interface ge-3/2/0.0 (Index 67) (SNMP ifIndex 85)
  Flags: SNMP-Traps Encapsulation: ENET2
  Input packets : 0
  Output packets: 6
  Protocol inet, MTU: 1500
    Flags: Unnumbered
    Donor interface: lo0.0 (Index 64)
    Preferred source address: 22.22.22.22
```

show interfaces (ACI Interface Set Configured)

```
user@host> show interfaces ge-1/0/0.4001
  Logical interface ge-1/0/0.4001 (Index 340) (SNMP ifIndex 548)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.4001 ]  Encapsulation: PPP-over-

    Ethernet
    ACI VLAN:
      Dynamic Profile: aci-vlan-set-profile
    PPPoE:
      Dynamic Profile: aci-vlan-pppoe-profile,
      Service Name Table: None,
      Max Sessions: 32000, Max Sessions VSA Ignore: Off,
      Duplicate Protection: On, Short Cycle Protection: Off,
      AC Name: nbc
    Input packets : 9
    Output packets: 8
    Protocol multiservice, MTU: Unlimited
```

show interfaces (Serial)

Syntax
show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
Display status information about serial interfaces, including RS-232, RS-422/449, EIA-530, X.21, and V.35.

Options
interface-type—On M Series and T Series routers, the interface type is **se-*fpc/pic/port***. On the J Series routers, the interface type is **se-*pim*/0/*port***.

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

descriptions—(Optional) Display interface description strings.

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

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

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces (Serial, EIA-530) on page 184
show interfaces brief (Serial, EIA-530) on page 184
show interfaces detail (Serial, EIA-530) on page 184
show interfaces extensive (Serial, EIA-530) on page 185
show interfaces (Serial, V.35) on page 186
show interfaces brief (Serial, V.35) on page 186
show interfaces detail (Serial, V.35) on page 187
show interfaces extensive (Serial, V.35) on page 187
show interfaces statistics detail (RS 449) on page 189

Output Fields
Table 9 on page 177 lists the output fields for the **show interfaces** (Serial) command. Output fields are listed in the approximate order in which they appear.

Table 9: show interfaces (Serial) Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under "Common Output Fields Description" on page 111.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Type	Type of interface.	All levels
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	Maximum transmission unit (MTU) size on the physical interface.	All levels
Maximum speed	Maximum speed. The nonconfigurable value is 16,384 kbps.	**detail extensive** none
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under "Common Output Fields Description" on page 111.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under "Common Output Fields Description" on page 111.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under "Common Output Fields Description" on page 111.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalive packets. • **Interval *seconds***—Time between successive keepalive requests. The range of values, in seconds, is 10 to 32,767. The default value is 10. • **Up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range of values is 1 to 255. The default value is 1. • **Down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 to 255. The default value is 3.	All levels
Keepalive	(PPP and HDLC) Information about keepalive packets. • **Input: *number* (*hh*:*mm*:*ss* ago)**—Number of keepalive packets received by PPP and the time since the last keepalive packet was received. • **Output: *number* (*hh*:*mm*:*ss* ago)**—Number of keepalive packets sent by PPP and the time since the last keepalive packet was sent.	**brief** none

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Keepalive statistics	(PPP and HDLC) Information about keepalive packets. • **Input:** ***number*** **(last seen** ***hh:mm:ss*** **ago)**—Number of keepalive packets received by PPP and the time since the last keepalive packet was received. • **Output:** ***number*** **(last seen** ***hh:mm:ss*** **ago)**—Number of keepalive packets sent by PPP and the time since the last keepalive packet was sent.	**detail extensive**
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
CoS queues	Number of CoS queues configured.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(***hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues supported	Total number of egress queues supported on the specified interface. Displayed with the **statistics** option.	**detail extensive**
Egress queues in use	Total number of egress queues in use on the specified interface. Displayed with the **statistics** option.	**detail extensive**

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Queue counters	CoS queue number and its associated user-configured forwarding class name. Displayed with the **statistics** option. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**

Serial media information	Information about the physical media:
	• **Line protocol**—**eia530**, **eia530a**, **rs232**, **rs449**, **v.35**, or **x.21.**.
	• **Resync history**—Information about resynchronization events:
	  • **Sync loss count**—Number of times the synchronization was lost.
	• **Data signal**—(X.21 and V.35) Information about the data signal:
	  • **Rx Clock**—Receive clock status: OK (DTE is receiving the receive clock signal) or Not detected (receive clock signal is not being received).
	• **Control signals**—Information about modem control signals:
	  • **Local mode:DCE** (data communication equipment) or **DTE** (data terminal equipment)
	  • **To DCE**—Control signals that the Serial PIC sent to the DCE: DTR (Data Terminal Ready:**up** or **down**) or RTS (Request To Send: **up** or **down**.)
	  • **From DC**—Control signals that the Serial PIC received from the DCE: CTS (Clear To Send: **up** or **down**), DCD (Data Carrier Detect: **up** or **down**), **DSR** (Data Set Ready: **up** or **down**), or TM (Test Mode: **up** or **down**).
	• **Clocking mode**—Clocking used for the transmit clock:
	  • **dte**—Transmit clock is generated by DTE.
	  • **dce**—Transmit clock is generated by the DCE and is looped back as the transmit clock.
	  • **loop-timed**—Receive clock from the DCE is looped back as the transmit clock.
	• **Clock rate**—Rate, in megahertz (MHz), at which the clock is configured.
	• **Loopback**—Configured loopback mode for the interface: **dce-remote**, **dce-local**, **liu**, **local**, or **none**.
	• **Tx clock**—Clocking phase of the transmit clock: **invert** (transmit clock polarity is inverted) or **non-invert** (transmit clock polarity is not inverted).
	• **Line encoding**—Type of line encoding used: **nrz** (nonreturn to zero) or **nrzi** (return to zero inverted).
		detail extensive

Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface: • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under "Common Output Fields Description" on page 111.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the source and destination address are also displayed.	**brief**
Protocol	Protocol family configured on the logical interface, such as iso, inet6, mpls.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about protocol family flags. Possible values are described in the "Family Flags" section under "Common Output Fields Description" on page 111.	**detail extensive**

Table 9: show interfaces (Serial) Output Fields *(continued)*

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under "Common Output Fields Description" on page 111.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Sample Output

show interfaces (Serial, EIA-530)

