

## Ethernet Interfaces



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Published: 2013-02-14

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#### *Ethernet Interfaces*

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# Table of Contents

	About the Documentation . . . . .	xiii
	Documentation and Release Notes . . . . .	xiii
	Supported Platforms . . . . .	xiii
	Using the Examples in This Manual . . . . .	xiii
	Merging a Full Example . . . . .	xiv
	Merging a Snippet . . . . .	xiv
	Documentation Conventions . . . . .	xv
	Documentation Feedback . . . . .	xvii
	Requesting Technical Support . . . . .	xvii
	Self-Help Online Tools and Resources . . . . .	xvii
	Opening a Case with JTAC . . . . .	xviii
<b>Part 1</b>	<b>Overview</b>	
<b>Chapter 1</b>	<b>Ethernet Interfaces . . . . .</b>	<b>3</b>
	Ethernet Interfaces Overview . . . . .	3
<b>Part 2</b>	<b>Configuration</b>	
<b>Chapter 2</b>	<b>Ethernet Interfaces . . . . .</b>	<b>7</b>
	Configuring Ethernet Physical Interface Properties . . . . .	7
	Configuring J Series Services Router Switching Interfaces . . . . .	11
	Example: Configuring J Series Services Router Switching Interfaces . . . . .	12
	MX Series Router Interface Identifiers . . . . .	13
	Enabling Ethernet MAC Address Filtering . . . . .	13
	Filtering Specific MAC Addresses . . . . .	14
	Configuring Ethernet Loopback Capability . . . . .	16
	Configuring Flow Control . . . . .	16
	Ignoring Layer 3 Incomplete Errors . . . . .	17
	Configuring the Link Characteristics on Ethernet Interfaces . . . . .	17
	Configuring Gratuitous ARP . . . . .	19
	Adjusting the ARP Aging Timer . . . . .	20
	Configuring the Interface Speed on Ethernet Interfaces . . . . .	20
	Configuring the Ingress Rate Limit . . . . .	21
	Configuring Multicast Statistics Collection on Ethernet Interfaces . . . . .	22
	Configuring Weighted Random Early Detection . . . . .	22
	Example: Configuring Fast Ethernet Interfaces . . . . .	23
	Example: Configuring Gigabit Ethernet Interfaces . . . . .	23
<b>Chapter 3</b>	<b>Network Interfaces Configuration Statements and Hierarchy . . . . .</b>	<b>25</b>
	[edit interfaces] Hierarchy Level . . . . .	25
	[edit logical-systems] Hierarchy Level . . . . .	41

## Chapter 4

[edit protocols connections] Hierarchy Level . . . . .	46
[edit protocols dot1x] Hierarchy Level . . . . .	47
[edit protocols iccp] Hierarchy Level . . . . .	47
[edit protocols lacp] Hierarchy Level . . . . .	48
[edit protocols oam] Hierarchy Level . . . . .	48
[edit protocols ppp] Hierarchy Level . . . . .	50
[edit protocols pppoe] Hierarchy Level . . . . .	50
[edit protocols protection-group] Hierarchy Level . . . . .	51
[edit protocols vrrp] Hierarchy Level . . . . .	52
<b>Statement Summary . . . . .</b>	<b>53</b>
802.3ad . . . . .	53
aggregate (Gigabit Ethernet CoS Policer) . . . . .	54
aggregated-ether-options . . . . .	55
auto-negotiation . . . . .	57
auto-negotiation (J Series uPIM) . . . . .	58
bandwidth-limit (Policer for Gigabit Ethernet Interfaces) . . . . .	59
burst-size-limit (Policer for Gigabit Ethernet Interfaces) . . . . .	59
classifier . . . . .	60
ethernet (Protocols OAM) . . . . .	61
ethernet-policer-profile . . . . .	64
ethernet-switch-profile . . . . .	65
fast-aps-switch . . . . .	67
fastether-options . . . . .	68
flow-control . . . . .	69
forwarding-class (Gigabit Ethernet IQ Classifier) . . . . .	70
framing (10-Gigabit Ethernet Interfaces) . . . . .	71
gether-options . . . . .	72
gratuitous-arp-reply . . . . .	73
ieee802.1p . . . . .	74
ignore-l3-incompletes . . . . .	74
ingress-rate-limit . . . . .	75
inner-tag-protocol-id . . . . .	75
inner-vlan-id . . . . .	76
input-priority-map . . . . .	77
input-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP) . . . . .	77
interfaces . . . . .	78
lacp (Aggregated Ethernet) . . . . .	79
link-discovery . . . . .	80
link-fault-management . . . . .	81
link-mode . . . . .	83
link-protection . . . . .	85
link-speed (Aggregated Ethernet) . . . . .	86
loopback (Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet) . . . . .	87
loss-priority . . . . .	87
mac-learn-enable . . . . .	88
minimum-links . . . . .	89
no-auto-mdix . . . . .	90
no-gratuitous-arp-request . . . . .	90

oam	91
optics-options	93
output-priority-map	94
output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP)	95
pdu-interval	95
pdu-threshold	96
periodic	97
policer (CoS)	98
pop	99
pop-pop	99
pop-swap	100
premium (Output Priority Map)	100
premium (Policer)	101
push	101
push-push	102
source-address-filter	103
source-filtering	104
speed (Ethernet)	105
swap	106
swap-push	106
swap-swap	107
switch-options	107
switch-port	108
tag-protocol-id (TPIDs Expected to Be Sent or Received)	109
tag-protocol-id (TPID to Rewrite)	110
unit	111
vlan-id (VLAN ID to Rewrite)	117
vlan-tagging	118
vlan-tags (Stacked VLAN Tags)	119
wavelength	121

## Part 3

### Chapter 5

## Administration

<b>Monitoring Commands</b>	<b>127</b>
show interfaces (Aggregated Ethernet)	128
show interfaces demux0 (Demux Interfaces)	138
show interfaces diagnostics optics (Gigabit Ethernet, 10-Gigabit Ethernet, and 100 Gigabit Ethernet)	148
show interfaces (Fast Ethernet)	165
show interfaces (10-Gigabit Ethernet)	182
show interfaces interface-set (Ethernet Interface Set)	209
show interfaces interface-set queue	212
show interfaces irb	221
show lacp interfaces	228
show interfaces mac-database (Gigabit Ethernet)	232
show interfaces mc-ae	237
show oam ethernet connectivity-fault-management delay-statistics	239
show oam ethernet connectivity-fault-management forwarding-state	243
show oam ethernet connectivity-fault-management interfaces	247

	show oam ethernet connectivity-fault-management linktrace path-database .....	257
	show oam ethernet connectivity-fault-management mep-database .....	259
	show oam ethernet connectivity-fault-management mep-statistics .....	269
	show oam ethernet connectivity-fault-management path-database .....	280
	show oam ethernet evc .....	282
	show oam ethernet link-fault-management .....	283
	show oam ethernet lmi .....	289
	show oam ethernet lmi statistics .....	291
	show protection-group ethernet-ring aps .....	293
	show protection-group ethernet-ring data-channel .....	295
	show protection-group ethernet-ring interface .....	297
	show protection-group ethernet-ring node-state .....	300
	show protection-group ethernet-ring statistics .....	303
	show protection-group ethernet-ring vlan .....	306
<b>Chapter 6</b>	<b>Command Summary .....</b>	<b>309</b>
	Ethernet Interface Operational Mode Commands .....	309
	VRRP Operational Mode Commands .....	314
<b>Part 4</b>	<b>Troubleshooting</b>	
<b>Chapter 7</b>	<b>Ethernet .....</b>	<b>317</b>
	tracertoe ethernet .....	318
<b>Chapter 8</b>	<b>Interface Diagnostics .....</b>	<b>321</b>
	Interface Diagnostics .....	321
	Configuring Loopback Testing .....	321
	Interface Diagnostics .....	323
	Starting and Stopping a BERT Test .....	327
	Example: Configuring Bit Error Rate Testing .....	327
<b>Chapter 9</b>	<b>Investigate Fast Ethernet and Gigabit Ethernet Interfaces .....</b>	<b>329</b>
	Monitor Fast Ethernet and Gigabit Ethernet Interfaces .....	329
	Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces ...	329
	Monitor Fast Ethernet and Gigabit Ethernet Interfaces .....	330
	Display the Status of Fast Ethernet Interfaces .....	330
	Display the Status of Gigabit Ethernet Interfaces .....	331
	Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface .....	332
	Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface .....	333

Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface . . .	337
Fiber-Optic Ethernet Interface Specifications . . . . .	339
Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces . . . . .	339
Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces . . . . .	340
Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface . . . . .	341
Create a Loopback . . . . .	341
Create a Physical Loopback for a Fiber-Optic Interface . . . . .	341
Create a Loopback Plug for an RJ-45 Ethernet Interface . . . . .	342
Configure a Local Loopback . . . . .	342
Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up . . . . .	343
Configure a Static Address Resolution Protocol Table Entry . . . . .	345
Clear Fast Ethernet or Gigabit Ethernet Interface Statistics . . . . .	347
Ping the Fast Ethernet or Gigabit Ethernet Interface . . . . .	348
Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics . . . .	349
Diagnose a Suspected Circuit Problem . . . . .	351
Locate the Fast Ethernet and Gigabit Ethernet LINK Alarm and Counters . . . . .	351
Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters . . . . .	351
Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm . . . . .	352
Fast Ethernet and Gigabit Ethernet Counters . . . . .	354

## Part 5

## Index

Index . . . . .	359
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# List of Figures

Part 4	Troubleshooting	
Chapter 9	Investigate Fast Ethernet and Gigabit Ethernet Interfaces . . . . .	329
	Figure 1: RJ-45 Ethernet Loopback Plug . . . . .	342



# List of Tables

	<b>About the Documentation</b> . . . . .	<b>xiii</b>
	Table 1: Notice Icons . . . . .	xv
	Table 2: Text and Syntax Conventions . . . . .	xv
<b>Part 3</b>	<b>Administration</b>	
<b>Chapter 5</b>	<b>Monitoring Commands</b> . . . . .	<b>127</b>
	Table 3: show interfaces (Aggregated Ethernet) Output Fields . . . . .	128
	Table 4: Demux show interfaces Output Fields . . . . .	138
	Table 5: 10-Gigabit Ethernet DWDM and DWDM OTN PICs show interfaces diagnostics optics Output Fields . . . . .	149
	Table 6: Gigabit Ethernet Bidirectional SFP Optics show interfaces diagnostics optics Output Fields . . . . .	150
	Table 7: Gigabit Ethernet SFP show interfaces diagnostics Output Fields . . . . .	152
	Table 8: 10-Gigabit Ethernet Transceivers show interfaces diagnostics optics Output Fields . . . . .	155
	Table 9: 10-Gigabit Ethernet XFP Transceivers show interfaces diagnostics optics Output Fields . . . . .	157
	Table 10: show interfaces Fast Ethernet Output Fields . . . . .	165
	Table 11: show interfaces Gigabit Ethernet Output Fields . . . . .	183
	Table 12: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type . . . . .	197
	Table 13: Ethernet show interfaces interface-set Output Fields . . . . .	209
	Table 14: Ethernet show interfaces interface-set queue Output Fields . . . . .	213
	Table 15: show interfaces irb Output Fields . . . . .	221
	Table 16: show lacp interfaces Output Fields . . . . .	228
	Table 17: show interfaces mac-database Output Fields . . . . .	232
	Table 18: show interfaces mc-ae Output Fields . . . . .	237
	Table 19: show oam ethernet connectivity-fault-management delay-statistics and mep-statistics Output Fields . . . . .	240
	Table 20: show oam ethernet connectivity-fault-management forwarding-state Output Fields . . . . .	243
	Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields . . . . .	248
	Table 22: show oam ethernet connectivity-fault-management linktrace path-database Output Fields . . . . .	257
	Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields . . . . .	260
	Table 24: show oam ethernet connectivity-fault-management delay-statistics and mep-statistics Output Fields . . . . .	270

	Table 25: show oam ethernet connectivity-fault-management path-database Output Fields . . . . .	280
	Table 26: show oam ethernet evc Output Fields . . . . .	282
	Table 27: show oam ethernet link-fault-management Output Fields . . . . .	283
	Table 28: show oam ethernet lmi Output Fields . . . . .	289
	Table 29: show oam ethernet lmi statistics Output Fields . . . . .	291
	Table 30: show protection-group ethernet-ring aps Output Fields . . . . .	293
	Table 31: show protection-group ethernet-ring data-channel Output Fields . . . . .	295
	Table 32: MX Series Routers show protection-group ethernet-ring interface Output Fields . . . . .	297
	Table 33: show protection-group ethernet-ring node-state Output Fields . . . . .	300
	Table 34: show protection-group ethernet-ring statistics Output Fields . . . . .	303
	Table 35: show protection-group ethernet-ring vlan Output Fields . . . . .	306
<b>Chapter 6</b>	<b>Command Summary . . . . .</b>	<b>309</b>
	Table 36: Ethernet Interface Operational Mode Commands . . . . .	309
	Table 37: VRRP Operational Mode Commands . . . . .	314
<b>Part 4</b>	<b>Troubleshooting</b>	
<b>Chapter 7</b>	<b>Ethernet . . . . .</b>	<b>317</b>
	Table 38: traceroute ethernet Output Fields . . . . .	318
<b>Chapter 8</b>	<b>Interface Diagnostics . . . . .</b>	<b>321</b>
	Table 39: Loopback Modes by Interface Type . . . . .	322
	Table 40: BERT Capabilities by Interface Type . . . . .	326
<b>Chapter 9</b>	<b>Investigate Fast Ethernet and Gigabit Ethernet Interfaces . . . . .</b>	<b>329</b>
	Table 41: Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces . . . . .	329
	Table 42: Status of Fast Ethernet Interfaces . . . . .	331
	Table 43: Status of Gigabit Ethernet Interfaces . . . . .	332
	Table 44: Errors to Look For . . . . .	336
	Table 45: MAC Statistics Errors . . . . .	336
	Table 46: Autonegotiation Information . . . . .	337
	Table 47: Fiber-Optic Ethernet Interface Specifications . . . . .	339
	Table 48: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces . . . . .	340
	Table 49: Problems and Solutions for a Physical Link That Is Down . . . . .	345
	Table 50: Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters . . . . .	352
	Table 51: Major Fast Ethernet and Gigabit Ethernet Counters . . . . .	354

# About the Documentation

- [Documentation and Release Notes on page xiii](#)
- [Supported Platforms on page xiii](#)
- [Using the Examples in This Manual on page xiii](#)
- [Documentation Conventions on page xv](#)
- [Documentation Feedback on page xvii](#)
- [Requesting Technical Support on page xvii](#)

## Documentation and Release Notes

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## Supported Platforms

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

- [ACX Series](#)
- [M Series](#)
- [MX Series](#)
- [T Series](#)
- [J Series](#)

## Using the Examples in This Manual

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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.xml; }
```

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

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

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

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

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

## Documentation Conventions

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

Table 2: Text and Syntax Conventions

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

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

Convention	Description	Examples
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies book names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS System Basics Configuration Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
<b>Text like this</b>	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols <b>ospf area area-id</b>] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Enclose optional keywords or variables.	<b>stub &lt;default-metric metric&gt;;</b>
(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.	<b>broadcast   multicast</b>  <i>(string1   string2   string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>J-Web GUI Conventions</b>		
<b>Bold text like this</b>	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .



## Documentation Feedback

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

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

## Requesting Technical Support

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

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

## Self-Help Online Tools and Resources

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

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

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

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

## Opening a Case with JTAC

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

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

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

## PART 1

# Overview

- [Ethernet Interfaces on page 3](#)



## CHAPTER 1

# Ethernet Interfaces

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

### Ethernet Interfaces Overview

---

Ethernet was developed in the early 1970s at the Xerox Palo Alto Research Center (PARC) as a data-link control layer protocol for interconnecting computers. It was first widely used at 10 megabits per second (Mbps) over coaxial cables and later over unshielded twisted pairs using 10Base-T. More recently, 100Base-TX (Fast Ethernet, 100 Mbps), Gigabit Ethernet (1 gigabit per second [Gbps]), 10-Gigabit Ethernet (10 Gbps), and 100-Gigabit Ethernet (100 Gbps) have become available.

Juniper Networks routers support the following types of Ethernet interfaces:

- Fast Ethernet
- Tri-Rate Ethernet copper
- Gigabit Ethernet
- Gigabit Ethernet intelligent queuing (IQ)
- Gigabit Ethernet IQ2 and IQ2-E
- 10-Gigabit Ethernet IQ2 and IQ2-E
- 10-Gigabit Ethernet
- 10-Gigabit Ethernet dense wavelength-division multiplexing (DWDM)
- 100-Gigabit Ethernet
- Management Ethernet interface, which is an out-of-band management interface within the router
- Internal Ethernet interface, which connects the Routing Engine to the packet forwarding components
- Aggregated Ethernet interface, a logical linkage of Fast Ethernet, Gigabit Ethernet, or 10-Gigabit Ethernet physical connections

#### Related Documentation

- [Configuring Ethernet Physical Interface Properties on page 7](#)
- [Configuring J Series Services Router Switching Interfaces on page 11](#)

- [MX Series Router Interface Identifiers on page 13](#)
- [Enabling Ethernet MAC Address Filtering on page 13](#)
- [Configuring Ethernet Loopback Capability on page 16](#)
- [Configuring Flow Control on page 16](#)
- [Ignoring Layer 3 Incomplete Errors on page 17](#)
- [Configuring the Link Characteristics on Ethernet Interfaces on page 17](#)
- [Configuring Gratuitous ARP on page 19](#)
- [Adjusting the ARP Aging Timer on page 20](#)
- [Configuring the Interface Speed on Ethernet Interfaces on page 20](#)
- [Configuring the Ingress Rate Limit on page 21](#)
- [Configuring Multicast Statistics Collection on Ethernet Interfaces on page 22](#)
- [Configuring Weighted Random Early Detection on page 22](#)
- [Junos® OS Ethernet Interfaces](#)
- [Junos® OS Network Interfaces](#)

## PART 2

# Configuration

- [Ethernet Interfaces on page 7](#)
- [Network Interfaces Configuration Statements and Hierarchy on page 25](#)
- [Statement Summary on page 53](#)





## CHAPTER 2

# Ethernet Interfaces

- [Configuring Ethernet Physical Interface Properties on page 7](#)
- [Configuring J Series Services Router Switching Interfaces on page 11](#)
- [MX Series Router Interface Identifiers on page 13](#)
- [Enabling Ethernet MAC Address Filtering on page 13](#)
- [Configuring Ethernet Loopback Capability on page 16](#)
- [Configuring Flow Control on page 16](#)
- [Ignoring Layer 3 Incomplete Errors on page 17](#)
- [Configuring the Link Characteristics on Ethernet Interfaces on page 17](#)
- [Configuring Gratuitous ARP on page 19](#)
- [Adjusting the ARP Aging Timer on page 20](#)
- [Configuring the Interface Speed on Ethernet Interfaces on page 20](#)
- [Configuring the Ingress Rate Limit on page 21](#)
- [Configuring Multicast Statistics Collection on Ethernet Interfaces on page 22](#)
- [Configuring Weighted Random Early Detection on page 22](#)
- [Example: Configuring Fast Ethernet Interfaces on page 23](#)
- [Example: Configuring Gigabit Ethernet Interfaces on page 23](#)

## Configuring Ethernet Physical Interface Properties

---

To configure Fast Ethernet-specific physical interface properties, include the **fastether-options** statement at the **[edit interfaces fe-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces fe-fpc/pic/port]  
link-mode (full-duplex | half-duplex);  
speed (10m | 100m);  
vlan-tagging;  
fastether-options {  
    802.3ad aex (primary | backup);  
    (flow-control | no-flow-control);  
    ignore-l3-incompletes;  
    ingress-rate-limit rate;  
    (loopback | no-loopback);  
    source-address-filter {  
        mac-address;
```

```

}
(source-filtering | no-source-filtering);
}

```



**NOTE:** The `speed` statement applies to the management Ethernet interface (fxp0 or em0), the Fast Ethernet 12-port and 48-port Physical Interface Card (PIC) interfaces, the J Series Gigabit Ethernet uPIM interfaces and the MX Series Tri-Rate Ethernet copper interfaces. The Fast Ethernet, fxp0, and em0 interfaces can be configured for 10 Mbps or 100 Mbps (10m | 100m). The J Series Gigabit Ethernet uPIM interfaces and the MX Series Tri-Rate Ethernet copper interfaces can be configured for 10 Mbps, 100 Mbps, or 1 Gbps (10m | 100m | 1g). The 4-port and 8-port Fast Ethernet PICs support a speed of 100 Mbps only.

MX Series routers support Gigabit Ethernet automatic line sensing of MDI (Media Dependent Interface) and MDIX (Media Dependent Interface with Crossover) port connections. MDI is the Ethernet port connection typically used on network interface cards (NIC). MDIX is the standard Ethernet port wiring for hubs and switches. This feature allows MX Series routers to automatically detect MDI and MDIX connections and configure the router port accordingly. You can disable this feature by using the `no-auto-mdix` statement at the [edit interfaces *ge-fpc/pic/port*] hierarchy level.



**NOTE:** Junos OS supports Ethernet host addresses with no subnets. This enables you to configure an Ethernet interface as a host address (that is, with a network mask of /32), without requiring a subnet. Such interfaces can serve as OSPF point-to-point interfaces, and MPLS is also supported.

To configure physical interface properties specific to Gigabit Ethernet and 10-Gigabit Ethernet, include the `gigether-options` statement at the [edit interfaces *ge-fpc/pic/port*] or [edit interfaces *xe-fpc/pic/port*] hierarchy level:

```

[edit interfaces ge-fpc/pic/port]
gigether-options {
  802.3ad aex (primary | backup);
  auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
    local-interface-offline>;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  (loopback | no-loopback);
  no-auto-mdix;
  source-address-filter {
    mac-address;
  }
  (source-filtering | no-source-filtering);
}

```

Additionally, for 10-Gigabit Ethernet DWDM-specific physical interface properties, include the `optics-options` statement at the [edit interfaces *ge-fpc/pic/port*] hierarchy level:

```
[edit interfaces ge-fpc/pic/port]
optics-options {
  wavelength nm;
}
```

To configure Gigabit Ethernet IQ-specific physical interface properties, include the **gigether-options** statement at the **[edit interfaces ge-fpc/pic/port]** hierarchy level. These statements are supported on 10-Gigabit Ethernet IQ2 and IQ2-E PIC. Some of these statements are also supported on Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router). For more information, see [“Example: Configuring Gigabit Ethernet Interfaces” on page 23](#).

```
[edit interfaces ge-fpc/pic/port]
flexible-vlan-tagging;
gigether-options {
  802.3ad aex (primary | backup);
  auto-negotiation | no-auto-negotiation remote-fault <local-interface-online |
    local-interface-offline>;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  (loopback | no-loopback);
  (source-filtering | no-source-filtering);
  ethernet-switch-profile {
    (mac-learn-enable | no-mac-learn-enable);
    tag-protocol-id [tpids];
    ethernet-policer-profile {
      input-priority-map {
        ieee802.1p premium [values];
      }
      output-priority-map {
        classifier {
          premium {
            forwarding-class class-name {
              loss-priority (high | low);
            }
          }
        }
      }
    }
  }
  policer cos-policer-name {
    aggregate {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
    premium {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
  }
}
native-vlan-id number;
}
```

To configure 10-Gigabit Ethernet physical interface properties, include the **lan-phy** or **wan-phy** statement at the **[edit interfaces xe-fpc/pic/port framing]** hierarchy level. For more information, see 10-Gigabit Ethernet Framing Overview.

```
[edit interfaces]
xe-0/0/0 {
  framing {
    (lan-phy | wan-phy);
  }
}
```

To configure OAM 802.3ah support for Ethernet interfaces, include the **oam** statement at the **[edit protocols]** hierarchy level.

```
oam {
  ethernet {
    link-fault-management {
      interfaces {
        interface-name {
          pdu-interval interval;
          link-discovery (active | passive);
          pdu-threshold count;
        }
      }
    }
  }
}
```

To configure Gigabit Ethernet IQ-specific logical interface properties, include the **input-vlan-map**, **output-vlan-map**, **layer2-policer**, and **vlan-tags** statements:

```
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;
}
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;
}
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
```

You can include these 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]`

To configure aggregated Ethernet-specific physical interface properties, include the `aggregated-ether-options` statement at the `[edit interfaces aex]` hierarchy level:

```
[edit interfaces aex]
aggregated-ether-options {
  ethernet-switch-profile {
    tag-protocol-id tpid;
  }
  (flow-control | no-flow-control);
  lacp mode {
    periodic interval;
  }
  link-protection;
  link-speed speed;
  (loopback | no-loopback);
  minimum-links number;
  source-address-filter {
    mac-address;
  }
  (source-filtering | no-source-filtering);
}
```

#### Related Documentation

- [Example: Configuring Gigabit Ethernet Interfaces on page 23](#)
- 10-Gigabit Ethernet Framing Overview
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring J Series Services Router Switching Interfaces

The J Series routers with multiport Gigabit Ethernet uPIMs supports Ethernet access switching. This functionality provides the ability to switch traffic at Layer 2 in addition to routing traffic at Layer 3.

J Series routers with multiport Gigabit Ethernet uPIMs can be deployed in branch offices as an access or desktop switch with integrated routing capability. The multiport Gigabit Ethernet uPIM provides Ethernet switching, while the Routing Engine provides routing functionality.

Routed traffic is forwarded from any port of the multiport Gigabit Ethernet uPIM to the WAN interface. Switched traffic is forwarded from one port of the multiport Gigabit Ethernet uPIM to another port on the same the multiport Gigabit Ethernet uPIM. Switched traffic is not forwarded from a port on one multiport Gigabit Ethernet uPIM to a port on a different multiport Gigabit Ethernet uPIM. For more information about configuring the multiport Gigabit Ethernet uPIM switching mode, see the Junos OS System Basics Configuration Guide.

In access switching mode, only one physical interface is configured for the entire multiport Gigabit Ethernet uPIM. The single physical interface serves as a Virtual Router Interface (VRI). Configuration of the physical port characteristics is done under the single physical interface.

To configure multiport Gigabit Ethernet uPIM Ethernet port properties, include the **switch-port** statement at the **[edit interfaces ge-pim/0/0]** hierarchy level:

```
[edit interfaces ge-pim/0/0]
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed 1g;
    link-mode (full-duplex | half-duplex);
  }
}
```

Access switching mode is supported on the 6-port, 8-port, and 16-port Gigabit Ethernet uPIMs.

The multiport Gigabit Ethernet uPIMs are supported on the J2320, J2350, J4350, and J6350 Services Routers.

The 6-port and 8-port multiport Gigabit Ethernet uPIM occupies a single slot and can be installed in any slot. Because the 16-port Gigabit Ethernet uPIM is two slots high, you cannot install a 16-port uPIM in the top slots (slots 1 and 4). Ports are numbered 0 through 5 on the 6-port Gigabit Ethernet uPIM, 0 through 7 on the 8-port Gigabit Ethernet uPIM, and 0 through 15 on the 16-port Gigabit Ethernet uPIM.

## Example: Configuring J Series Services Router Switching Interfaces

Configure a single physical interface for the uPIM and set the port parameters for port 0 and port 1:

```
[edit interfaces]
ge-2/0/0 {
  switch-options {
    switch-port 0 {
      no-auto-negotiation;
      speed 1g;
      link-mode full-duplex;
    }
    switch-port 1 {
      no-auto-negotiation;
      speed 10m;
      link-mode half-duplex;
    }
  }
}
```

- Related Documentation
- [switch-options on page 107](#)
  - [switch-port on page 108](#)
  - [speed on page 105](#)

- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## MX Series Router Interface Identifiers

Juniper Networks MX Series 3D Universal Edge Routers support several types of line cards, including Dense Port Concentrators (DPCs), Flexible Port Concentrators (FPCs) with associated Physical Interface Cards (PICs), Modular Port Concentrators (MPCs) with associated Modular Interface Cards (MICs), or MICs. FPCs are populated with PICs for various interface types. DPCs and MPCs with associated MICs, and MICs support a variety of port configurations and combine the functions of FPCs and the PICs. The configuration syntax for each type of line card is the same: *type-fpc/pic/port*.

Ports are numbered from 0 through 9 for Gigabit Ethernet and Tri-Rate Ethernet copper interfaces. Port numbers are always 0 for 10-Gigabit Ethernet interfaces.



**NOTE:** In certain displays, the MX Series routers identify the Packet Forwarding Engine (PFE) rather than the PIC number. PFE 0 corresponds to PIC 0, PFE 1 corresponds to PIC 2, PFE 2 corresponds to PIC 1, and PFE 3 corresponds to PIC 3.

### Related Documentation

- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces
- Router Interfaces

## Enabling Ethernet MAC Address Filtering

By default, source address filtering is disabled. On aggregated Ethernet interfaces, Fast Ethernet, Gigabit Ethernet, 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), you can enable source address filtering, which blocks all incoming packets to an interface.



**NOTE:** Source address filtering is not supported on J Series Services Routers.

To enable the filtering, include the **source-filtering** statement:

```
source-filtering;
```

To explicitly disable filtering, include the **no-source-filtering** statement:

```
no-source-filtering;
```

You can include these statements at the following hierarchy levels:

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



**NOTE:** When you integrate a standalone T640 router into a routing matrix, the PIC media access control (MAC) addresses for the integrated T640 router are derived from a pool of MAC addresses maintained by the TX Matrix router. For each MAC address you specify in the configuration of a formerly standalone T640 router, you must specify the same MAC address in the configuration of the TX Matrix router.

Similarly, when you integrate a standalone T1600 router into a routing matrix, the PIC MAC addresses for the integrated T1600 router are derived from a pool of MAC addresses maintained by the TX Matrix Plus router. For each MAC address you specify in the configuration of a formerly standalone T1600 router, you must specify the same MAC address in the configuration of the TX Matrix Plus router.

---

## Filtering Specific MAC Addresses

When source address filtering is enabled, you can configure the interface to receive packets from specific MAC addresses. To do this, specify the MAC addresses in the **source-address-filter** statement:

```
source-address-filter {  
    mac-address;  
    <additional-mac-address>;  
}
```

You can include these statements at the following hierarchy levels:

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

You can specify the MAC address as *nn:nn:nn:nn:nn:nn* or *nnnn.nnnn.nnnn*, where *n* is a hexadecimal number. You can configure up to 64 source addresses. To specify more than one address, include the **source-address-filter** statement multiple times.





**NOTE:** The `source-address-filter` statement is not supported on 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); instead, include the `accept-source-mac` statement. For more information, see [Configuring Gigabit Ethernet Policers](#).

If the remote Ethernet card is changed, the interface cannot receive packets from the new card because it has a different MAC address.

Source address filtering does not work when Link Aggregation Control Protocol (LACP) is enabled. This behavior is not applicable to T series routers and PTX Series Packet Transport Switches. For more information about LACP, see [Configuring Aggregated Ethernet LACP](#).



**NOTE:** On untagged Gigabit Ethernet interfaces, you should not configure the `source-address-filter` statement at the [edit interfaces *ge-fpc/pic/port* *gigether-options*] hierarchy level and the `accept-source-mac` statement at the [edit interfaces *ge-fpc/pic/port* *gigether-options* unit *logical-unit-number*] hierarchy level simultaneously. If these statements are configured for the same interfaces at the same time, an error message is displayed.