```
user@host> show interfaces se-5/0/1
Physical interface: se-5/0/1, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 41
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running
  Interface flags: Point-To-Point Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 32 (00:00:10 ago), Output: 31 (00:00:07 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 15:10:18 PDT (00:05:22 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface se-5/0/1.0 (Index 71) (SNMP ifIndex 45)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 12.0.0.0/30, Local: 12.0.0.1, Broadcast: 12.0.0.3
```

show interfaces brief (Serial, EIA-530)

```
user@host> show interfaces se-5/0/1 brief
Physical interface: se-5/0/1, Enabled, Physical link is Up
  Type: Serial, Link-level type: PPP, MTU: 1504
  Device flags   : Present Running
  Interface flags: Point-To-Point Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 235 (00:00:10 ago), Output: 234 (00:00:00 ago)

  Logical interface se-5/0/1.0
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    inet  12.0.0.1/30
```

show interfaces detail (Serial, EIA-530)

```
user@host> show interfaces se-5/0/1 detail
Physical interface: se-5/0/1, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 41, Generation: 25
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running
  Interface flags: Point-To-Point Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 37 (last seen 00:00:06 ago)
    Output: 35 (last sent 00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 15:10:18 PDT (00:06:02 ago)
```

```
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  928                   40 bps
   Output bytes  :                 1023                   48 bps
   Input  packets:                   76                    0 pps
   Output packets:                   77                    0 pps
  Serial media information:
    Line protocol: eia530
    Resync history:
      Sync loss count: 0
    Data signal:
      Rx Clock: OK
    Control signals:
      Local mode: DTE
      To DCE: DTR: up, RTS: up
      From DCE: CTS: up, DCD: up, DSR: up
    Clocking mode: loop-timed
    Clock rate: 8.0 MHz
    Loopback: none
    Tx clock: non-invert
    Line encoding: nrz

  Logical interface se-5/0/1.0 (Index 71) (SNMP ifIndex 45) (Generation 9)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 15, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 12.0.0.0/30, Local: 12.0.0.1, Broadcast: 12.0.0.3,
        Generation: 23
```

show interfaces extensive (Serial, EIA-530)

```
user@host> show interfaces se-5/0/1 extensive
Physical interface: se-5/0/1, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 41, Generation: 25
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running
  Interface flags: Point-To-Point Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 40 (last seen 00:00:00 ago)
    Output: 37 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 15:10:18 PDT (00:06:28 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  988                   40 bps
   Output bytes  :                 1088                   48 bps
   Input  packets:                   81                    0 pps
   Output packets:                   82                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 2, Runts: 0, Giants: 0,
    Policed discards: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, MTU errors: 0,
    Resource errors: 0
  Serial media information:
```

```
    Line protocol: eia530
    Resync history:
      Sync loss count: 0
    Data signal:
      Rx Clock: OK
    Control signals:
      Local mode: DTE
      To DCE: DTR: up, RTS: up
      From DCE: CTS: up, DCD: up, DSR: up
    Clocking mode: loop-timed
    Clock rate: 8.0 MHz
    Loopback: none
    Tx clock: non-invert
    Line encoding: nrz
  Packet Forwarding Engine configuration:
    Destination slot: 5, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue        Bandwidth          Buffer   Priority   Limit
                            %          bps     %     usec
    0 best-effort          95     15564800    95        0         low    none
    3 network-control       5       819200     5        0         low    none

  Logical interface se-5/0/1.0 (Index 71) (SNMP ifIndex 45) (Generation 9)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 15, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 12.0.0.0/30, Local: 12.0.0.1, Broadcast: 12.0.0.3,
        Generation: 23
```

show interfaces (Serial, V.35)

```
user@host> show interfaces se-5/0/0
Physical interface: se-5/0/0, Enabled, Physical link is Down
  Interface index: 150, SNMP ifIndex: 39
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
  Link flags     : Loose-NCP
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 14:51:27 PDT (01:02:23 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

  Logical interface se-5/0/0.0 (Index 73) (SNMP ifIndex 27)
    Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps
    Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 13.0.0.0/30, Local: 13.0.0.2, Broadcast: 13.0.0.3
```

show interfaces brief (Serial, V.35)

```
user@host> show interfaces se-5/0/0 brief
Physical interface: se-5/0/0, Enabled, Physical link is Down
  Type: Serial, Link-level type: PPP, MTU: 1504
  Device flags   : Present Running Down
```

```
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
  Link flags     : Loose-NCP
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)

  Logical interface se-5/0/0.0
    Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps
    Encapsulation: PPP
    inet  13.0.0.2/30
```

show interfaces detail (Serial, V.35)

```
user@host> show interfaces se-5/0/0 detail
Physical interface: se-5/0/0, Enabled, Physical link is Down
  Interface index: 150, SNMP ifIndex: 39, Generation: 31
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
  Link flags     : Loose-NCP
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 14:51:27 PDT (01:03:15 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
  Serial media information:
    Line protocol: v.35
    Resync history:
      Sync loss count: 0
    Data signal:
      Rx Clock: Not Detected
    Control signals:
      Local mode: DCE
      To DTE: CTS: down, DCD: down, DSR: up
      From DTE: DTR: down, RTS: down
    DCE loopback override: Off
    Clocking mode: internal
    Clock rate: 38.4 KHz
    Loopback: none
    Tx clock: non-invert
    Line encoding: nrz

  Logical interface se-5/0/0.0 (Index 73) (SNMP ifIndex 27) (Generation 12)
    Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps
    Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 17, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 13.0.0.0/30, Local: 13.0.0.2, Broadcast: 13.0.0.3,
        Generation: 23
```

show interfaces extensive (Serial, V.35)

```
user@host> show interfaces se-5/0/0 extensive
Physical interface: se-5/0/0, Enabled, Physical link is Down
  Interface index: 150, SNMP ifIndex: 39, Generation: 31
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 16384kbps
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
  Link flags     : Loose-NCP
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-04-26 14:51:27 PDT (01:04:17 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
    Resource errors: 0
  Serial media information:
    Line protocol: v.35
    Resync history:
      Sync loss count: 0
    Data signal:
      Rx Clock: Not Detected
    Control signals:
      Local mode: DCE
      To DTE: CTS: down, DCD: down, DSR: up
      From DTE: DTR: down, RTS: down
    DCE loopback override: Off
    Clocking mode: internal
    Clock rate: 38.4 KHz
    Loopback: none
    Tx clock: non-invert
    Line encoding: nrz
  Packet Forwarding Engine configuration:
    Destination slot: 5, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue          Bandwidth          Buffer      Priority   Limit
                             %           bps     %    usec
    0 best-effort           95      15564800    95       0            low    none
    3 network-control        5        819200     5       0            low    none