On tagged Gigabit Ethernet interfaces, you should not configure the `source-address-filter` statement at the [edit interfaces [edit interfaces *ge-fpc/pic/port* *gigether-options*] hierarchy level and the `accept-source-mac` statement at the [edit interfaces *ge-fpc/pic/port* *gigether-options* unit *logical-unit-number*] hierarchy level with an identical MAC address specified in both filters. If these statements are configured for the same interfaces with an identical MAC address specified, an error message is displayed.



**NOTE:** Source address filtering is not supported on 200G 40x10G MPC and 200G 4x100G MPC for MX Series.

#### Related Documentation

- [source-address-filter on page 103](#)
- [Configuring Gigabit Ethernet Policers](#)
- [Configuring Aggregated Ethernet LACP](#)
- [Ethernet Interfaces Overview on page 3](#)
- [Junos® OS Ethernet Interfaces](#)

## Configuring Ethernet Loopback Capability

---

By default, local aggregated Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces connect to a remote system. To place an interface in loopback mode, include the **loopback** statement:

```
loopback;
```



**NOTE:** If you configure a local loopback on a 1-port 10-Gigabit IQ2 and IQ2-E PIC using the **loopback** statement at the [edit interfaces *interface-name* *gigether-options*] hierarchy level, the transmit-path stops working, causing the remote end to detect a link down.

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

```
[edit]
user@host# delete interfaces fe-fpc/pic/port fastether-options loopback
```

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

```
no-loopback;
```

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

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

### Related Documentation

- [loopback on page 87](#)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring Flow Control

---

By default, the router or switch imposes flow control to regulate the amount of traffic sent out on a Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, and 10-Gigabit Ethernet interface. Flow control is not supported on the 4-port Fast Ethernet PIC. This is useful if the remote side of the connection is a Fast Ethernet or Gigabit Ethernet switch.

You can disable flow control if you want the router or switch to permit unrestricted traffic. To disable flow control, include the **no-flow-control** statement:

```
no-flow-control;
```

To explicitly reinstate flow control, include the **flow-control** statement:

```
flow-control;
```

You can include these statements at the following hierarchy levels:

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



**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.

**Related  
Documentation**

- [flow-control on page 69](#)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Ignoring Layer 3 Incomplete Errors

By default, Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces count Layer 3 incomplete errors. You can configure the interface to ignore Layer 3 incomplete errors.

To ignore Layer 3 incomplete errors, include the **ignore-l3-incompletes** statement:

```
ignore-l3-incompletes;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* fastether-options]
- [edit interfaces *interface-name* gigheter-options]

**Related  
Documentation**

- [ignore-l3-incompletes on page 74](#)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring the Link Characteristics on Ethernet Interfaces

*Full-duplex* communication means that both ends of the communication can send and receive signals at the same time. *Half-duplex* is also bidirectional communication, but signals can flow in only one direction at a time.

By default, the router's management Ethernet interface, **fxp0** or **em0**, autonegotiates whether to operate in full-duplex or half-duplex mode. J Series Gigabit Ethernet interfaces and Fast Ethernet interfaces, except the J Series ePIM Fast Ethernet interfaces, can operate in either full-duplex or half-duplex mode, and all other interfaces can operate only in full-duplex mode. For Gigabit Ethernet and 10-Gigabit Ethernet, the link partner must also be set to full duplex.



**NOTE:** For M Series, MX Series, and most T Series routers, the management Ethernet interface is **fxp0**. For TX Matrix Plus routers and T1600 routers configured in a routing matrix, the management Ethernet interface is **em0**.



**NOTE:** Automated scripts that you have developed for standalone T1600 routers (T1600 routers that are not in a routing matrix) might contain references to the **fxp0** management Ethernet interface. Before reusing the scripts on T1600 routers in a routing matrix, edit the command lines that reference the **fxp0** management Ethernet interface so that the commands reference the **em0** management Ethernet interface instead.



**NOTE:** When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled.



**NOTE:** On a J Series ePIM Fast Ethernet interface, if you specify half-duplex (or if full-duplex mode is not autonegotiated), the following message is written to the system log: "Half-duplex mode not supported on this PIC, forcing full-duplex mode."



**NOTE:** When you manually configure Fast Ethernet interfaces on the M Series and T Series routers, link mode and speed must both be configured. If both these values are not configured, the router uses autonegotiation for the link and ignores the user-configured settings.



**NOTE:** Member links of an aggregated Ethernet bundle must not be explicitly configured with a link mode. You must remove any such link-mode configuration before committing the aggregated Ethernet configuration.

To explicitly configure an Ethernet interface to operate in either full-duplex or half-duplex mode, include the **link-mode** statement at the **[edit interfaces *interface-name*]** hierarchy level:

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

`link-mode` (full-duplex | half-duplex);

- Related Documentation
- [link-mode on page 83](#)
  - [Ethernet Interfaces Overview on page 3](#)
  - Junos® OS Ethernet Interfaces

## Configuring Gratuitous ARP

Gratuitous Address Resolution Protocol (ARP) requests provide duplicate IP address detection. A gratuitous ARP request is a broadcast request for a router's own IP address. If a router or switch sends an ARP request for its own IP address and no ARP replies are received, the router- or switch-assigned IP address is not being used by other nodes. If a router or switch sends an ARP request for its own IP address and an ARP reply is received, the router- or switch-assigned IP address is already being used by another node.

By default, the router or switch responds to gratuitous ARP requests. On Ethernet interfaces, you can disable responses to gratuitous ARP requests. To disable responses to gratuitous ARP requests, include the **no-gratuitous-arp-request** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
no-gratuitous-arp-request;
```

To return to the default—that is, to respond to gratuitous ARP requests—delete the **no-gratuitous-arp-request** statement from the configuration:

```
[edit]
user@host# delete interfaces interface-name no-gratuitous-arp-request
```

Gratuitous ARP replies are reply packets sent to the broadcast MAC address with the target IP address set to be the same as the sender's IP address. When the router or switch receives a gratuitous ARP reply, the router or switch can insert an entry for that reply in the ARP cache.

By default, updating the ARP cache on gratuitous ARP replies is disabled on the router or switch. On Ethernet interfaces, you can enable handling of gratuitous ARP replies on a specific interface by including the **gratuitous-arp-reply** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
gratuitous-arp-reply;
```

To restore the default behavior, include the **no-gratuitous-arp-reply** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
no-gratuitous-arp-reply;
```

- Related Documentation
- [gratuitous-arp-reply on page 73](#)
  - [no-gratuitous-arp-request on page 90](#)
  - [Ethernet Interfaces Overview on page 3](#)

- Junos® OS Ethernet Interfaces

## Adjusting the ARP Aging Timer

---

By default, the ARP aging timer is set at 20 minutes. In environments with many directly attached hosts, such as metro Ethernet environments, increasing the amount of time between ARP updates by configuring the ARP aging timer can improve performance in an event where having thousands of clients time out at the same time might impact packet forwarding performance. In environments where there are devices connected with lower ARP aging timers (less than 20 minutes), decreasing the ARP aging timer can improve performance by preventing the flooding of traffic toward next hops with expired ARP entries. In most environments, the default ARP aging timer value does not need to be adjusted.

To configure the system-wide ARP aging timer, include the **aging-timer** statement at the **[edit system arp]** hierarchy level:

```
[edit system arp]
aging-timer minutes;
```

The aging timer range is from 1 through 240 minutes. The timer value you configure takes effect as ARP entries expire. In other words, each subsequent refreshed ARP entry receives the new timer value. The new timer value does not apply to ARP entries that exist at the time you commit the configuration.

For more information about statements you can configure at the **[edit system]** hierarchy level, see the Junos OS System Basics Configuration Guide.

### Related Documentation

- arp (System)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring the Interface Speed on Ethernet Interfaces

---

For M Series and T Series Fast Ethernet 12-port and 48-port PIC interfaces, the management Ethernet interface (**fxp0** or **em0**), the J Series Gigabit Ethernet uPIM interfaces, and the MX Series Tri-Rate Ethernet copper interfaces, you can explicitly set the interface speed. The Fast Ethernet, **fxp0**, and **em0** interfaces can be configured for 10 Mbps or 100 Mbps (**10m** | **100m**). The J Series Gigabit Ethernet uPIM interfaces and the MX Series Tri-Rate Ethernet copper interfaces can be configured for 10 Mbps, 100 Mbps, or 1 Gbps (**10m** | **100m** | **1g**). MX Series routers, with MX-DPC and Tri-Rate Copper SFPs, support 20x1 Copper to provide backwards compatibility with 100/10BASE-T and 1000BASE-T operation through an Serial Gigabit Media Independent Interface (SGMII) interface.



**NOTE:** On MX Series routers with tri-rate copper SFP interfaces, if the port speed is negotiated to the configured value and the negotiated speed and interface speed do not match, the link will not be brought up.



**NOTE:** When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled.



**NOTE:** Half-duplex mode is not supported on Tri-Rate Ethernet copper interfaces. When you include the speed statement, you must include the link-mode full-duplex statement at the same hierarchy level.

To explicitly configure the speed, include the **speed** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
speed (10m | 100m | 1g);
```

#### Related Documentation

- [speed on page 105](#)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring the Ingress Rate Limit

On Fast Ethernet 8-port, 12-port, and 48-port PIC interfaces only, you can apply port-based rate limiting to the ingress traffic that arrives at the PIC.

To configure an ingress rate limit on a Fast Ethernet 8-port, 12-port, or 48-port PIC interface, include the **ingress-rate-limit** statement at the **[edit interfaces *interface-name* fastether-options]** hierarchy level:

```
[edit interfaces interface-name fastether-options]  
ingress-rate-limit rate;
```

**rate** can range in value from 1 through 100 Mbps.

#### Related Documentation

- [ingress-rate-limit on page 75](#)
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring Multicast Statistics Collection on Ethernet Interfaces

---

T Series and TX Matrix routers support multicast statistics collection on Ethernet interfaces in both ingress and egress directions. The multicast statistics functionality can be configured on a physical interface thus enabling multicast accounting for all the logical interfaces below the physical interface.

The multicast statistics information is displayed only when the interface is configured with the **multicast-statistics** statement, which is not enabled by default.

Multicast statistics collection requires at least one logical interface is configured with family inet and/or inet6; otherwise, the commit for **multicast-statistics** will fail.

The multicast in/out statistics can be obtained via interfaces statistics query through CLI and via MIB objects through SNMP query.

To configure multicast statistics:

1. Include the **multicast-statistics** statement at the **[edit interfaces interface-name]** hierarchy level.

An example of a multicast statistics configuration for a Ethernet interface follows:

```
[edit interfaces]
  ge-fpc/pic/port {
    multicast-statistics;
  }
```

To display multicast statistics, use the **show interfaces *interface-name* statistics detail** command.

### Related Documentation

- multicast-statistics
- Configuring Multicast Statistics Collection on Aggregated Ethernet Interfaces
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces

## Configuring Weighted Random Early Detection

---

On M7i, M10i, M40e, M320, M120, and T Series routers, the Ethernet IQ2 and IQ2-E PIC families extend CoS functionality by supporting network congestion avoidance with weighted random early detection (WRED).

### Related Documentation

- For information on configuring WRED, see the Junos OS Class of Service Configuration Guide.
- [Ethernet Interfaces Overview on page 3](#)
- Junos® OS Ethernet Interfaces



## Example: Configuring Fast Ethernet Interfaces

The following configuration is sufficient to get a Fast Ethernet interface up and running. By default, IPv4 Fast Ethernet interfaces use Ethernet version 2 encapsulation.

```
[edit]
user@host# set interfaces fe-5/2/1 unit 0 family inet address local-address
user@host# show
interfaces {
  fe-5/2/1 {
    unit 0 {
      family inet {
        address local-address;
      }
    }
  }
}
```

**Related Documentation**

- Junos® OS Ethernet Interfaces

## Example: Configuring Gigabit Ethernet Interfaces

The following configuration is sufficient to get a Gigabit Ethernet, Tri-Rate Ethernet copper, or 10-Gigabit Ethernet interface up and running. By default, IPv4 Gigabit Ethernet interfaces on MX Series, M Series, and T Series routers use 802.3 encapsulation. J Series Gigabit Ethernet interfaces do not support 802.3 encapsulation.

```
[edit]
user@host# set interfaces ge-2/0/1 unit 0 family inet address local-address
user@host# show
interfaces {
  ge-2/0/1 {
    unit 0 {
      family inet {
        address local-address;
      }
    }
  }
}
```

The M160, M320, M120, T320, and T640 2-port Gigabit Ethernet PIC supports two independent Gigabit Ethernet links.

Each of the two interfaces on the PIC is named:

```
ge-fpc/pic/[0.1]
```

Each of these interfaces has functionality identical to the Gigabit Ethernet interface supported on the single-port PIC.

**Related Documentation**

- Junos® OS Ethernet Interfaces



## CHAPTER 3

# Network Interfaces Configuration Statements and Hierarchy

- [\[edit interfaces\] Hierarchy Level on page 25](#)
- [\[edit logical-systems\] Hierarchy Level on page 41](#)
- [\[edit protocols connections\] Hierarchy Level on page 46](#)
- [\[edit protocols dot1x\] Hierarchy Level on page 47](#)
- [\[edit protocols iccp\] Hierarchy Level on page 47](#)
- [\[edit protocols lacp\] Hierarchy Level on page 48](#)
- [\[edit protocols oam\] Hierarchy Level on page 48](#)
- [\[edit protocols ppp\] Hierarchy Level on page 50](#)
- [\[edit protocols pppoe\] Hierarchy Level on page 50](#)
- [\[edit protocols protection-group\] Hierarchy Level on page 51](#)
- [\[edit protocols vrrp\] Hierarchy Level on page 52](#)

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

---

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



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

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

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

```

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

```

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

```

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

```

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



```

    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interface interface-name;
    }
}
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
otn-options {
    fec (efec | gfec | none);
    (laser-enable | no-laser-enable);
    (line-loopback | no-line-loopback);
    pass-thru;
    rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
    transmit-payload-type number;
}

```

```
trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
| odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
tti;
}
optics-options {
wavelength nm;
alarm alarm-name {
(syslog | link-down);
}
warning warning-name {
(syslog | link-down);
}
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
chap {
access-profile name;
default-chap-secret name;
local-name name;
passive;
}
compression {
acfc;
pfc;
}
dynamic-profile profile-name;
no-termination-request;
pap {
access-profile name;
local-name name;
local-password password;
compression;
}
}
psn-vc psn-vci-identifier;
psn-vp psn-vpi-identifier;
receive-bucket {
overflow (discard | tag);
rate percentage;
threshold bytes;
}
redundancy-options {
priority sp-fpc/pic/port;
secondary sp-fpc/pic/port;
hot-standby;
}
satop-options {
payload-size n;
}
schedulers number;
serial-options {
```

```

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

```

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

```

        speed (10m | 100m | 1g);
        link-mode (full-duplex | half-duplex);
    }
}
t1-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout value;
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
        value>;
    fcs (16 | 32);
    (feac-loop-respond | no-feac-loop-respond);
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {

```

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

```

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

```

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



```

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

```

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

```

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

```

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

## [\[edit logical-systems\] Hierarchy Level](#)

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

```

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

```

```
compression-device interface-name;  
description text;  
interface {  
    l2tp-interface-id name;  
    (dedicated | shared);  
}  
dialer-options {  
    activation-delay seconds;  
    deactivation-delay seconds;  
    dial-string [ dial-string-numbers ];  
    idle-timeout seconds;  
    initial-route-check seconds;  
    load-threshold number;  
    pool pool;  
    remote-name remote-callers;  
    watch-list {  
        [ routes ];  
    }  
}  
disable;  
dlci dlci-identifier;  
drop-timeout milliseconds;  
dynamic-call-admission-control {  
    activation-priority priority;  
    bearer-bandwidth-limit kilobits-per-second;  
}  
encapsulation type;  
epd-threshold cells plp1 cells;  
fragment-threshold bytes;  
input-vlan-map {  
    inner-tag-protocol-id;  
    inner-vlan-id;  
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);  
    tag-protocol-id tpid;  
    vlan-id number;  
}  
interleave-fragments;  
inverse-arp;  
layer2-policer {  
    input-policer policer-name;  
    input-three-color policer-name;  
    output-policer policer-name;  
    output-three-color policer-name;  
}  
link-layer-overhead percent;  
minimum-links number;  
mrru bytes;  
multicast-dlci dlci-identifier;  
multicast-vci vpi-identifier.vci-identifier;  
multilink-max-classes number;  
multipoint;  
oam-liveness {  
    up-count cells;  
    down-count cells;  
}  
oam-period (seconds | disable);
```

```

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

```

```
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;  
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id--vlan-id]  
vpi vpi-identifier;  
family family {  
    accounting {  
        destination-class-usage;  
        source-class-usage {  
            direction;  
        }  
    }  
    bundle interface-name;  
    filter {  
        group filter-group-number;  
        input filter-name;  
        input-list {  
            [ filter-names ];  
        }  
        output filter-name;  
        output-list {  
            [ filter-names ];  
        }  
    }  
    ipsec-sa sa-name;  
    keep-address-and-control;  
    mtu bytes;  
    multicast-only;  
    no-redirects;  
    policer {  
        arp policer-template-name;  
        input policer-template-name;  
        output policer-template-name;  
    }  
    primary;  
    proxy inet-address address;  
    receive-options-packets;  
    receive-ttl-exceeded;  
    remote (inet-address address | mac-address address);  
    rpf-check <fail-filter filter-name> {  
        <mode loose>;  
    }  
    sampling {  
        direction;  
    }  
    service {  
        input {  
            service-set service-set-name <service-filter filter-name>;  
            post-service-filter filter-name;  
        }  
        output {  
            service-set service-set-name <service-filter filter-name>;  
        }  
    }  
    (translate-discard-eligible | no-translate-discard-eligible);  
    (translate-fecn-and-becn | no-translate-fecn-and-becn);  
    unnumbered-address interface-name destination address destination-profile  
        profile-name;
```



- Junos® OS Network Interfaces

## [\[edit protocols connections\] Hierarchy Level](#)

---

The following statements can also be configured at the **[edit logical-systems *logical-system-name* protocols connections]** hierarchy level.

```
interface-switch connection-name {  
    interface interface-name.unit-number;  
    interface interface-name.unit-number;  
}
```



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

## [edit protocols dot1x] Hierarchy Level

```
dot1x {
  authenticator
    authentication-profile-name access-profile-name;
    interface interface-ids {
      maximum-requests integer;
      retries integer;
      quiet-period seconds;
      transmit-period seconds;
      reauthentication (disable | interval seconds);
      server-timeout seconds;
      supplicant (single);
      supplicant-timeout seconds;
    }
  }
}
```

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

## [edit protocols iccp] Hierarchy Level

```
iccp {
  traceoptions;
  local-ip-address ip address;
  session-establishment-hold-time value;
  authentication-key string;
  peer ip-address {
    local-ip-address ip address;
    session-establishment-hold-time value;
    authentication-key string;
    redundancy-group-id-list redundancy-group-id-list;
    liveness-detection;
  }
}
```

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

## [\[edit protocols lacp\] Hierarchy Level](#)

---

```
traceroptions {  
  file filename <files number> <size size> <world-readable | no-world-readable>;  
  flag flag <disable>;  
}
```

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

## [\[edit protocols oam\] Hierarchy Level](#)

---

```
ethernet {  
  connectivity-fault-management {  
    action-profile profile-name {  
      default-actions {  
        interface-down;  
      }  
      event {  
        adjacency-loss;  
        interface-status-tlv (down | lower-layer-down);  
        port-status-tlv blocked;  
        rdi;  
      }  
    }  
  }  
  linktrace {  
    age (30m | 10m | 1m | 30s | 10s);  
    path-database-size path-database-size;  
  }  
  maintenance-domain domain-name {  
    bridge-domain name;  
    routing-instance rl {  
      bridge-domain name;  
      instance vpls-instance;  
      interface (ge | xe) fpc/pic/port.domain;  
      level number;  
      maintenance-association name {  
        mep identifier {  
          direction (up | down)  
          interface (ge | xe) fpc/pic/port.domain (working | protect );  
          auto-discovery;  
          lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |  
            rem-err-xcon | xcon);  
          priority number;  
        }  
      }  
    }  
    mip-half-function (none | default | explicit);  
    name-format (character-string | none | dns | mac+2oct);  
    short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);  
    protect-maintenance-association protect-ma-name;  
    remote-maintenance-association remote-ma-name;
```

```

continuity-check {
  hold-interval minutes;
  interval (10m | 10s | 1m | 1s | 100ms);
  loss-threshold number;
}
maintenance-association ma-name {
  mip-half-function (none | default | explicit);
  mep mep-id {
    auto-discovery;
    direction (up | down);
    interface interface-name (working | protect);
    priority number;
    remote-mep mep-id {
      action-profile profile-name;
      sla-iterator-profile profile-name {
        data-tlv-size bytes;
        iteration-count frames;
        priority priority-value;
      }
    }
  }
}
}
performance-monitoring {
  hardware-assisted-timestamping;
  sla-iterator-profiles {
    profile-name {
      disable;
      calculation-weight {
        delay delay-weight;
        delay-variation delay-variation-weight;
      }
      cycle-time milliseconds;
      iteration-period connections;
      measurement-type (loss | statistical-frame-loss | two-way-delay);
    }
  }
}
link-fault-management {
  action-profile profile-name {
    action {
      syslog;
      link-down;
      send-critical-event;
    }
    event {
      link-adjacency-loss;
      link-event-rate {
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
      }
      protocol-down;
    }
  }
}

```

```
}
interface interface-name {
  apply-action-profile profile-name;
  event-thresholds {
    frame-error count;
    frame-period count;
    frame-period-summary count;
    symbol-period count;
  }
  link-discovery (active | passive);
  negotiation-options {
    allow-remote-loopback;
    no-allow-link-events;
  }
  pdu-interval interval;
  pdu-threshold threshold-value;
  remote-loopback;
}
}
fnp {
  interval <100ms | 1s | 10s | 1m | 10m>;
  loss-threshold number
  interface interface name {
    domain-id domain-id
  }
}
}
```

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

---

## [\[edit protocols ppp\] Hierarchy Level](#)

```
monitor-session (interface-name | all);
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable |
  no-world-readable> ;
  flag flag <disable>;
}
```

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

---

## [\[edit protocols pppoe\] Hierarchy Level](#)

```
pppoe {
  no-send-pads-error;
  no-send-pads-ac-info
```

```

pado-advertise;
service-name-tables table-name {
  service service-name {
    drop;
    delay seconds;
    terminate;
    dynamic-profile profile-name;
    routing-instance routing-instance-name;
    max-sessions number;
    agent-specifier {
      aci circuit-id-string ari remote-id-string {
        drop;
        delay seconds;
        terminate;
        dynamic-profile profile-name;
        routing-instance routing-instance-name;
        static-interface interface-name;
      }
    }
  }
}
}
traceoptions {
  file <filename> <files number> <match regular-expression> <size maximum-file-size>
  <world-readable | no-world-readable>;
  filter {
    aci regular-expression;
    ari regular-expression;
    service-name regular-expression;
    underlying-interface interface-name;
  }
  flag flag;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
}

```

### [edit protocols protection-group] Hierarchy Level

```

ethernet-ring ring-name {
  east-interface {
    control-channel channel-name {
      vlan number;
    }
  }
  guard-interval number;
  node-id mac-address;
  restore-interval number;
  ring-protection-link-owner;
  west-interface {
    control-channel channel-name {
      vlan number;
    }
  }
}

```

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

---

## [edit protocols vrrp] Hierarchy Level

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

```
protocols {
  vrrp {
    failover-delay milliseconds;
    global-advertisements-threshold advertisement-value;
    skew-timer-disable;
    startup-silent-period seconds;
    traceoptions {
      file <filename> <files number> <match regular-expression> <microsecond-stamp>
        <size maximum-file-size> <world-readable | no-world-readable>;
      flag flag;
      no-remote-trace;
    }
    version-3;
  }
}
```

- Related Documentation**
- Notational Conventions Used in Junos OS Configuration Hierarchies
  - [edit protocols] Hierarchy Level
  - *Junos OS Hierarchy and RFC Reference*
  - Junos® OS Ethernet Interfaces
  - Junos® OS Network Interfaces

## CHAPTER 4

# Statement Summary

### 802.3ad

---

Syntax	<pre>802.3ad {     aex (primary   backup);     lacp {         port-priority;     } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> <a href="#">fastether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> ]
Release Information	Statement introduced before Junos OS Release 7.4. <b>primary</b> and <b>backup</b> options added in Junos OS Release 8.3.
Description	Specify aggregated Ethernet logical interface number.
Options	<b>aex</b> —Aggregated Ethernet logical interface number. <b>Range:</b> 0 through 15  <b>primary</b> —For link protection configurations, specify the primary link for egress traffic.  <b>backup</b> —For link protection configurations, specify the backup link for egress traffic.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><li>• Configuring an Aggregated Ethernet Interface</li><li>• Configuring Aggregated Ethernet Link Protection</li></ul>

## aggregate (Gigabit Ethernet CoS Policer)

---

<b>Syntax</b>	<pre>aggregate {     bandwidth-limit <i>bps</i>;     burst-size-limit <i>bytes</i>; }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> <a href="#">policer</a> <i>cos-policer-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Define a policer to apply to nonpremium traffic.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Gigabit Ethernet Policers</a></li><li>• <a href="#">premium (Hierarchical Policer)</a></li><li>• <a href="#">ieee802.1p on page 74</a></li></ul>



## aggregated-ether-options

```

Syntax  aggregated-ether-options {
        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;
                }
            }
        }
        (mac-learn-enable | no-mac-learn-enable);
    }
    (flow-control | no-flow-control);
    lacp {
        (active | passive);
        link-protection {
            disable;
            (revertive | non-revertive);
            periodic interval;
            system-priority priority;
            system-id system-id;
        }
        link-protection;
        link-speed speed;
        logical-interface-fpc-redundancy;
        (loopback | no-loopback);
        minimum-links number;
        rebalance-periodic time hour:minute <interval hours>;
        source-address-filter {
            mac-address;
            (source-filtering | no-source-filtering);
        }
    }
}

```

Hierarchy Level [edit interfaces aex]

<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure aggregated Ethernet-specific interface properties.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Ethernet Interfaces Overview on page 3</a></li></ul>

## auto-negotiation

<b>Syntax</b>	(auto-negotiation   no-auto-negotiation) <remote-fault (local-interface-online   local-interface-offline)>;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ether-options], [edit interfaces <i>interface-name</i> <b>gigether-options</b> ], [edit interfaces <i>ge-pim</i> /0/0 <b>switch-options</b> <b>switch-port</b> <i>port-number</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 8.4 for J Series Services Routers. 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.
<b>Description</b>	For Gigabit Ethernet interfaces on M Series, MX Series, T Series, TX Matrix routers, and ACX Series routers explicitly enable autonegotiation and remote fault. For EX Series switches and J Series Services Routers, explicitly enable autonegotiation only.

- **auto-negotiation**—Enables autonegotiation. This is the default.
- **no-auto-negotiation**—Disable autonegotiation. When autonegotiation is disabled, you must explicitly configure the link mode and speed.

When you configure Tri-Rate Ethernet copper interfaces to operate at 1 Gbps, autonegotiation must be enabled.



**NOTE:** On EX Series switches, an interface configuration that disables autonegotiation and manually sets the link speed to 1 Gbps is accepted when you commit the configuration; however, if the interface you are configuring is a Tri-Rate Ethernet copper interface, the configuration is ignored as invalid and autonegotiation is enabled by default.

To correct the invalid configuration and disable autonegotiation:

1. Delete the **no-auto-negotiation** statement and commit the configuration.
2. Set the link speed to 10 or 100 Mbps, set **no-auto-negotiation**, and commit the configuration.

On J Series Services Routers with universal Physical Interface Modules (uPIMs) and on EX Series switches, if the link speed and duplex mode are also configured, the interfaces use the values configured as the desired values in the negotiation. If autonegotiation is disabled, the link speed and link mode must be configured.



**NOTE:** On T4000 routers, the **auto-negotiation** command is ignored for interfaces other than Gigabit Ethernet.

<b>Default</b>	Autonegotiation is automatically enabled. No explicit action is taken after the autonegotiation is complete or if the negotiation fails.
<b>Options</b>	<b>remote-fault (local-interface-online   local-interface-offline)</b> —(Optional) For M Series, MX Series, T Series, TX Matrix routers, and ACX Series routers only, manually configure remote fault on an interface. <b>Default:</b> local-interface-online
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Gigabit Ethernet Autonegotiation Overview</li><li>• <a href="#">Configuring J Series Services Router Switching Interfaces on page 11</a></li><li>• Configuring Gigabit Ethernet Interfaces (CLI Procedure)</li><li>• Configuring Gigabit Ethernet Interfaces (CLI Procedure)</li></ul>

---

## auto-negotiation (J Series uPIM)

---

<b>Syntax</b>	(auto-negotiation   no-auto-negotiation);
<b>Hierarchy Level</b>	[edit interfaces ge- <i>pim</i> /0/0 <b>switch-options</b> <b>switch-port</b> <i>port-number</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4.
<b>Description</b>	<p>For universal Physical Interface Modules (uPIMs) on J Series Services Routers only, explicitly enable autonegotiation. If the link speed and duplex are also configured, the interfaces use the values configured as the desired values in the negotiation. Include the <b>no-auto-negotiation</b> statement to disable autonegotiation.</p> <p>If autonegotiation is disabled, the link speed and link mode must be configured.</p>
<b>Default</b>	Autonegotiation is enabled by default.
<b>Options</b>	<b>auto-negotiation</b> —Enables autonegotiation. <b>no-auto-negotiation</b> —Disables autonegotiation.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring J Series Services Router Switching Interfaces on page 11</a></li></ul>

## bandwidth-limit (Policer for Gigabit Ethernet Interfaces)

<b>Syntax</b>	<code>bandwidth-limit <i>bps</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile ethernet-policer-profile</a> policer <i>cos-policer-name</i> <a href="#">aggregate</a> ], [edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile ethernet-policer-profile</a> policer <i>cos-policer-name</i> <a href="#">premium</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Define a policer to apply to nonpremium traffic.
<b>Options</b>	<p><b><i>bps</i></b>—Bandwidth limit, in bits per second. Specify either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p><b>Range:</b> 32 Kbps through 32 gigabits per second (Gbps). For IQ2 and IQ2-E interfaces 65,536 bps through 1 Gbps. For 10-Gigabit IQ2 and IQ2-E interfaces 65,536 bps through 10 Gbps.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Gigabit Ethernet Policers</li> <li><a href="#">burst-size-limit (Policer for Gigabit Ethernet Interfaces) on page 59</a></li> </ul>

## burst-size-limit (Policer for Gigabit Ethernet Interfaces)

<b>Syntax</b>	<code>burst-size-limit <i>bytes</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile ethernet-policer-profile</a> policer <i>cos-policer-name</i> <a href="#">aggregate</a> ], [edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile ethernet-policer-profile</a> policer <i>cos-policer-name</i> <a href="#">premium</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Define a policer to apply to nonpremium traffic.
<b>Options</b>	<p><b><i>bytes</i></b>—Burst length.</p> <p><b>Range:</b> 1500 through 100,000,000 bytes</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Gigabit Ethernet Policers</li> <li><a href="#">bandwidth-limit (Policer for Gigabit Ethernet Interfaces) on page 59</a></li> </ul>

## classifier

---

<b>Syntax</b>	<pre>classifier {   per-unit-scheduler {     forwarding-class <i>class-name</i> {       <b>loss-priority</b> (high   low);     }   } }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <b>ethernet-switch-profile</b> <b>ethernet-policer-profile output-priority-map</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the classifier for the output priority map to be applied to outgoing frames on this interface.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Specifying an Output Priority Map</li><li><a href="#">input-priority-map on page 77</a></li></ul>

## ethernet (Protocols OAM)