  Logical interface se-5/0/0.0 (Index 73) (SNMP ifIndex 27) (Generation 12)
    Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps
    Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 17, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 13.0.0.0/30, Local: 13.0.0.2, Broadcast: 13.0.0.3,
```

```
        Generation: 23
```

show interfaces statistics detail (RS 449)

```
user@host> show interfaces se-6/0/0 statistics detail
 Interface index: 149, SNMP ifIndex: 59, Generation: 150
  Type: Serial, Link-level type: PPP, MTU: 1504, Maximum speed: 8mbps
  Device flags   : Present Running
  Interface flags: Point-To-Point Internal: 0x4000
  Link flags     : No-Keepalives Loose-NCP
  Hold-times     : Up 0 ms, Down 0 ms
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2007-11-28 19:38:36 PST (00:14:06 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  744                    0 bps
   Output bytes  :                 5978                    0 bps
   Input  packets:                   33                    0 pps
   Output packets:                  129                    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: 13, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 5 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   24                   24                    0

    1 expedited-fo                   0                    0                    0

    2 bulk                           0                    0                    0

    3 assured-forw                 105                  105                    0

    4 voip                           0                    0                    0

  Serial media information:
    Line protocol: rs449
    Resync history:
      Sync loss count: 0
    Data signal:
      Rx Clock: OK
    Control signals:
      Local mode: DTE
      To DCE: DTR: up, RTS: up
      From DCE: CTS: up, DCD: up, DSR: up
    Clocking mode: internal
    Loopback: none
    Tx clock: non-invert
    Line encoding: nrz

  Logical interface se-6/0/0.0 (Index 75) (SNMP ifIndex 69) (Generation 141)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 256, Generation: 145, Route table: 0
      Flags: None
```

```
                Addresses, Flags: Is-Preferred Is-Primary
                  Destination: 11.11.11/24, Local: 11.11.11.2, Broadcast: 11.11.11.255,
                  Generation: 157
```

show interfaces extensive

Syntax show interfaces extensive

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches.

Description Display extensive information about all interfaces configured on the router.

NOTE:

- At some times, the cumulative byte counters displayed with the **show interfaces extensive** command on the 10-Gigabit Ethernet MPC with SFP+ is not always increasing and cumulative and does not give the correct results. There is a time lag in collecting these statistics, during which the display might decrease or go from a nonzero number to zero. Eventually, the counter will display the correct result.
- When the **show interfaces extensive** command is executed on a router with an MPC or a T4000 Type 5 FPC, the *Input packet rejects* counter of the *Filter statistics* field also displays statistics related to the following packet errors:
  - Invalid VLAN range
  - Tagged packet received on an untagged interface
- When the **show interfaces extensive** command is executed on an interface that is configured on a T4000 Type 5 FPC, the *IPv6 transit statistics* field displays:
  - Total statistics (sum of transit and local statistics) at the physical interface level
  - Transit statistics at the logical interface level
- When the **show interfaces extensive** command is executed on an aggregate interface in a T1600 Core Router, the IPv6 *Input bytes* is displayed for an aggregate interface. However, the IPv6 *Input bytes* is always zero on a member link of an aggregated bundle even when there are IPv6 transit traffic on the member link. This is because the logical interface index of the aggregate logical interface is updated but not the logical interface of the member links in the channel lookup table.

Options This command has no options.

Required Privilege Level view

List of Sample Output show interfaces extensive (Circuit Emulation) on page 193

show interfaces extensive (Fast Ethernet) on page 193
show interfaces extensive (Gigabit Ethernet) on page 195
show interfaces extensive (10-Gigabit Ethernet) on page 195
show interfaces extensive (IQ2 and IQ2E) on page 198
show interfaces extensive (100-Gigabit Ethernet) on page 201
show interfaces extensive (PTX5000 Packet Transport Switch) on page 202
show interfaces extensive (T4000 Routers with Type 5 FPCs) on page 204
show interfaces extensive (T4000 Routers with 24-port 10-Gigabit Ethernet LAN/WAN PIC on Type 5 FPC) on page 206
show interfaces extensive (Aggregated Ethernet) on page 208

Output Fields For more information, see the output fields table for the particular interface type in which you are interested. For information about destination class and source class statistics, see the "Destination Class Field" section and the "Source Class Field" section under "Common Output Fields Description" on page 111. For sample output for specific interfaces, see the other topics in this collection.

Sample Output

show interfaces extensive (Circuit Emulation)

If a Circuit Emulation (CE) PIC is configured for SAToP pseudowire, then pseudowire statistics are displayed in the CE information section of the show interface extensive output. If SAToP pseudowire is not configured on the CE PIC, then all the CE information counters will be displayed as 0 (zero).

```
user@host> show interface t1-0/0/0 extensive
Physical interface :t1-0/0/0, Enabled, Physical Link : Up
        Interface index:61441
        Speed : 1.54 Mbps, Loopback: Disabled
        Operational state : Enabled,    Encapsulation : Trans
        Encoding : b8zs,        Framing    : unframe,   Build-out : 0-30
        Inversion    : enable,  Clock source : master
        Description :
        Traffic statistics:
        T1 media:       Seconds
        ES              1643
        SES             1643

        CE Info         Packets             Bytes
        CE Rx     :     2395529             306627712
        CE Tx     :     2396259             306721152
        CE Rx Drop:     0                   0
        CE Tx Drop:     0                   0

        CE Overrun  Events: 0
        CE Underrun Events: 0
```

Sample Output

show interfaces extensive (Fast Ethernet)

```
user@host> show interfaces fe-0/2/1 extensive
Physical interface: fe-0/2/0, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 23, Generation: 130
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:90:69:91:c4:3e, Hardware address: 00:90:69:91:c4:3e
  Last flapped   : 2006-04-16 23:00:41 PDT (02:08:05 ago)
  Statistics last cleared: 2006-04-16 21:42:00 PDT (03:26:46 ago)
  Traffic statistics:
   Input  bytes  :                17539                 152 bps
   Output bytes  :                92968                 224 bps
   Input  packets:                  348                   0 pps
   Output packets:                 1349                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

    FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
```

```
  0 best-effort                  66                  66                   0

  1 expedited-fo                  0                   0                   0

  2 assured-forw                  0                   0                   0

  3 network-cont               1283                1283                   0

Active alarms  : None
Active defects : None
MAC statistics:                       Receive         Transmit
  Total octets                          24721           105982
  Total packets                           348             1349
  Unicast packets                         347              430
  Broadcast packets                         1               37
  Multicast packets                         0              882
  CRC/Align errors                          0                0
  FIFO errors                               0                0
  MAC control frames                        0                0
  MAC pause frames                          0                0
  Oversized frames                          0
  Jabber frames                             0
  Fragment frames                           0
  VLAN tagged frames                        0
  Code violations                           0
Filter statistics:
  Input packet count                      348
  Input packet rejects                      0
  Input DA rejects                          0
  Input SA rejects                          0
  Output packet count                                    1349
  Output packet pad count                                   0
  Output packet error count                                 0
  CAM destination filters: 3, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete
  Link partner:
      Link mode: Full-duplex, Flow control: None, Remote fault: OK
Packet Forwarding Engine configuration:
  Destination slot: 0
CoS information:
  CoS transmit queue               Bandwidth      Buffer    Priority    Limit

                                 %           bps   %   usec
  0 best-effort                 95      95000000  95    0            low    none
  3 network-control              5       5000000   5    0            low    none
Logical interface fe-0/2/0.0 (Index 66) (SNMP ifIndex 46) (Generation 133)
  Flags: SNMP-Traps Encapsulation: ENET2
  Protocol inet, MTU: 1500, Generation: 142, Route table: 0
    Flags: DCU, SCU-out
                                                Packets                 Bytes
    Destination class             (packet-per-second)    (bits-per-second)
                       silv1_new                     0                     0
                                 (                   0) (                  0)
                       silv2_new                     0                     0
                                 (                   0) (                  0)
                       silv_misc                     0                     0
                                 (                   0) (                  0)
                         silver0                     0                     0
                                 (                   0) (                  0)
```

```
                          silver2                    0                    0
                                  (                  0) (                 0)
                          silver3                    0                    0
                                  (                  0) (                 0)
                          silver4                    0                    0
                                  (                  0) (                 0)
                          silver5                    0                    0
                                  (                  0) (                 0)
                          silver6                    0                    0
                                  (                  0) (                 0)
                          silver7                    0                    0
                                  (                  0) (                 0)
                          silver9                    0                    0
                                  (                  0) (                 0)
                                                  Packets                Bytes
    Source class                   (packet-per-second)    (bits-per-second)
                            gold1                    0                    0
                                  (                  0) (                 0)
                            gold2                16600              1062400
                                  (                  0) (                 0)
                            gold3                    0                    0
                                  (                  0) (                 0)
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 12.1.1/24, Local: 12.1.1.1, Broadcast: 12.1.1.255,
      Generation: 150
```

Sample Output

show interfaces extensive (Gigabit Ethernet)

```
user@host> show interfaces ge-5/0/0.0 extensive

  Logical interface ge-5/0/0.0 (Index 71) (SNMP ifIndex 1930) (Generation 139)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                  42
     Input  packets:                   0
     Output packets:                   1
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                  42
     Input  packets:                   0
     Output packets:                   1
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Output Filters: f-any
    Protocol inet, MTU: 1500, Generation: 155, Route table: 0
      Output Filters: f-inet,
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.11.1/24, Local: 10.11.1.1, Broadcast: 10.11.1.255,
        Generation: 170
    Protocol multiservice, MTU: Unlimited, Generation: 156, Route table: 0
      Flags: Is-Primary
      Policer: Input: __default_arp_policer__
```

Sample Output

show interfaces extensive (10-Gigabit Ethernet)

```
user@host> show interfaces xe-2/1/0 extensive

Physical interface: xe-2/1/0, Enabled, Physical link is Up
  Interface index: 258, SNMP ifIndex: 762, Generation: 2046
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, BPDU Error:
 None, Loopback: None, Source filtering: Disabled,
  Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:1d:b5:f8:6d:eb, Hardware address: 00:1d:b5:f8:6d:eb
  Last flapped   : 2011-12-17 00:19:02 PST (07:36:37 ago)
  Statistics last cleared: 2011-12-17 07:55:24 PST (00:00:15 ago)
  Traffic statistics:
   Input  bytes  :               110000                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                 1000                    0 pps
   Output packets:                    0                    0 pps
   IPv6 transit statistics:
    Input  bytes  :               110000
    Output bytes  :                    0
    Input  packets:                 1000
    Output packets:                    0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0,
    MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                  0                    0                    0

    1 expedited-fo                 0                    0                    0

    2 assured-forw                 0                    0                    0

    3 network-cont                 0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                             0
    Errored blocks                         0
  MAC statistics:                     Receive         Transmit
    Total octets                       128000                0
    Total packets                        1000                0
    Unicast packets                      1000                0
    Broadcast packets                       0                0
    Multicast packets                       0                0
    CRC/Align errors                        0                0
```

```
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
  Filter statistics:
    Input packet count                    1000
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                       0
    Output packet pad count                                   0
    Output packet error count                                 0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 2
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95     9500000000    95              0      low
none
    3 network-control           5      500000000     5              0      low
none
  Interface transmit statistics: Disabled

  Logical interface xe-2/1/0.0 (Index 83) (SNMP ifIndex 1677) (Generation 10082)

    Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :               110000
     Output bytes  :                    0
     Input  packets:                 1000
     Output packets:                    0
     IPv6 transit statistics:
      Input  bytes  :               55000
      Output bytes  :                   0
      Input  packets:                 500
      Output packets:                   0
    Local statistics:
     Input  bytes  :               55000
     Output bytes  :                   0
     Input  packets:                 500
     Output packets:                   0
    Transit statistics:
     Input  bytes  :               55000                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                 500                    0 pps
     Output packets:                   0                    0 pps
     IPv6 transit statistics:
      Input  bytes  :               55000
      Output bytes  :                   0
      Input  packets:                 500
      Output packets:                   0
    Protocol inet6, MTU: 1500, Generation: 23739, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 2001:1000:abcd:2312:1432:abcd:1234:0/112, Local:
```

```
2001:1000:abcd:2312:1432:abcd:1234:1234
    Generation: 506
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::21d:b5ff:fef8:6deb
    Protocol multiservice, MTU: Unlimited, Generation: 508
    Generation: 23740, Route table: 0
      Policer: Input: __default_arp_policer__
```

Sample Output

show interfaces extensive (IQ2 and IQ2E)