```

Syntax  ethernet {
        connectivity-fault-management {
            action-profile profile-name {
                default-actions {
                    interface-down;
                }
            }
        }
        performance-monitoring {
            delegate-server-processing;
            hardware-assisted-timestamping;
            sla-iterator-profiles {
                profile-name {
                    disable;
                    calculation-weight {
                        delay delay-weight;
                        delay-variation delay-variation-weight;
                    }
                    cycle-time milliseconds;
                    iteration-period connections;
                    measurement-type (loss | statistical-frame-loss | two-way-delay);
                }
            }
        }
        linktrace {
            age (30m | 10m | 1m | 30s | 10s);
            path-database-size path-database-size;
        }
        maintenance-domain domain-name {
            level number;
            name-format (character-string | none | dns | mac+2octet);
            maintenance-association ma-name {
                short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
                protect-maintenance-association protect-ma-name;
                remote-maintenance-association remote-ma-name;
                continuity-check {
                    convey-loss-threshold;
                    hold-interval minutes;
                    interface-status-tlv;
                    interval (10m | 10s | 1m | 1s | 100ms);
                    loss-threshold number;
                    port-status-tlv;
                }
            }
            mep mep-id {
                auto-discovery;
                direction (up | down);
                interface interface-name (protect | working);
                lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                    rem-err-xcon | xcon );
                priority number;
                remote-mep mep-id {
                    action-profile profile-name;
                    sla-iterator-profile profile-name {

```

```
        data-tlv-size size;  
        iteration-count count-value;  
        priority priority-value;  
    }  
}  
}  
}  
}  
}  
}  
evcs evc-id {  
    evc-protocol cfm management-domain domain-id (management-association  
        association-id | vpls (routing-instance instance-id);  
    remote-uni-count count;  
    multipoint-to-multipoint;  
}  
link-fault-management {  
    action-profile profile-name {  
        action {  
            link-down;  
            send-critical-event;  
            syslog;  
        }  
        event {  
            link-adjacency-loss;  
            link-event-rate {  
                frame-error count;  
                frame-period count;  
                frame-period-summary count;  
                symbol-period count;  
            }  
            protocol-down;  
        }  
    }  
}  
interface interface-name {  
    apply-action-profile;  
    link-discovery (active | passive);  
    pdu-interval interval;  
    pdu-threshold threshold-value;  
    remote-loopback;  
    event-thresholds {  
        frame-error count;  
        frame-period count;  
        frame-period-summary count;  
        symbol-period count;  
    }  
    negotiation-options {  
        allow-remote-loopback;  
        no-allow-link-events;  
    }  
}  
}  
lmi {  
    status-counter count;  
    polling-verification-timer value;  
    interface name {  
        uni-id uni-name;
```



```

        status-counter number;
        polling-verification-timer value;
        evc-map-type (all-to-one-bundling | bundling | service-multiplexing);
        evc evc-name {
            default-evc;
            vlan-list vlan-id-list;
        }
    }
}

```

**Hierarchy Level** [edit protocols [oam](#)]

**Release Information** Statement introduced in Junos OS Release 8.2.

**Description** For Ethernet interfaces on M320, MX Series, and T Series routers, provide fault signaling and detection for 802.3ah Operation, Administration, and Management (OAM) support.

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**

- Enabling IEEE 802.3ah OAM Support
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

## ethernet-policer-profile

<b>Syntax</b>	<pre> 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;     }   } } </pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> ], [edit interfaces <i>interface-name</i> aggregated-ether-options <a href="#">ethernet-switch-profile</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For Gigabit Ethernet IQ, 10-Gigabit Ethernet, 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 a class of service (CoS)-based policer. Policing applies to the inner VLAN identifiers, not to the outer tag. For Gigabit Ethernet interfaces with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), the <b>premium</b> policer is not supported.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Gigabit Ethernet Policers</li> </ul>

## ethernet-switch-profile

```
Syntax 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 tpid;
    }
    (mac-learn-enable | no-mac-learn-enable);
}
```

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

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

**Description** For Gigabit Ethernet IQ, 10-Gigabit Ethernet IQ2 and IQ2-E, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC, aggregated Ethernet with Gigabit Ethernet IQ interfaces, and the built-in Gigabit Ethernet port on the M7i router), configure VLAN tag and MAC address accounting and filtering properties.

The statements are explained separately.




**NOTE:** When you gather interfaces into a bridge domain, the `no-mac-learn-enable` statement at the [edit interfaces *interface-name* *gigether-options* *ethernet-switch-profile*] hierarchy level is not supported. You must use the `no-mac-learning` statement at the [edit bridge-domains *bridge-domain-name* *bridge-options* interface *interface-name*] hierarchy level to disable MAC learning on an interface in a bridge domain. For information

on disabling MAC learning for a bridge domain, see the *MX Series Layer 2 Configuration Guide*.

.....

<b>Default</b>	If the <b>ethernet-switch-profile</b> statement is not configured, 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) behave like Gigabit Ethernet interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring Gigabit Ethernet Policers</li><li>• Configuring MAC Address Filtering</li><li>• Stacking and Rewriting Gigabit Ethernet VLAN Tags Overview</li></ul>

## fast-aps-switch

<b>Syntax</b>	fast-aps-switch;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> sonet-options aps]
<b>Release Information</b>	Statement introduced in Junos OS Release 12.1.
<b>Description</b>	(M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.
	<div>  <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.</li> <li>When the fast-aps-switch statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.</li> <li>To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.</li> <li>The fast-aps-switch statement cannot be configured when the APS annex-b option is configured.</li> <li>The interfaces that have the fast-aps-switch statement configured cannot be used in virtual private LAN service (VPLS) environments.</li> </ul> </div>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Reducing APS Switchover Time in Layer 2 Circuits</li> </ul>

## fastether-options

---

**Syntax**    fastether-options {  
              802.3ad {  
                  aex (primary | backup);  
                  lACP {  
                      port-priority;  
                  }  
              }  
              (flow-control | no-flow-control);  
              ignore-l3-incompletes;  
              ingress-rate-limit *rate*;  
              (loopback | no-loopback);  
              mpls {  
                  pop-all-labels {  
                      required-depth *number*;  
                  }  
              }  
              source-address-filter {  
                  *mac-address*;  
              }  
              (source-filtering | no-source-filtering);  
          }

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


**Release Information**    Statement introduced before Junos OS Release 7.4.

**Description**    Configure Fast Ethernet-specific interface properties.  
  
                  The statements are explained separately.

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

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

## flow-control

<b>Syntax</b>	(flow-control   no-flow-control);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <a href="#">aggregated-ether-options</a> ], [edit interfaces <i>interface-name</i> ether-options], [edit interfaces <i>interface-name</i> <a href="#">fastether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> ], [edit interfaces <i>interface-name</i> multiservice-options], [edit interfaces interface-range <i>name</i> <a href="#">aggregated-ether-options</a> ], [edit interfaces interface-range <i>name</i> ether-options]
<b>Release Information</b>	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.
<b>Description</b>	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.
	<div>  <p><b>NOTE:</b> 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.</p> </div>
<b>Default</b>	Flow control is enabled.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Flow Control on page 16</a></li> <li>• Configuring Gigabit Ethernet Interfaces (CLI Procedure)</li> </ul>


## forwarding-class (Gigabit Ethernet IQ Classifier)

---

<b>Syntax</b>	<code>forwarding-class <i>class-name</i> {     <code>loss-priority</code> (high   low); }</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <code>ethernet-switch-profile</code> <code>ethernet-policer-profile output-priority-map classifier premium</code> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ interfaces only, define forwarding class name and option values.
<b>Options</b>	<p><i>class-name</i>—Name of forwarding class.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Specifying an Output Priority Map</li><li>• <a href="#">input-priority-map on page 77</a></li><li>• <code>forwarding-class</code> statement in the Junos OS Class of Service Configuration Guide</li></ul>



## framing (10-Gigabit Ethernet Interfaces)

<b>Syntax</b>	framing (lan-phy   wan-phy);
<b>Hierarchy Level</b>	[edit interfaces xe- <i>fpc/pic/port</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.0.
<b>Description</b>	For routers supporting the 10-Gigabit Ethernet interface, configure the framing format. WAN PHY mode is supported on MX240, MX480, MX960, T640, T1600, and T4000 routers only.
	<div>  <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>The T4000 Core Router supports only LAN PHY mode in Junos OS Release 12.1R1. Starting with Junos OS Release 12.1R2, WAN PHY mode is supported on the T4000 routers with the 12-port 10-Gigabit Ethernet LAN/WAN PIC with SFP+ (PF-12XGE-SFPP). Starting with Junos OS Release 12.2, WAN PHY mode is supported on the T4000 routers with the 24-port 10-Gigabit Ethernet LAN/WAN PIC with SFP+ (PF-24XGE-SFPP).</li> <li>When the PHY mode changes, interface traffic is disrupted because of port reinitialization.</li> </ul> </div>
<b>Default</b>	Operates in LAN PHY mode.
<b>Options</b>	<p><b>lan-phy</b>—10GBASE-R interface framing format that bypasses the WIS sublayer to directly stream block-encoded Ethernet frames on a 10-Gigabit Ethernet serial interface.</p> <p><b>wan-phy</b>—10GBASE-W interface framing format that allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and SONET devices.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>10-Gigabit Ethernet Framing Overview</li> <li>Configuring SONET Options for 10-Gigabit Ethernet Interfaces</li> </ul>

## gigether-options

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

}

<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure Gigabit Ethernet specific interface properties.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Ethernet Interfaces Overview on page 3</a></li> <li>• <a href="#">gether-options (ACX Series)</a></li> </ul>

## gratuitous-arp-reply

<b>Syntax</b>	(gratuitous-arp-reply   no-gratuitous-arp-reply);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	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.
<b>Description</b>	For Ethernet interfaces, enable updating of the ARP cache for replies received in response to gratuitous ARP requests.
<b>Default</b>	Updating of the ARP cache is disabled on all Ethernet interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Gratuitous ARP on page 19</a></li> <li>• <a href="#">no-gratuitous-arp-request on page 90</a></li> </ul>

## ieee802.1p

---

<b>Syntax</b>	ieee802.1p premium [ <i>values</i> ];
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> input-priority-map]
<b>Release Information</b>	Statement introduced before Junos Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, configure premium priority values for IEEE 802.1p input traffic.
<b>Options</b>	<b>values</b> —Define IEEE 802.1p priority values to be treated as premium. <b>Range:</b> 0 through 7
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Specifying an Input Priority Map</a></li></ul>

## ignore-l3-incompletes

---

<b>Syntax</b>	ignore-l3-incompletes;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <a href="#">fastether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
<b>Description</b>	Ignore the counting of Layer 3 incomplete errors on Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Ignoring Layer 3 Incomplete Errors on page 17</a></li></ul>

## ingress-rate-limit

<b>Syntax</b>	<code>ingress-rate-limit rate;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> fastether-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Perform port-based rate limiting on ingress traffic arriving on Fast Ethernet 8-port, 12-port, and 48-port PICs.
<b>Options</b>	<b>rate</b> —Traffic rate, in megabits per second (Mbps). <b>Range:</b> 1 through 100 Mbps
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring the Ingress Rate Limit on page 21</a></li> </ul>

## inner-tag-protocol-id

<b>Syntax</b>	<code>inner-tag-protocol-id tpid;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>input-vlan-map</b> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>input-vlan-map</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, configure the IEEE 802.1Q TPID value to rewrite for the inner tag. All TPIDs you include in input and output VLAN maps must be among those you specify at the <b>[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile tag-protocol-id [ <i>tpids</i> ]]</b> hierarchy level.
<b>Default</b>	If the <b>inner-tag-protocol-id</b> statement is not configured, the TPID value is 0x8100.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Inner and Outer TPIDs and VLAN IDs</a></li> </ul>

## inner-vlan-id

---

<b>Syntax</b>	<code>inner-vlan-id <i>number</i>;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> <i>input-vlan-map</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> <i>output-vlan-map</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i></code> <code><i>input-vlan-map</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i></code> <code><i>output-vlan-map</i>]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	<p>For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN ID to rewrite for the inner tag of the final packet.</p> <p>You cannot include the <b>inner-vlan-id</b> statement with the <b>swap</b> statement, <b>swap-push</b> statement, <b>push-push</b> statement, or <b>push-swap</b> statement and the <b>inner-vlan-id</b> statement at the <code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> <i>output-vlan-map</i>]</code> hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the <b>inner-vlan-id</b> statement you include at the <code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i>]</code> hierarchy level.</p>
<b>Options</b>	<p><i>number</i>—VLAN ID number.</p> <p><b>Range:</b> 0 through 4094</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring Inner and Outer TPIDs and VLAN IDs</li></ul>

## input-priority-map

<b>Syntax</b>	input-priority-map { <code>ieee802.1p</code> premium [ <i>values</i> ]; }
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <code>gigether-options</code> <code>ethernet-switch-profile</code> <code>ethernet-policer-profile</code> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the input policer priority map to be applied to incoming frames on this interface.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Specifying an Input Priority Map</li> <li><a href="#">output-priority-map on page 94</a></li> </ul>

## input-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP)

<b>Syntax</b>	input-vlan-map { ( <code>pop</code>   <code>pop-pop</code>   <code>pop-swap</code>   <code>push</code>   <code>push-push</code>   <code>swap</code>   <code>swap-push</code>   <code>swap-swap</code> ); <code>inner-tag-protocol-id</code> <i>tpid</i> ; <code>inner-vlan-id</code> <i>number</i> ; <code>tag-protocol-id</code> <i>tpid</i> ; <code>vlan-id</code> <i>number</i> ; }
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <code>unit</code> <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <code>unit</code> <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.  <code>pop-pop</code> , <code>pop-swap</code> , <code>push-push</code> , <code>swap-push</code> , and <code>swap-swap</code> statements introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP interfaces only, define the rewrite profile to be applied to incoming frames on this logical interface.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Stacking a VLAN Tag</li> <li><a href="#">output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP) on page 95</a></li> </ul>


## interfaces

---

<b>Syntax</b>	interfaces { ... }
<b>Hierarchy Level</b>	[edit]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure interfaces on the router.
<b>Default</b>	The management and internal Ethernet interfaces are automatically configured. You must configure all other interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Physical Interface Configuration Statements Overview</li><li>• Configuring Aggregated Ethernet Link Protection</li></ul>



## lacp (Aggregated Ethernet)

<b>Syntax</b>	<pre>lacp {   (active   passive);   admin-key <i>key</i>;   fast-failover;   link-protection {     disable;     (revertive   non-revertive);   }   periodic <i>interval</i>;   system-id <i>mac-address</i>;   system-priority <i>priority</i>; }</pre>
<b>Hierarchy Level</b>	[edit interfaces aex <a href="#">aggregated-ether-options</a> ]
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p><b>fast-failover</b> option introduced in Junos OS Release 12.2.</p>
<b>Description</b>	For aggregated Ethernet interfaces only, configure Link Aggregation Control Protocol (LACP).
<b>Default</b>	If you do not specify LACP as either <b>active</b> or <i>passive</i> , LACP remains passive.
<b>Options</b>	<p><b>active</b>—Initiate transmission of LACP packets.</p> <p><b>admin-key <i>number</i></b>—Specify an administrative key for the router or switch.</p>
	<div>  <p><b>NOTE:</b> You must also configure Multichassis Link Aggregation (MC-LAG) when you configure the <b>admin-key</b>.</p> </div>
	<p><b>passive</b>—Respond to LACP packets.</p> <p><b>fast-failover</b>—Specify to override the IEEE 802.3ad standard and allow the standby link to receive traffic. Overriding the default behavior facilitates subsecond failover.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Aggregated Ethernet LACP</li> <li>Configuring Aggregated Ethernet LACP (CLI Procedure)</li> </ul>

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

## link-discovery

---

<b>Syntax</b>	link-discovery (active   passive);
<b>Hierarchy Level</b>	[edit protocols <a href="#">oam</a> <a href="#">ethernet</a> <a href="#">link-fault-management</a> interface <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2.
<b>Description</b>	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the discovery mode used for IEEE 802.3ah Operation, Administration, and Management (OAM) support. The discovery process is triggered automatically when OAM 802.3ah functionality is enabled on a port. Link monitoring is done when the interface sends periodic OAM PDUs.
<b>Options</b>	(active   passive)—Passive or active mode. In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality. In passive mode, the peer initiates the discovery process. Once the discovery process is initiated, both sides participate in discovery.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring Link Discovery</li></ul>

## link-fault-management

```
Syntax  link-fault-management {
        action-profile profile-name {
            action {
                link-down;
                send-critical-event;
                syslog;
            }
            event {
                link-adjacency-loss;
                link-event-rate {
                    frame-error count;
                    frame-period count;
                    frame-period-summary count;
                    symbol-period count;
                }
                protocol-down;
            }
        }
        interface interface-name {
            apply-action-profile profile-name;
            link-discovery (active | passive);
            pdu-interval interval;
            pdu-threshold threshold-value;
            remote-loopback;
            event-thresholds {
                frame-error count;
                frame-period count;
                frame-period-summary count;
                symbol-period count;
            }
            negotiation-options {
                allow-remote-loopback;
                no-allow-link-events;
            }
        }
    }
```

**Hierarchy Level** [edit protocols [oam](#) [ethernet](#)]

**Release Information** Statement introduced in Junos OS Release 8.2.

**Description** For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify fault signaling and detection for IEEE 802.3ah Operation, Administration, and Management (OAM) support.

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**
- [Enabling IEEE 802.3ah OAM Support](#)

## link-mode

<b>Syntax</b>	<code>link-mode <i>mode</i> (automatic   full-duplex   half-duplex);</code>
<b>Hierarchy Level</b>	<code>[edit interfaces <i>interface-name</i>],</code> <code>[edit interfaces <i>interface-name</i> ether-options],</code> <code>[edit interfaces <i>ge-pim</i>/<i>O</i>/<i>O</i> <i>switch-options</i> <i>switch-port</i> <i>port-number</i>]</code>
<b>Release Information</b>	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.
<b>Description</b>	Set the device's link connection characteristic.
<b>Options</b>	<p><i>mode</i>—Link characteristics:</p> <ul style="list-style-type: none"> <li>• <b>automatic</b>—Link mode is negotiated. This is the default for EX Series switches.</li> <li>• <b>full-duplex</b>—Connection is full duplex.</li> <li>• <b>half-duplex</b>—Connection is half duplex.</li> </ul> <p><b>Default:</b> Fast Ethernet interfaces, except the J Series ePIM Fast Ethernet interfaces, can operate in either full-duplex or half-duplex mode. The router's management Ethernet interface, <b>fxp0</b> or <b>em0</b>, the built-in Fast Ethernet interfaces on the FIC (M7i router), and the Gigabit Ethernet ports on J Series Services Routers with uPIMs installed and configured for access switching mode autonegotiate whether to operate in full-duplex or half-duplex mode. Unless otherwise noted here, all other interfaces operate only in full-duplex mode.</p>



**NOTE:** On J Series ePIM Fast Ethernet interfaces, if you specify half-duplex (or if full-duplex mode is not autonegotiated), the following message is written to the system log: "Half-duplex mode not supported on this PIC, forcing full-duplex mode."



**NOTE:** On EX Series switches, if **no-auto-negotiation** is specified in `[edit interfaces interface-name ether-options]`, you can select only **full-duplex** or **half-duplex**. If **auto-negotiation** is specified, you can select any mode.



**NOTE:** Member links of an aggregated Ethernet bundle must not be explicitly configured with a link mode. You must remove any such link-mode configuration before committing the aggregated Ethernet configuration.

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Link Characteristics on Ethernet Interfaces on page 17</a></li><li>• Understanding Management Ethernet Interfaces</li><li>• Configuring Gigabit Ethernet Interfaces (CLI Procedure)</li></ul>

## link-protection

<b>Syntax</b>	<pre>link-protection {   disable;   (revertive  non-revertive); }</pre>
<b>Hierarchy Level</b>	<p>[edit interfaces aex <a href="#">aggregated-ether-options</a>]</p> <p>[edit interfaces aex aggregated-ether-options <i>lACP</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.3.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for <b>disable</b>, <b>revertive</b>, and <b>non-revertive</b> statements added in Junos OS Release 9.3.</p>
<b>Description</b>	<p>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 <b>primary</b> and <b>backup</b> statements at the [edit interfaces <i>ge-fpc/pic/port</i> <b>gigether-options 802.3ad aex</b>] hierarchy level or the [edit interfaces <i>fe-fpc/pic/port</i> <b>fastether-options 802.3ad aex</b>] hierarchy level.</p> <p>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.</p> <p>For Junos OS link protection, specify <b>link-protection</b> at the following hierarchy levels:</p> <ul style="list-style-type: none"> <li>• [edit interfaces <i>ge-fpc/pic/port</i> <b>ether-options 802.3ad aex</b>]</li> <li>• [edit interfaces <i>xe-fpc/pic/port</i> <b>ether-options 802.3ad aex</b>]</li> </ul> <p>For LACP standards link protection, specify <b>link-protection</b> at the following hierarchy levels:</p> <ul style="list-style-type: none"> <li>• For global LACP link protection, specify at [edit chassis aggregated-devices ethernet <b>lACP</b>]</li> <li>• For a specific aggregated Ethernet interface, specify at [edit interfaces aeX <b>aggregated-ether-options lACP</b>]</li> </ul>
<b>Options</b>	The statements are explained separately.
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• Configuring Aggregated Ethernet Link Protection</li> <li>• Configuring LACP Link Protection of Aggregated Ethernet Interfaces (CLI Procedure)</li> </ul>


## link-speed (Aggregated Ethernet)

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<b>Syntax</b>	link-speed <i>speed</i> ;
<b>Hierarchy Level</b>	[edit interfaces aex <a href="#">aggregated-ether-options</a> ], [edit interfaces interface-range <i>name</i> aggregated-ether-options], [edit interfaces interface-range <i>name</i> aggregated-sonet-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	For aggregated Ethernet interfaces only, set the required link speed.
<b>Options</b>	<p><b>speed</b>—For aggregated Ethernet links, you can specify <b>speed</b> in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p>Aggregated Ethernet links on the M120 router can have one of the following speed values:</p> <ul style="list-style-type: none"><li>• <b>100m</b>—Links are 100 Mbps.</li><li>• <b>10g</b>—Links are 10 Gbps.</li><li>• <b>1g</b>—Links are 1 Gbps.</li><li>• <b>oc192</b>—Links are OC192 or STM64c.</li></ul> <p>Aggregated Ethernet links on EX Series switches can be configured to operate at one of the following speed values:</p> <ul style="list-style-type: none"><li>• <b>10m</b></li><li>• <b>100m</b></li><li>• <b>1g</b></li><li>• <b>10g</b></li></ul>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Aggregated Ethernet Link Speed</a></li><li>• <a href="#">Configuring Aggregated Ethernet Links (CLI Procedure)</a></li><li>• <a href="#">Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch</a></li></ul>



## loopback (Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet)


<b>Syntax</b>	(loopback   no-loopback);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> aggregated-ether-options], [edit interfaces <i>interface-name</i> ether-options], [edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gigether-options], [edit interfaces interface-range <i>name</i> ether-options]
<b>Release Information</b>	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.
<b>Description</b>	For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces, enable or disable loopback mode.
	<div>  <p><b>NOTE:</b> By default, local aggregated Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces connect to a remote system.</p> </div>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Ethernet Loopback Capability on page 16</a></li> </ul>

## loss-priority

<b>Syntax</b>	loss-priority (high   low);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile output-priority-map classifier premium forwarding-class <i>class-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Specify the packet loss priority value.
<b>Options</b>	<b>high</b> —Packet has high loss priority.  <b>low</b> —Packet has low loss priority.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Specifying an Output Priority Map</a></li> </ul>

## mac-learn-enable

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<b>Syntax</b>	(mac-learn-enable   no-mac-learn-enable);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>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), and for Gigabit Ethernet DPCs on MX Series routers, configure whether source and destination MAC addresses are dynamically learned:</p> <ul style="list-style-type: none"><li>• <b>mac-learn-enable</b>—Allow the interface to dynamically learn source and destination MAC addresses.</li><li>• <b>no-mac-learn-enable</b>—Prohibit the interface from dynamically learning source and destination MAC addresses.</li></ul> <p>MAC address learning is based on source addresses. You can start accounting for traffic after there has been traffic sent from the MAC address. Once the MAC address is learned, the frames and bytes transmitted to or received from the MAC address can be tracked.</p> <div><p><b>NOTE:</b> When you gather interfaces into a bridge domain, the <b>no-mac-learn-enable</b> statement at the [edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile] hierarchy level is not supported. You must use the <b>no-mac-learning</b> statement at the [edit bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>] hierarchy level to disable MAC learning on an interface in a bridge domain. For information on disabling MAC learning for a bridge domain, see <i>MX Series Layer 2 Configuration Guide</i>.</p></div>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring MAC Address Filtering</li></ul>

## minimum-links

<b>Syntax</b>	<code>minimum-links <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces aex <a href="#">aggregated-ether-options</a> ], [edit interfaces aex aggregated-sonet-options], [edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> <a href="#">unit logical-unit-number</a> ], [edit interfaces interface-range <i>range</i> <a href="#">aggregated-ether-options</a> ], [edit interfaces interface-range <i>range</i> aggregated-sonet-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <a href="#">unit logical-unit-number</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	For aggregated Ethernet, SONET/SDH, multilink, link services, and voice services interfaces only, set the minimum number of links that must be up for the bundle to be labeled up.
<b>Options</b>	<p><b><i>number</i></b>—Number of links.</p> <p><b>Range:</b> On M120, M320, MX Series, T Series, and TX Matrix routers with Ethernet interfaces, 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.</p> <p><b>Default:</b> 1</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Aggregated Ethernet Minimum Links</li> <li>Configuring Aggregated SONET/SDH Minimum Links</li> <li>Configuring Aggregated Ethernet Links (CLI Procedure)</li> <li>Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch</li> <li>Junos Services Interfaces Configuration Release 12.3</li> </ul>

## no-auto-mdix

---

<b>Syntax</b>	no-auto-mdix;
<b>Hierarchy Level</b>	[edit interface <i>ge-fpc/port/pic</i> <i>gigether-options</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
<b>Description</b>	Disable the Auto MDI/MDIX feature.  MX Series routers with Gigabit Ethernet interfaces automatically detect MDI and MDIX port connections. Use this statement to override the default setting. Remove this statement to return to the default setting.
<b>Default</b>	Auto MDI/MDIX is enabled by default.
<b>Options</b>	There are no options for this statement.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Ethernet Interfaces Overview on page 3</a></li><li>• <a href="#">gigether-options on page 72</a>.</li></ul>

## no-gratuitous-arp-request

---

<b>Syntax</b>	no-gratuitous-arp-request;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	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.
<b>Description</b>	For Ethernet interfaces and pseudowire logical interfaces, do not respond to gratuitous ARP requests.
<b>Default</b>	Gratuitous ARP responses are enabled on all Ethernet interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Gratuitous ARP on page 19</a></li><li>• <a href="#">gratuitous-arp-reply on page 73</a></li></ul>

## oam

```

Syntax  oam {
    ethernet {
        connectivity-fault-management {
            action-profile profile-name {
                default-actions {
                    interface-down;
                }
            }
        }
        performance-monitoring {
            delegate-server-processing;
            hardware-assisted-timestamping;
            sla-iterator-profiles {
                profile-name {
                    disable;
                    calculation-weight {
                        delay delay-weight;
                        delay-variation delay-variation-weight;
                    }
                    cycle-time milliseconds;
                    iteration-period connections;
                    measurement-type (loss | statistical-frame-loss | two-way-delay);
                }
            }
        }
        linktrace {
            age (30m | 10m | 1m | 30s | 10s);
            path-database-size path-database-size;
        }
        maintenance-domain domain-name {
            level number;
            name-format (character-string | none | dns | mac+2octet);
            maintenance-association ma-name {
                short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
                protect-maintenance-association protect-ma-name;
                remote-maintenance-association remote-ma-name;
                continuity-check {
                    convey-loss-threshold;
                    hold-interval minutes;
                    interface-status-tlv;
                    interval (10m | 10s | 1m | 1s | 100ms);
                    loss-threshold number;
                    port-status-tlv;
                }
            }
            mep mep-id {
                auto-discovery;
                direction (up | down);
                interface interface-name (protect | working);
                lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                    rem-err-xcon | xcon );
                priority number;
                remote-mep mep-id {
                    action-profile profile-name;
                }
            }
        }
    }
}

```