```
user@host> show interfaces ge-3/2/2 extensive
    Physical interface: ge-3/2/2, Enabled, Physical link is Up
      Interface index: 156, SNMP ifIndex: 548, Generation: 159
      Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
      Flow control: Enabled, Auto-negotiation: Enabled, Remote fault: Online
      Device flags   : Present Running
      Interface flags: SNMP-Traps Internal: 0x4000
      CoS queues     : 8 supported, 8 maximum usable queues
      Schedulers     : 128
      Hold-times     : Up 0 ms, Down 0 ms
      Current address: 00:14:f6:12:86:fa, Hardware address: 00:14:f6:12:86:fa
      Last flapped   : 2010-03-17 04:03:11 PDT (00:45:30 ago)
      Statistics last cleared: Never
      Traffic statistics:
       Input  bytes  :              1716096                 0 bps
       Output bytes  :              1716448                 0 bps
       Input  packets:                13407                 0 pps
       Output packets:                13411                 0 pps
       IPv6 total statistics:
        Input  bytes  :             1716096
        Output bytes  :             1716096
        Input  packets:               13407
        Output packets:               13407
      Ingress traffic statistics at Packet Forwarding Engine:
       Input  bytes  :              1716096                 0 bps
       Input  packets:                13407                 0 pps
       Drop   bytes  :                    0                 0 bps
       Drop   packets:                    0                 0 pps
      Input errors:
        Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0, FIFO errors:
0,
        Resource errors: 0
      Output errors:
       Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets:
 0, FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
      Ingress queues: 8 supported, 4 in use
      Queue counters:       Queued packets  Transmitted packets      Dropped
packets
        0 best-effort                13407                13407
   0
        1 expedited-fo                   0                    0
   0
        2 assured-forw                   0                    0
   0
        3 network-cont                   0                    0
   0
      Egress queues: 8 supported, 4 in use
      Queue counters:       Queued packets  Transmitted packets      Dropped
packets
```

```
     0 best-effort                13407                13407
0
     1 expedited-fo                   0                    0
0
     2 assured-forw                   0                    0
0
     3 network-cont                   4                    4
0
   Active alarms  : None
   Active defects : None
   MAC statistics:                       Receive         Transmit
     Total octets                        1716096          1716448
     Total packets                         13407            13411
     Unicast packets                       13407            13407
     Broadcast packets                         0                0
     Multicast packets                         0                4
     CRC/Align errors                          0                0
     FIFO errors                               0                0
     MAC control frames                        0                0
     MAC pause frames                          0                0
     Oversized frames                          0
     Jabber frames                             0
     Fragment frames                           0
     VLAN tagged frames                        0
     Code violations                           0
   Filter statistics:
     Input packet count                    13407
     Input packet rejects                      0
     Input DA rejects                          0
     Input SA rejects                          0
     Output packet count                                    13411
     Output packet pad count                                    0
     Output packet error count                                  0
     CAM destination filters: 0, CAM source filters: 0
   Autonegotiation information:
     Negotiation status: Complete
     Link partner:
         Link mode: Full-duplex, Flow control: None, Remote fault: OK
     Local resolution:
         Flow control: Symmetric, Remote fault: Link OK
   Packet Forwarding Engine configuration:
     Destination slot: 3
   CoS information:
     Direction : Output
     CoS transmit queue               Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
     0 best-effort             95     950000000    95              0      low
 none
     3 network-control          5      50000000     5              0      low
 none
     Direction : Input
     CoS transmit queue               Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
     0 best-effort             95     950000000    95              0      low
 none
     3 network-control          5      50000000     5              0      low
 none

   Logical interface ge-3/2/2.0 (Index 83) (SNMP ifIndex 6080) (Generation
```

```
148)
        Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]  Encapsulation: ENET2
        Traffic statistics:
         Input  bytes  :                   0
         Output bytes  :                 336
         Input  packets:                   0
         Output packets:                   4
         IPv6 total statistics:
          Input  bytes  :             1716096
          Output bytes  :             1716096
          Input  packets:               13407
          Output packets:               13407
        Local statistics:
         Input  bytes  :                   0
         Output bytes  :                 336
         Input  packets:                   0
         Output packets:                   4
        Transit statistics:
         Input  bytes  :                   0                    0 bps
         Output bytes  :                   0                    0 bps
         Input  packets:                   0                    0 pps
         Output packets:                   0                    0 pps
         IPv6 total statistics:
          Input  bytes  :             1716096
          Output bytes  :             1716096
          Input  packets:               13407
          Output packets:               13407
        Protocol inet6, MTU: 1500, Generation: 159, Route table: 0
          Flags: Is-Primary
          Addresses, Flags: Is-Default Is-Primary
            Destination: Unspecified, Local: 2000::2
        Generation: 146
          Addresses, Flags: Is-Preferred
            Destination: fe80::/64, Local: fe80::214:f600:6412:86fa
        Protocol multiservice, MTU: Unlimited, Generation: 148
        Generation: 160, Route table: 0
          Policer: Input: __default_arp_policer__

    Logical interface ge-3/2/2.32767 (Index 84) (SNMP ifIndex 6081) (Generation
149)
        Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  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 multiservice, MTU: Unlimited, Generation: 161, Route table: 0
          Flags: None
          Policer: Input: __default_arp_policer__
```


Sample Output

show interfaces extensive (100-Gigabit Ethernet)

```
user@host> show interfaces et-0/0/0:0 extensive
Physical interface: et-0/0/0:0, Enabled, Physical link is Down
  Interface index: 156, SNMP ifIndex: 516, Generation: 163
  Link-level type: Ethernet, MTU: 9192, Speed: 50000mbps, BPDU Error: None,
MAC-REWRITE Error: None,
  Loopback: Disabled, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:aa:aa:aa:aa:00, Hardware address: 00:21:59:5c:48:00
  Last flapped   : 2010-01-07 16:36:49 PST (18:02:35 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, 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
  Egress queues: 8 supported, 8 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 DEFAULT, NC-                   0                    0                    0