```

        sla-iterator-profile profile-name {
            data-tlv-size size;
            iteration-count count-value;
            priority priority-value;
        }
    }
}
}
}
}
}
link-fault-management {
    action-profile profile-name {
        action {
            link-down;
            send-critical-event;
            syslog;
        }
        event {
            link-adjacency-loss;
            link-event-rate {
                frame-error count;
                frame-period count;
                frame-period-summary count;
                symbol-period count;
            }
            protocol-down;
        }
    }
}
interface interface-name {
    apply-action-profile
    link-discovery (active | passive);
    pdu-interval interval;
    pdu-threshold threshold-value;
    remote-loopback;
    event-thresholds {
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
    }
    negotiation-options {
        allow-remote-loopback;
        no-allow-link-events;
    }
}
}
}
}
}
}

```

Hierarchy Level [edit protocols]

**Release Information** Statement introduced in Junos OS Release 8.2.  
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Switches.

<b>Description</b>	For Ethernet interfaces on M320, M120, MX Series, and T Series routers and PTX Series Packet Transport Switches, provide IEEE 802.3ah Operation, Administration, and Maintenance (OAM) support.  The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• IEEE 802.3ah OAM Link-Fault Management Overview</li> <li>• Configuring Ethernet 802.1ag OAM on PTX Series Packet Transport Switches</li> </ul>

## optics-options

<b>Syntax</b>	<pre> optics-options {     alarm low-light-alarm {         (link-down   syslog);     }     warning low-light-warning {         (link-down   syslog);     }     wavelength nm; } </pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. <b>alarm</b> option and <b>warning</b> options introduced in Junos OS Release 10.0. Statement introduced in Junos OS Release 12.1 for EX Series switches.
<b>Description</b>	For 10-Gigabit Ethernet dense wavelength-division multiplexing (DWDM) interfaces only, configure full C-band International Telecommunication Union (ITU)-Grid tunable optics.
<b>Options</b>	The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• 10-Gigabit Ethernet DWDM Interface Wavelength Overview</li> </ul>

## output-priority-map

---

<b>Syntax</b>	<pre>output-priority-map {   classifier {     premium {       forwarding-class <i>class-name</i> {         loss-priority (high   low);       }     }   } }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> together-options <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the output policer priority map to be applied to outgoing frames on this interface.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Specifying an Output Priority Map</li><li><a href="#">input-priority-map on page 77</a></li></ul>



## output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP)

<b>Syntax</b>	<pre>output-vlan-map {   (pop   pop-pop   pop-swap   push   push-push   swap   swap-push   swap-swap);   inner-tag-protocol-id <i>tpid</i>;   inner-vlan-id <i>number</i>;   tag-protocol-id <i>tpid</i>;   vlan-id <i>number</i>; }</pre>
<b>Hierarchy Level</b>	<pre>[edit interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i>]</pre>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p><b>pop-pop</b>, <b>pop-swap</b>, <b>push-push</b>, <b>swap-push</b>, and <b>swap-swap</b> statements added in Junos OS Release 8.1.</p>
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Port 10-Gigabit Ethernet SFPP interfaces only, define the rewrite operation to be applied to outgoing frames on this logical interface.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Stacking and Rewriting Gigabit Ethernet VLAN Tags</li> <li><a href="#">input-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP) on page 77</a></li> </ul>

## pdu-interval

<b>Syntax</b>	<code>pdu-interval <i>interval</i>;</code>
<b>Hierarchy Level</b>	<code>[edit protocols <b>oam</b> <b>ethernet link-fault-management</b> interface <i>interface-name</i>]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2.
<b>Description</b>	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the periodic OAM PDU sending interval for fault detection. Used for IEEE 802.3ah Operation, Administration, and Management (OAM) support.
<b>Options</b>	<p><b>interval</b>—Periodic OAM PDU sending interval.</p> <p><b>Range:</b> 100 through 1000 milliseconds</p> <p><b>Default:</b> 1000 milliseconds</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring the OAM PDU Interval</li> </ul>

## pdu-threshold

---

<b>Syntax</b>	<code>pdu-threshold <i>threshold-value</i>;</code>
<b>Hierarchy Level</b>	[edit protocols <a href="#">oam</a> <a href="#">ethernet</a> <a href="#">link-fault-management</a> interface <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2.
<b>Description</b>	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the number of OAM PDUs to miss before an error is logged. Used for IEEE 802.3ah Operation, Administration, and Management (OAM) support.
<b>Options</b>	<b><i>threshold-value</i></b> —The number of PDUs missed before declaring the peer lost. <b>Range:</b> 3 through 10 PDUs <b>Default:</b> 3 PDUs
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring the OAM PDU Threshold</li></ul>

## periodic

---

<b>Syntax</b>	<code>periodic interval;</code>
<b>Hierarchy Level</b>	[edit interfaces aex <a href="#">aggregated-ether-options lacp</a> ], [edit interfaces interface-range <i>name</i> <a href="#">aggregated-ether-options lacp</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	For aggregated Ethernet interfaces only, configure the interval for periodic transmission of LACP packets.
<b>Options</b>	<p><i>interval</i>—Interval for periodic transmission of LACP packets.</p> <ul style="list-style-type: none"> <li><b>fast</b>—Transmit packets every second.</li> <li><b>slow</b>—Transmit packets every 30 seconds.</li> </ul> <p><b>Default:</b> <b>fast</b></p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Aggregated Ethernet LACP</li> <li>Configuring Aggregated Ethernet LACP (CLI Procedure)</li> <li>Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch</li> </ul>

## policer (CoS)

---

<b>Syntax</b>	<pre>policer <i>cos-policer-name</i> {     aggregate {         bandwidth-limit <i>bps</i>;         burst-size-limit <i>bytes</i>;     }     premium {         bandwidth-limit <i>bps</i>;         burst-size-limit <i>bytes</i>;     } }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	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), define a CoS policer template to specify the premium bandwidth and burst-size limits, and the aggregate bandwidth and burst-size limits. The premium policer is not supported on MX Series routers or for Gigabit Ethernet interfaces with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router).
<b>Options</b>	<p><b><i>cos-policer-name</i></b>—Name of one policer to specify the premium bandwidth and burst-size limits, and the aggregate bandwidth and burst-size limits.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring Gigabit Ethernet Policers</li></ul>

## pop

<b>Syntax</b>	pop;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet interfaces using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to remove a VLAN tag from the top of the VLAN tag stack. The outer VLAN tag of the frame is removed.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Removing a VLAN Tag</li> </ul>

## pop-pop

<b>Syntax</b>	pop-pop;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to remove both the outer and inner VLAN tags of the frame.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Removing the Outer and Inner VLAN Tags</li> </ul>

## pop-swap

---

<b>Syntax</b>	pop-swap;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2, and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to remove the outer VLAN tag of the frame, and replace the inner VLAN tag of the frame with a user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Removing the Outer VLAN Tag and Rewriting the Inner VLAN Tag</li></ul>

## premium (Output Priority Map)

---

<b>Syntax</b>	premium { <a href="#">forwarding-class</a> <i>class-name</i> { <a href="#">loss-priority</a> (high   low); } }
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> <a href="#">output-priority-map</a> <a href="#">classifier</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ interfaces only, define the classifier for egress premium traffic.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Specifying an Output Priority Map</li><li><a href="#">input-priority-map on page 77</a></li></ul>

## premium (Policer)

<b>Syntax</b>	premium { bandwidth-limit <i>bps</i> ; burst-size-limit <i>bytes</i> ; }
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> gigether-options <a href="#">ethernet-switch-profile</a> <a href="#">ethernet-policer-profile</a> <a href="#">policer</a> <i>cos-policer-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Define a policer to apply to nonpremium traffic.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Gigabit Ethernet Policers</li> <li><a href="#">aggregate (Gigabit Ethernet CoS Policer) on page 54</a></li> <li><a href="#">ieee802.1p on page 74</a></li> </ul>

## push

<b>Syntax</b>	push;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet interfaces using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to add a new VLAN tag to the top of the VLAN stack. An outer VLAN tag is pushed in front of the existing VLAN tag. If you include the <b>push</b> statement in the configuration, you must also include the <a href="#">pop</a> statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ] hierarchy level.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Stacking a VLAN Tag</li> </ul>

## push-push

---

<b>Syntax</b>	push-push;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to push two VLAN tags in front of the frame.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Stacking Two VLAN Tags</li></ul>



## source-address-filter

<b>Syntax</b>	source-address-filter { <i>mac-address</i> ; }
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <a href="#">aggregated-ether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">fastether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Packet Transport Switches.
<b>Description</b>	For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, Gigabit Ethernet IQ interfaces, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), specify the MAC addresses from which the interface can receive packets. For this statement to have any effect, you must include the <b>source-filtering</b> statement in the configuration to enable source address filtering. This statement is not supported on the J Series Services Routers.
<b>Options</b>	<p><b>mac-address</b>—MAC address filter. You can specify the MAC address as <i>nn:nn:nn:nn:nn:nn</i> or <i>nnnn.nnnn.nnnn</i>, where <i>n</i> is a decimal digit. To specify more than one address, include multiple <b>mac-address</b> options in the <b>source-address-filter</b> statement.</p> <p>If you enable the VRRP on a Fast Ethernet or Gigabit Ethernet interface, as described in VRRP and VRRP for IPv6 Overview, and if you enable MAC source address filtering on the interface, you must include the virtual MAC address in the list of source MAC addresses that you specify in the <b>source-address-filter</b> statement. MAC addresses ranging from <b>00:00:5e:00:01:00</b> through <b>00:00:5e:00:01:ff</b> are reserved for VRRP, as defined in RFC 3768, <i>Virtual Router Redundancy Protocol</i>. When you configure the VRRP group, the group number must be the decimal equivalent of the last hexadecimal byte of the virtual MAC address.</p> <p>On untagged Gigabit Ethernet interfaces, you should not configure the <b>source-address-filter</b> statement and the <b>accept-source-mac</b> statement simultaneously. On tagged Gigabit Ethernet interfaces, you should not configure the <b>source-address-filter</b> statement and the <b>accept-source-mac</b> statement with an identical MAC address specified in both filters.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Enabling Ethernet MAC Address Filtering on page 13</a></li> <li>• <a href="#">Configuring MAC Filtering on PTX Series Packet Transport Switches</a></li> <li>• <a href="#">source-filtering on page 104</a></li> </ul>

## source-filtering

---

<b>Syntax</b>	(source-filtering   no-source-filtering);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <a href="#">aggregated-ether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">fastether-options</a> ], [edit interfaces <i>interface-name</i> <a href="#">gigether-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Packet Transport Switches.
<b>Description</b>	<p>For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, and Gigabit Ethernet IQ interfaces only, enable the filtering of MAC source addresses, which blocks all incoming packets to that interface. To allow the interface to receive packets from specific MAC addresses, include the <b>source-address-filter</b> statement.</p> <p>If the remote Ethernet card is changed, the interface is no longer able to receive packets from the new card because it has a different MAC address.</p>
<b>Default</b>	Source address filtering is disabled.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Enabling Ethernet MAC Address Filtering on page 13</a></li><li>• <a href="#">Configuring MAC Filtering on PTX Series Packet Transport Switches</a></li><li>• <a href="#">accept-source-mac</a></li><li>• <a href="#">source-address-filter on page 103</a></li></ul>

## speed (Ethernet)

<b>Syntax</b>	speed (10m   100m   1g   auto);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ], [edit interfaces ge- <i>pim</i> /0/0 <i>switch-options</i> <i>switch-port</i> <i>port-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
<b>Description</b>	Configure the interface speed. This statement applies to the management Ethernet interface ( <b>fxp0</b> or <b>em0</b> ), Fast Ethernet 12-port and 48-port PICs, the built-in Fast Ethernet port on the FIC (M7i router), the built-in Ethernet interfaces on J Series Services Routers, Combo Line Rate DPCs and Tri-Rate Ethernet Copper interfaces on MX Series routers, and on the Gigabit Ethernet ports on J Series Services Routers with uPIMs installed and configured for access switching mode. When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled. When you configure 100BASE-FX SFP, you must set the port speed at 100 Mbps.
<b>Options</b>	You can specify the speed as either <b>10m</b> (10 Mbps), <b>100m</b> (100 Mbps), or on J Series routers with uPIMs installed and on MX Series routers, <b>1g</b> (1 Gbps). You can specify the <b>auto</b> option only on MX Series routers.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring the Interface Speed</li> <li><a href="#">Configuring the Interface Speed on Ethernet Interfaces on page 20</a></li> <li>Configuring Gigabit Ethernet Autonegotiation</li> <li><a href="#">Configuring J Series Services Router Switching Interfaces on page 11</a></li> </ul>

## swap

---

<b>Syntax</b>	swap;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to replace a VLAN tag. The outer VLAN tag of the frame is overwritten with the user-specified VLAN tag information.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Rewriting the VLAN Tag on Tagged Frames</a></li></ul>

## swap-push

---

<b>Syntax</b>	swap-push;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to replace the outer VLAN tag of the frame with 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.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Rewriting a VLAN Tag and Adding a New Tag</a></li></ul>

## swap-swap

<b>Syntax</b>	swap-swap;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">input-vlan-map</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">output-vlan-map</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to replace both the inner and the outer VLAN tags of the frame with a user-specified VLAN tag value.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Rewriting the Inner and Outer VLAN Tags</li> </ul>

## switch-options

<b>Syntax</b>	switch-options { switch-port <i>port-number</i> { ( <a href="#">auto-negotiation</a>   no-auto-negotiation); <a href="#">speed</a> (10m   100m   1g); <a href="#">link-mode</a> (full-duplex   half-duplex); } }
<b>Hierarchy Level</b>	[edit interfaces <i>ge-pim</i> /0/0]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4.
<b>Description</b>	On a J Series Services Router with multiport Gigabit Ethernet uPIMs installed and operating in access switching mode, only one physical interface is configured for the entire multiport Gigabit Ethernet uPIM. Configuration of the physical port characteristics is done under the single physical interface.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><a href="#">Configuring J Series Services Router Switching Interfaces on page 11</a></li> </ul>

## switch-port

---

<b>Syntax</b>	<pre>switch-port <i>port-number</i> {     (auto-negotiation   no-auto-negotiation);     speed (10m   100m   1g);     link-mode (full-duplex   half-duplex); }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>ge-pim/0/0</i> <a href="#">switch-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4.
<b>Description</b>	On a J Series Services Router with Ethernet uPIMs installed and operating in access switching mode, configuration of the physical port characteristics, done under the single physical interface.
<b>Default</b>	Autonegotiation is enabled by default. If the link speed and duplex are also configured, the interfaces use the values configured as the desired values in the negotiation.
<b>Options</b>	<p><b><i>port-number</i></b>—Ports are numbered 0 through 5 on the 6-port Gigabit Ethernet uPIM, 0 through 7 on the 8-port Gigabit Ethernet uPIM, and 0 through 15 on the 16-port Gigabit Ethernet uPIM.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring J Series Services Router Switching Interfaces on page 11</a></li></ul>

## tag-protocol-id (TPIDs Expected to Be Sent or Received)

<b>Syntax</b>	<code>tag-protocol-id [ <i>tpids</i> ];</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <b>gigether-options</b> <b>ethernet-switch-profile</b> ], [edit interfaces <i>interface-name</i> <b>aggregated-ether-options</b> <b>ethernet-switch-profile</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, aggregated Ethernet with Gigabit Ethernet IQ interfaces, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC, and the built-in Gigabit Ethernet port on the M7i router), define the TPIDs expected to be sent or received on a particular VLAN. For each Gigabit Ethernet port, you can configure up to eight TPIDs using the <b>tag-protocol-id</b> statement; but only the first four TPIDs are supported on IQ2 and IQ2-E interfaces.</p> <p>For 10-Gigabit Ethernet LAN/WAN PIC interfaces on T Series routers, only the default TPID value (<b>0x8100</b>) is supported.</p>
<b>Options</b>	<i>tpids</i> —TPIDs to be accepted on the VLAN. Specify TPIDs in hexadecimal.
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring Frames with Particular TPIDs to Be Processed as Tagged Frames</li> </ul>

## tag-protocol-id (TPID to Rewrite)

---

<b>Syntax</b>	tag-protocol-id <i>tpid</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces only, configure the outer TPID value. All TPIDs you include in input and output VLAN maps must be among those you specify at the [edit interfaces <i>interface-name</i> <b>gigether-options ethernet-switch-profile tag-protocol-id [ <i>tpids</i> ]</b>] hierarchy level.</p> <p>For 10-Gigabit Ethernet LAN/WAN PIC interfaces on T Series routers, value the default TPID value (<b>0x8100</b>) is supported.</p>
<b>Default</b>	If the <b>tag-protocol-id</b> statement is not configured, the TPID value is 0x8100.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring Inner and Outer TPIDs and VLAN IDs</li></ul>



## unit

```

Syntax  unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    accounting-profile name;
    advisory-options {
        downstream-rate rate;
        upstream-rate rate;
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
        interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
        rtp {
            maximum-contexts number <force>;
            f-max-period number;
            queues [ queue-numbers ];
            port {
                minimum port-number;
                maximum port-number;
            }
        }
    }
    compression-device interface-name;
    copy-tos-to-outer-ip-header;
    demux-destination family;
    demux-source family;
    demux-options {
        underlying-interface interface-name;
    }
    description text;
    interface {
        l2tp-interface-id name;
        (dedicated | shared);
    }
    dialer-options {
        activation-delay seconds;
        callback;
        callback-wait-period time;
        deactivation-delay seconds;
        dial-string [ dial-string-numbers ];
        idle-timeout seconds;
    }
  }

```

```

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

```

```

output-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-restart-timer milliseconds;
  pap {
    access-profile name;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
pppoe-underlying-options {
  access-concentrator name;
  dynamic-profile profile-name;
  max-sessions number;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
  queue-length number;
}
short-sequence;
targeted-distribution;

```