    1 REALTIME                       0                    0                    0

    2 PRIVATE, NC-                   0                    0                    0

    3 CONTROL                     1253                 1253                    0

    4 BC-H, CLASS_                   0                    0                    0

    5 BC-M, CLASS_                   0                    0                    0

    6 IA, CLASS_V_                   0                    0                    0

    7 CLASS_S_OUTP                   0                    0                    0

  Queue       Mapped Forwarding Class
  0        DEFAULT, NC-Q0
    1        REALTIME
    2        PRIVATE, NC-Q1
    3        CONTROL
    4        BC-H, CLASS-Q4
    5        BC-M, CLASS-Q5
```

```
  6        IA, CLASS_V_OUTPUT
  7        CLASS_S_OUTPUT
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
Packet Forwarding Engine configuration:
  Destination slot: 0
CoS information:
  Direction : Output
  CoS transmit queue              Bandwidth              Buffer Priority Limit

                              %            bps     %           usec
  0 best-effort            95    47500000000    95              0      low none

  3 network-control         5     2500000000     5              0      low none


Logical interface et-0/0/0:0.0 (Index 68) (SNMP ifIndex 546) (Generation 161)
  Flags: Deviet-Down SNMP-Traps Encapsulation: ENET2
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                  0 bps
   Output bytes  :                   0                  0 bps
   Input  packets:                   0                  0 pps
   Output packets:                   0                  0 pps
  Protocol inet, MTU: 9178, Generation: 220, Route table: 0
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 210.160.0/24, Local: 210.160.0.1, Broadcast: 210.160.0.255,
Generation: 192
  Protocol mpls, MTU: 9166, Maximum labels: 3, Generation: 221, Route table: 0

  Protocol multiservice, MTU: Unlimited, Generation: 222, Route table: 0
    Policer: Input: __default_arp_policer
```

Sample Output

show interfaces

```
user@host> show interfaces et-7/0/0 extensive
Physical interface: et-7/0/0, Enabled, Physical link is Up
```

extensive (PTX5000 Packet Transport Switch)

```
  Interface index: 168, SNMP ifIndex: 501, Generation: 171
  Link-level type: Ethernet, MTU: 1514, Speed: 10Gbps, BPDU Error: None,
MAC-REWRITE Error: None,
  Loopback: Disabled, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 88:e0:f3:3b:de:43, Hardware address: 88:e0:f3:3b:de:43
  Last flapped   : 2012-01-18 11:48:24 PST (01:47:08 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :              3583014                    0 bps
   Output bytes  :               758050                    0 bps
   Input  packets:                17740                    0 pps
   Output packets:                 3418                    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, Policed discards: 0, L3
incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors:
 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0,
    HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                 252                 252                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont               6196                6196                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : None
  Active defects : None
  MAC statistics:                      Receive         Transmit
    Total octets                       4108825          1159686
    Total packets                        21166             6448
    Unicast packets                      14824             3255
    Broadcast packets                        3                0
    Multicast packets                     6339             3193
    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                     16091
    Code violations                            0
  Filter statistics:
    Input packet count                         9
    Input packet rejects                       9
    Input DA rejects                           9
    Input SA rejects                           0
    Output packet count                                          0
    Output packet pad count                                      0
    Output packet error count                                    0
    CAM destination filters: 0, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Incomplete
  Packet Forwarding Engine configuration:
    Destination slot: 7
  CoS information:
    Direction : Output
    CoS transmit queue                 Bandwidth                 Buffer Priority
Limit
                                 %             bps     %           usec
    0 best-effort               95      9500000000    95              0      low
none
    3 network-control            5       500000000     5              0      low
none
  Interface transmit statistics: Disabled
```

Sample Output

show interfaces extensive (T4000

```
user@host> show interfaces xe-4/0/0 extensive
Physical interface: xe-4/0/0, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 859, Generation: 173
```

Routers with Type 5 FPCs)

```
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, Loopback:
None, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:12:1e:37:53:f8, Hardware address: 00:12:1e:37:53:f8
  Last flapped   : 2012-06-06 02:25:56 PDT (10:11:58 ago)
  Statistics last cleared: 2012-06-06 12:36:59 PDT (00:00:55 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, 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
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                             0
    Errored blocks                         0
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
    CRC/Align errors                         0                0
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
```

```
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
  Filter statistics:
    Input packet count                       0
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                  0
    Output packet pad count                              0
    Output packet error count                            0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 4
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95     4750000000    95              0      low
none
    3 network-control           5      250000000     5              0      low
none
  Interface transmit statistics: Disabled

  Logical interface xe-4/0/0.0 (Index 93) (SNMP ifIndex 834) (Generation 158)
    Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 1500, Generation: 192, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Is-Preferred Is-Primary
       Destination: 34.1.1/24, Local: 34.1.1.2, Broadcast: 34.1.1.255, Generation:
 157
    Protocol multiservice, MTU: Unlimited, Generation: 193, Route table: 0
      Policer: Input: __default_arp_policer__
```

Sample Output

show interfaces extensive (T4000 Routers with 24-port 10-Gigabit Ethernet

```
user@host> show interfaces xe-3/1/0 extensive
Physical interface: xe-3/1/0, Enabled, Physical link is Up
  Interface index: 160, SNMP ifIndex: 1285, Generation: 163
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, BPDU Error:
 None, Loopback: None,
```

LAN/WAN PIC on Type 5 FPC)

```
  Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 2c:6b:f5:e1:cb:39, Hardware address: 2c:6b:f5:e1:cb:39
  Last flapped   : 2012-05-09 07:15:54 UTC (03:39:52 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, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0,
    HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 ay_q1                         0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   ay_q1
    2                   assured-forwarding
    3                   network-control
  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                             0
    Errored blocks                         0
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
    CRC/Align errors                         0                0
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
```

```
    VLAN tagged frames                      0
    Code violations                         0
  Filter statistics:
    Input packet count                      0
    Input packet rejects                    0
    Input DA rejects                        0
    Input SA rejects                        0
    Output packet count                                0
    Output packet pad count                            0
    Output packet error count                          0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 3
  CoS information:
    Direction : Output
    CoS transmit queue             Bandwidth             Buffer Priority   Limit

                               %          bps     %           usec
    0 best-effort             95    9500000000    95              0      low    none

    3 network-control          5     500000000     5              0      low    none

  Preclassifier statistics:
    Traffic Class      Received Packets   Transmitted  Packets     Dropped Packets

    network-control                 0                      0                   0
    best-effort                     0                      0                   0
  Interface transmit statistics: Disabled
```

Sample Output

show interfaces extensive (Aggregated Ethernet)

```
user@host> show interfaces ae0 extensive
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 199, SNMP ifIndex: 570, Generation: 202
  Link-level type: Ethernet, MTU: 1514, Speed: 2Gbps, BPDU Error: None,
  MAC-REWRITE Error: None, 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: 2c:6b:f5:d1:0f:c0, Hardware address: 2c:6b:f5:d1:0f:c0
  Last flapped   : 2012-06-06 23:33:03 PDT (00:00:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                18532                 1984 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                  158                    2 pps
   Output packets:                    0                    0 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Dropped traffic statistics due to STP State:
   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: 8 supported, 4 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0 best-effort                    0                    0                    0

   1 expedited-fo                   0                    0                    0

   2 assured-forw                   0                    0                    0

   3 network-cont                   0                    0                    0

 Egress queues: 8 supported, 4 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0 best-effort                   57                   57                    0

   1 expedited-fo                   0                    0                    0

   2 assured-forw                   0                    0                    0

   3 network-cont               63605                63605                    0

 Queue number:         Mapped forwarding classes
   0                   best-effort
   1                   expedited-forwarding
   2                   assured-forwarding
   3                   network-control

 Logical interface ae0.0 (Index 331) (SNMP ifIndex 583) (Generation 142)
   Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
   Statistics        Packets        pps         Bytes          bps
   Bundle:
       Input :           149          2         17416         1984
       Output:             0          0             0            0
   Link:
     ge-3/2/5.0
       Input :            90          1         10100          992
       Output:             0          0             0            0
     ge-3/3/9.0
       Input :            59          1          7316          992
       Output:             0          0             0            0
   LACP info:        Role             System             System         Port
    Port  Port
                           priority          identifier  priority        number
     key
     ge-3/2/5.0     Actor           100   00:00:00:00:00:01        127       1
   1
     ge-3/2/5.0   Partner        127  00:24:dc:98:67:c0       127       1     1

     ge-3/3/9.0     Actor          100  00:00:00:00:00:01       127       2
1
     ge-3/3/9.0   Partner        127  00:24:dc:98:67:c0       127       2     1

   LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
     ge-3/2/5.0                38         137            0            0
     ge-3/3/9.0                36         139            0            0
   Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
     ge-3/2/5.0                 0           0            0            0
```

```
    ge-3/3/9.0                 0           0            0            0
  Protocol inet, MTU: 1500, Generation: 169, Route table: 0
    Flags: Sendbcast-pkt-to-re
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 1.1.1/24, Local: 1.1.1.2, Broadcast: 1.1.1.255, Generation:
153
  Protocol multiservice, MTU: Unlimited, Generation: 170, Route table: 0
    Flags: Is-Primary
    Policer: Input: __default_arp_policer__
```

show interfaces queue

Syntax

show interfaces queue
<aggregate | remaining-traffic>
<both-ingress-egress>
<egress>
<forwarding-class *forwarding-class*>
<ingress>
<interface-name *interface-name*>
<l2-statistics>
<remaining-traffic>

Release Information

Command introduced before Junos OS Release 7.4.
both-ingress-egress, **egress**, and **ingress** options introduced in Junos OS Release 7.6.
Command introduced in Junos OS Release 11.1 for the QFX Series.
l2-statistics option introduced in Junos OS Release 12.1.

Description

Display class-of-service (CoS) queue information for physical interfaces.

Options

none—Show detailed CoS queue statistics for all physical interfaces.

aggregate—(Optional) Display the aggregated queuing statistics of all logical interfaces that have traffic-control profiles configured. (Not on the QFX Series.)

both-ingress-egress—(Optional) On Gigabit Ethernet Intelligent Queuing 2 (IQ2) PICs, display both ingress and egress queue statistics. (Not on the QFX Series.)

egress—(Optional) Display egress queue statistics.

forwarding-class *forwarding-class*—(Optional) Forwarding class name for this queue. Shows detailed CoS statistics for the queue associated with the specified forwarding class.

ingress—(Optional) On Gigabit Ethernet IQ2 PICs, display ingress queue statistics. (Not on the QFX Series.)

interface-name *interface-name*—(Optional) Show detailed CoS queue statistics for the specified interface.

l2-statistics—(optional) Display layer 2 statistics for MLPPP, FRF.15, and FRF.16 bundles

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 10 on page 212. 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 not fragmentation is applied, corresponding layer 2 overheads are added, as shown in Table 10 on page 212.

Table 10: Layer 2 Overhead, Transmitted Packets/Bytes

Protocol	Fragmentation		LFI
	First fragmentation	Second to n 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:
       Framerelay header     :  2 bytes
       Control,NLPID         :  2 bytes
       Fragmentaion header   :  2 bytes
       Inner proto           :  2 bytes
       HDLC flag and  FCS    :  4 bytes

   Fragments 2 ...n :

       Framerelay header     :  2 bytes
       Control,NLPID         :  2 bytes
       Fragmentaion header   :  2 bytes
       HDLC flag and  FCS    :  4 bytes


   MFR (FRF16) Overhead details:
   ============================
   Fragment 1:
      Fragmentaion header   :  2 bytes
      Framerelay header     :  2 bytes
      Inner proto           :  2 bytes
      HDLC flag and  FCS    :  4 bytes

   Fragments 2 ...n :
      Fragmentaion header   :  2 bytes
      Framerelay 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):
  =============
       Framerelay 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

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. For related CoS operational mode commands, see the Junos OS Operational Mode Commands.

Required Privilege Level

view

List of Sample Output

show interfaces queue (Aggregated Ethernet on a T320 Router) on page 220
show interfaces queue (Fast Ethernet on a J4300 Router) on page 221

show interfaces queue (Gigabit Ethernet on a T640 Router) on page 222
show interfaces queue aggregate (Gigabit Ethernet Enhanced DPC) on page 222
show interfaces queue (Gigabit Ethernet IQ2 PIC) on page 226
show interfaces queue both-ingress-egress (Gigabit Ethernet IQ2 PIC) on page 229
show interfaces queue ingress (Gigabit Ethernet IQ2 PIC) on page 232
show interfaces queue egress (Gigabit Ethernet IQ2 PIC) on page 232
show interfaces queue remaining-traffic (Gigabit Ethernet Enhanced DPC) on page 234
show interfaces queue (Channelized OC12 IQE Type 3 PIC in SONET Mode) on page 237
show interfaces queue (QFX Series) on page 247
show interfaces queue l2-statistics (lsq interface) on page 248

Output Fields Table 11 on page 215 lists the output fields for the **show interfaces queue** command. Output fields are listed in the approximate order in which they appear.

Table 11: 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 "Common Output Fields Description" on page 111.
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	Queue number.

Table 11: show interfaces queue Output Fields *(continued)*

Field Name	Field Description
Queue counters (Ingress)	CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.
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.
Forwarding classes	Forwarding class name.
Queued Packets	Number of packets queued to this queue. NOTE: 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.
Queued Bytes	Number of bytes queued to this queue. The byte counts vary by PIC type. For more information, see Table 12 on page 218.
Transmitted Packets	Number of packets transmitted by this queue. When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (displayed under the **Packet Forwarding Engine Chassis Queues** field) shows the prefragmentation values. NOTE: For layer 2 statistics, see "Overhead for Layer 2 Statistics" on page 211
Transmitted Bytes	Number of bytes transmitted by this queue. The byte counts vary by PIC type. For more information, see Table 12 on page 218. NOTE: 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. NOTE: For layer 2 statistics, see "Overhead for Layer 2 Statistics" on page 211
Tail-dropped packets	Number of packets dropped because of tail drop.

Table 11: show interfaces queue Output Fields *(continued)*

Field Name	Field Description

RED-dropped packets	Number of packets dropped because of random early detection (RED).
	• (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:
	  • **Low, non-TCP**—Number of low-loss priority non-TCP packets dropped because of RED.
	  • **Low, TCP**—Number of low-loss priority TCP packets dropped because of RED.
	  • **High, non-TCP**—Number of high-loss priority non-TCP packets dropped because of RED.
	  • **High, TCP**—Number of high-loss priority TCP packets dropped because of RED.
	• (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:
	  • **Low**—Number of low-loss priority packets dropped because of RED.
	  • **Medium-low**—Number of medium-low loss priority packets dropped because of RED.
	  • **Medium-high**—Number of medium-high loss priority packets dropped because of RED.
	  • **High**—Number of high-loss priority packets dropped because of RED.

RED-dropped bytes	Number of bytes dropped because of RED. The byte counts vary by PIC type. For more information, see Table 12 on page 218.
	• (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:
	  • **Low, non-TCP**—Number of low-loss priority non-TCP bytes dropped because of RED.
	  • **Low, TCP**—Number of low-loss priority TCP bytes dropped because of RED.
	  • **High, non-TCP**—Number of high-loss priority non-TCP bytes dropped because of RED.
	  • **High, TCP**—Number of high-loss priority TCP bytes dropped because of RED.
	• (J Series routers only) The output classifies dropped bytes into the following categories:
	  • **Low**—Number of low-loss priority bytes dropped because of RED.
	  • **Medium-low**—Number of medium-low loss priority bytes dropped because of RED.
	  • **Medium-high**—Number of medium-high loss priority bytes dropped because of RED.
	  • **High**—Number of high-loss priority bytes dropped because of RED.

	Byte counts vary by PIC type. Table 12 on page 218 shows how the byte counts on the outbound interfaces vary depending on the PIC type. Table 12 on page 218 is based on the assumption that outbound interfaces are sending IP traffic with 478 bytes per packet.

Table 12: Byte Count by PIC Type

PIC Type	Output Level	Byte Count Includes	Comments
Gigabit Ethernet IQ and IQE PICs	Interface	Queued: 490 bytes per packet, representing 478 bytes of Layer 3 packet + 12 bytes Transmitted: 490 bytes per packet, representing 478 bytes of Layer 3 packet + 12 bytes RED dropped: 496 bytes per packet representing 478 bytes of Layer 3 packet + 18 bytes	The 12 additional bytes include 6 bytes for the destination MAC address + 4 bytes for the VLAN + 2 bytes for the Ethernet type. For RED dropped, 6 bytes are added for the source MAC address.
	Packet forwarding component	Queued: 478 bytes per packet, representing 478 bytes of Layer 3 packet Transmitted: 478 bytes per packet, representing 478 bytes of Layer 3 packet	–
Non-IQ PIC	Interface	T Series, TX Series, T1600, and MX Series routers: • Queued: 478 bytes of Layer 3 packet. • Transmitted: 478 bytes of Layer 3 packet. T4000 routers with Type 5 FPCs : • 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. • 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. M Series routers: • Queued: 478 bytes of Layer 3 packet. • Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead. PTX Series Packet Transport Switches: • 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). • 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). • 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.	The Layer 2 overhead is 14 bytes for non-VLAN traffic and 18 bytes for VLAN traffic.

Table 12: Byte Count by PIC Type *(continued)*

PIC Type	Output Level	Byte Count Includes	Comments
IQ and IQE PICs with a SONET/SDH interface	Interface	Queued: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes Transmitted: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes RED dropped: 482 bytes per packet, representing 478 bytes of Layer 3 packet + 4 bytes	The additional 4 bytes are for the Layer 2 Point-to-Point Protocol (PPP) header.
	Packet forwarding component	Queued: 478 bytes per packet, representing 478 bytes of Layer 3 packet Transmitted: 486 bytes per packet, representing 478 bytes of Layer 3 packet + 8 bytes	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	T Series, TX Series, T1600, and MX Series routers: • Queued: 478 bytes of Layer 3 packet. • Transmitted: 478 bytes of Layer 3 packet. M Series routers: • Queued: 478 bytes of Layer 3 packet. • Transmitted: 483 bytes per packet, representing 478 bytes of Layer 3 packet + 5 bytes • RED dropped: 478 bytes per packet, representing 478 bytes of Layer 3 packet	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	Queued: 478 bytes of Layer 3 packet + the full Layer 2 overhead including CRC. Transmitted: 478 bytes of Layer 3 packet + the full Layer 2 overhead including CRC.	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 8-port 1G IQ2 and IQ2-E PICs	Packet forwarding component	Queued: 478 bytes of Layer 3 packet. Transmitted: 478 bytes of Layer 3 packet.	–

Sample Output

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

```
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
```

Ethernet Enhanced DPC)

```
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

```
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
```

(Gigabit Ethernet IQ2 PIC)

```
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

```
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
```

(Gigabit Ethernet IQ2 PIC)

```
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

```
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
```

(Gigabit Ethernet Enhanced DPC)

```
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

```
user@host> show interfaces queue t3-1/1/0:7
 Physical interface: t3-1/1/0:7, Enabled, Physical link is Up
```

Type 3 PIC in SONET Mode)

```
  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
=========
```