```
transmit-weight number;  
(traps | no-traps);  
trunk-bandwidth rate;  
trunk-id number;  
tunnel {  
    backup-destination address;  
    destination address;  
    key number;  
    routing-instance {  
        destination routing-instance-name;  
    }  
    source source-address;  
    ttl number;  
}  
vci vpi-identifier.vci-identifier;  
vci-range start start-vci end end-vci;  
vpi vpi-identifier;  
vlan-id number;  
vlan-id-range number-number;  
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;  
family family {  
    accounting {  
        destination-class-usage;  
        source-class-usage {  
            (input | output | input output);  
        }  
    }  
    access-concentrator name;  
    address address {  
        ... the address subhierarchy appears after the main [edit interfaces interface-name unit  
            logical-unit-number family family-name] hierarchy ...  
    }  
    bridge-domain-type (bvlan | svlan);  
    bundle interface-name;  
    core-facing;  
    demux-destination {  
        destination-prefix;  
    }  
    demux-source {  
        source-prefix;  
    }  
    duplicate-protection;  
    dynamic-profile profile-name;  
    filter {  
        group filter-group-number;  
        input filter-name;  
        input-list [ filter-names ];  
        output filter-name;  
        output-list [ filter-names ];  
    }  
    interface-mode (access | trunk);  
    ipsec-sa sa-name;  
    isid-list all-service-groups;  
    keep-address-and-control;  
    mac-validate (loose | strict);  
    max-sessions number;
```

```

mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
protocols [inet iso mpls];
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name
    mode loose;
}
sampling {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address {
        dlci dlci-identifier;
        epd-threshold cells <plp1 cells>;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (disable | seconds);
        shaping {

```

```

        (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
         sustained rate);
        queue-length number;
    }
    vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
        hold-time seconds;
    }
    priority number;
    track {
        interface interface-name {
            bandwidth-threshold bits-per-second priority-cost number;
        }
        priority-hold-time seconds;
        route ip-address/prefix-length routing-instance instance-name priority-cost cost;
    }
    virtual-address [ addresses ];
    virtual-link-local-address ipv6-address;
    vrrp-inherit-from {
        active-interface interface-name;
        active-group group-number;
    }
}
}
}
}

```

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

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

**Options** *logical-unit-number*—Number of the logical unit.

**Range:** 0 through 1,073,741,823 for demux and PPPoE static interfaces only. 0 through 16,385 for all other static interface types.

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.

- |                              |   |
|------------------------------|---|
| <b>Related Documentation</b> | <ul style="list-style-type: none"> <li>Configuring Logical Interface Properties</li> <li>Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers</li> <li>Junos Services Interfaces Configuration Release 12.3</li> </ul> |
|------------------------------|---|

## vlan-id (VLAN ID to Rewrite)

<b>Syntax</b>	<code>vlan-id number;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>input-vlan-map</b>],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>input-vlan-map</b>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b>]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2, 10-Gigabit Ethernet LAN/WAN PIC, and IQ2-E interfaces and aggregated Ethernet using Gigabit Ethernet IQ interfaces, specify the line VLAN identifiers to be rewritten at the input or output interface.</p> <p>You cannot include the <b>vlan-id</b> statement with the <b>swap</b> statement, <b>swap-push</b> statement, <b>push-push</b> statement, or <b>push-swap</b> statement at the <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>output-vlan-map</b>]</code> hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the <b>vlan-id</b> statement that you include at the <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code> hierarchy level.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Rewriting the VLAN Tag on Tagged Frames</li> <li>Binding VLAN IDs to Logical Interfaces</li> </ul>

## vlan-tagging

---

<b>Syntax</b>	vlan-tagging;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> ]
<b>Release Information</b>	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.
<b>Description</b>	For Fast Ethernet and Gigabit Ethernet interfaces, aggregated Ethernet interfaces configured for VPLS, and pseudowire subscriber interfaces, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch</li><li>• Example: Configuring BGP Autodiscovery for LDP VPLS</li><li>• Configuring a Layer 3 Subinterface (CLI Procedure)</li><li>• Configuring Tagged Aggregated Ethernet Interfaces</li><li>• Configuring Interfaces for VPLS Routing</li><li>• Enabling VLAN Tagging</li><li>• 802.1Q VLANs Overview</li><li>• vlan-id</li></ul>



## vlan-tags (Stacked VLAN Tags)

<b>Syntax</b>	<code>vlan-tags inner <i>tpid.vlan-id</i> inner-range <i>vid1—vid2</i> outer <i>tpid.vlan-id</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Switches.
<b>Description</b>	For Gigabit Ethernet IQ and IQE interfaces only, bind TPIDs and 802.1Q VLAN tag IDs to a logical interface.



**NOTE:** The inner-range *vid1—vid2* option is supported on MX Series with IQE PICs only.

<b>Options</b>	<p><b>inner <i>tpid.vlan-id</i></b>—A TPID and a valid VLAN identifier.</p> <p><b>Range:</b> (most routers) For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.</p> <p><b>Range:</b> (PTX Series) For VLAN ID, 0 through 4094.</p> <p><b>inner-range <i>vid1—vid2</i></b>—For MX Series routers with Enhanced IQ (IQE) PICs only; specify a range of VLAN IDs where <i>vid1</i> is the start of the range and <i>vid2</i> is the end of the range.</p> <p><b>Range:</b> For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.</p> <p><b>outer <i>tpid.vlan-id</i></b>—A TPID and a valid VLAN identifier.</p> <p><b>Range:</b> (most routers) For VLAN ID, 1 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces. VLAN ID 0 is reserved for tagging the priority of frames.</p> <p><b>Range:</b> (PTX Series) For VLAN ID, 0 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces.</p>
----------------	---



**NOTE:** Configuring inner-range with the entire *vlan-id* range consumes system resources and is not a best practice. It should be used only when a subset of VLAN IDs of inner tag (not the entire range) needs to be associated with a logical interface. If you specify the entire range (1–4094), it has the same result as not specifying a range; however, it consumes Packet Forwarding Engine resources such as VLAN lookup table entries, and so on.

The following examples illustrate this further:

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

```
stacked-vlan-tagging;  
unit number {  
    vlan-tags outer vid inner-range 1-4094;  
}  
  
[edit interfaces interface-name]  
vlan-tagging;  
unit number {  
    vlan-id vid;  
}
```

---

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

<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Dual VLAN Tags</a></li><li>• <a href="#">Configuring Flexible VLAN Tagging on PTX Series Packet Transport Switches</a></li><li>• <a href="#">stacked-vlan-tagging</a></li></ul>
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## wavelength

<b>Syntax</b>	<code>wavelength <i>nm</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> <b>optics-options</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for EX Series switches.
<b>Description</b>	For 10-Gigabit Ethernet DWDM interfaces only, configure full C-band ITU-Grid tunable optics.
<b>Options</b>	<p><i>nm</i>—Wavelength value. It can be one of the following:</p> <ul style="list-style-type: none"> <li>• <b>1528.77</b>—1528.77 nanometers (nm), corresponds to 50 GHz through 100 GHz</li> <li>• <b>1529.16</b>—1529.16 nm, corresponds to 50 GHz</li> <li>• <b>1529.55</b>—1529.55 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1529.94</b>—1529.94 nm, corresponds to 50 GHz</li> <li>• <b>1530.33</b>—1530.33 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1530.72</b>—1530.72 nm, corresponds to 50 GHz</li> <li>• <b>1531.12</b>—1531.12 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1531.51</b>—1531.51 nm, corresponds to 50 GHz</li> <li>• <b>1531.90</b>—1531.90 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1532.29</b>—1532.29 nm, corresponds to 50 GHz</li> <li>• <b>1532.68</b>—1532.68 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1533.07</b>—1533.07 nm, corresponds to 50 GHz</li> <li>• <b>1533.47</b>—1533.47 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1533.86</b>—1533.86 nm, corresponds to 50 GHz</li> <li>• <b>1534.25</b>—1534.25 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1534.64</b>—1534.64 nm, corresponds to 50 GHz</li> <li>• <b>1535.04</b>—1535.04 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1535.43</b>—1535.43 nm, corresponds to 50 GHz</li> <li>• <b>1535.82</b>—1535.82 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1536.22</b>—1536.22 nm, corresponds to 50 GHz</li> <li>• <b>1536.61</b>—1536.61 nm, corresponds to 50 GHz through 100 GHz</li> <li>• <b>1537.00</b>—1537.00 nm, corresponds to 50 GHz</li> <li>• <b>1537.40</b>—1537.40 nm, corresponds to 50 GHz through 100 GHz</li> </ul>

- **1537.79**—1537.79 nm, corresponds to 50 GHz
- **1538.19**—1538.19 nm, corresponds to 50 GHz through 100 GHz
- **1538.58**—1538.58 nm, corresponds to 50 GHz
- **1538.98**—1538.98 nm, corresponds to 50 GHz through 100 GHz
- **1539.37**—1539.37 nm, corresponds to 50 GHz
- **1539.77**—1539.77 nm, corresponds to 50 GHz through 100 GHz
- **1540.16**—1540.16 nm, corresponds to 50 GHz
- **1540.56**—1540.56 nm, corresponds to 50 GHz through 100 GHz
- **1540.95**—1540.95 nm, corresponds to 50 GHz
- **1541.35**—1541.35 nm, corresponds to 50 GHz through 100 GHz
- **1541.75**—1541.75 nm, corresponds to 50 GHz
- **1542.14**—1542.14 nm, corresponds to 50 GHz through 100 GHz
- **1542.54**—1542.54 nm, corresponds to 50 GHz
- **1542.94**—1542.94 nm, corresponds to 50 GHz through 100 GHz
- **1543.33**—1543.33 nm, corresponds to 50 GHz
- **1543.73**—1543.73 nm, corresponds to 50 to 100 GHz
- **1544.13**—1544.13 nm, corresponds to 50 GHz
- **1544.53**—1544.53 nm, corresponds to 50 GHz through 100 GHz
- **1544.92**—1544.92 nm, corresponds to 50 GHz
- **1545.32**—1545.32 nm, corresponds to 50 GHz through 100 GHz
- **1545.72**—1545.72 nm, corresponds to 50 GHz
- **1546.12**—1546.12 nm, corresponds to 50 GHz through 100 GHz
- **1546.52**—1546.52 nm, corresponds to 50 GHz
- **1546.92**—1546.92 nm, corresponds to 50 GHz through 100 GHz
- **1547.32**—1547.32 nm, corresponds to 50 GHz
- **1547.72**—1547.72 nm, corresponds to 50 GHz through 100 GHz
- **1548.11**—1548.11 nm, corresponds to 50 GHz
- **1548.51**—1548.51 nm, corresponds to 50 GHz through 100 GHz
- **1548.91**—1548.91 nm, corresponds to 50 GHz
- **1549.32**—1549.32 nm, corresponds to 50 GHz through 100 GHz
- **1549.72**—1549.72 nm, corresponds to 50 GHz
- **1550.12**—1550.12 nm, corresponds to 50 GHz through 100 GHz
- **1550.52**—1550.52 nm, corresponds to 50 GHz

- **1550.92**—1550.92 nm, corresponds to 50 GHz through 100 GHz
- **1551.32**—1551.32 nm, corresponds to 50 GHz
- **1551.72**—1551.72 nm, corresponds to 50 GHz through 100 GHz
- **1552.12**—1552.12 nm, corresponds to 50 GHz
- **1552.52**—1552.52 nm, corresponds to 50 GHz through 100 GHz
- **1552.93**—1552.93 nm, corresponds to 50 GHz
- **1553.33**—1554.33 nm, corresponds to 50 GHz through 100 GHz
- **1553.73**—1554.73 nm, corresponds to 50 GHz
- **1554.13**—1554.13 nm, corresponds to 50 GHz through 100 GHz
- **1554.54**—1554.54 nm, corresponds to 50 GHz
- **1554.94**—1554.94 nm, corresponds to 50 GHz through 100 GHz
- **1555.34**—1555.34 nm, corresponds to 50 GHz
- **1555.75**—1555.75 nm, corresponds to 50 GHz through 100 GHz
- **1556.15**—1556.15 nm, corresponds to 50 GHz
- **1556.55**—1556.55 nm, corresponds to 50 GHz through 100 GHz
- **1556.96**—1556.96 nm, corresponds to 50 GHz
- **1557.36**—1557.36 nm, corresponds to 50 GHz through 100 GHz
- **1557.77**—1557.77 nm, corresponds to 50 GHz
- **1558.17**—1558.17 nm, corresponds to 50 GHz through 100 GHz
- **1558.58**—1558.58 nm, corresponds to 50 GHz
- **1558.98**—1558.98 nm, corresponds to 50 GHz through 100 GHz
- **1559.39**—1559.39 nm, corresponds to 50 GHz
- **1559.79**—1559.79 nm, corresponds to 50 GHz through 100 GHz
- **1560.20**—1560.20 nm, corresponds to 50 GHz
- **1560.61**—1560.61 nm, corresponds to 50 to 100 GHz
- **1561.01**—1561.01 nm, corresponds to 50 GHz
- **1561.42**—1561.42 nm, corresponds to 50 GHz through 100 GHz
- **1561.83**—1561.83 nm, corresponds to 50 GHz
- **1562.23**—1562.23 nm, corresponds to 50 GHz through 100 GHz
- **1562.64**—1562.64 nm, corresponds to 50 GHz
- **1563.05**—1563.05 nm, corresponds to 50 GHz through 100 GHz
- **1563.45**—1563.45 nm, corresponds to 50 GHz

- **1563.86**—1563.86 nm, corresponds to 50 GHz through 100 GHz
- **Default: 1550.12**—1550.12 nm, corresponds to 50 GHz through 100 GHz

<b>Required Privilege</b>	interface—To view this statement in the configuration.
<b>Level</b>	interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• 10-Gigabit Ethernet DWDM Interface Wavelength Overview</li> </ul>

## PART 3

# Administration

- [Monitoring Commands on page 127](#)
- [Command Summary on page 309](#)





## CHAPTER 5

# Monitoring Commands

## show interfaces (Aggregated Ethernet)

<b>Syntax</b>	<pre>show interfaces ae <i>number</i> &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p>
<b>Description</b>	(M Series, T Series, and MX Series routers and EX Series switches) Display status information about the specified aggregated Fast Ethernet or Gigabit Ethernet interface.
<b>Options</b>	<p><b>ae <i>number</i></b>—Display standard information about the specified aggregated Fast Ethernet or Gigabit Ethernet interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information about the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<p><a href="#">show interfaces (Aggregated Ethernet) on page 133</a></p> <p><a href="#">show interfaces brief (Aggregated Ethernet) on page 133</a></p> <p><a href="#">show interfaces detail (Aggregated Ethernet) on page 133</a></p> <p><a href="#">show interfaces extensive (Aggregated Ethernet) on page 134</a></p> <p><a href="#">show interfaces extensive (Aggregated Ethernet with VLAN Stacking) on page 135</a></p>
<b>Output Fields</b>	Table 3 on page 128 lists the output fields for the <b>show interfaces</b> (Aggregated Ethernet) command. Output fields are listed in the approximate order in which they appear.

Table 3: show interfaces (Aggregated Ethernet) Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
<b>Physical interface</b>	Name of the physical interface and state of the interface.	All levels
<b>Enabled</b>	State of the physical interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
<b>Interface index</b>	Index number of the physical interface, which reflects its initialization sequence.	All levels

Table 3: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	Maximum transmission unit size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Loopback status: <b>Enabled</b> or <b>Disabled</b> . If loopback is enabled, type of loopback: <b>Local</b> or <b>Remote</b> .	All levels
Source filtering	Source filtering status: <b>Enabled</b> or <b>Disabled</b> .	All levels
Flow control	Flow control status: <b>Enabled</b> or <b>Disabled</b> .	All levels
Minimum links needed	Number of child links that must be operational for the aggregate interface to be operational.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interfaces Flags" section under Common Output Fields Description.	All levels
Current address	Configured MAC address.	detail extensive
Hardware address	Hardware MAC address.	detail extensive
Last flapped	Date, time, and how long ago the interface went from down to up or from up to down. The format is <b>Last flapped: year-month-day hours:minutes:seconds timezone (hours:minutes:seconds ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	detail extensive
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive

Table 3: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number of and rate at which bytes and packets are received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes and rate, in bps, at which bytes are received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes and rate, in bps, at which bytes are transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets and rate, in pps, at which packets are received on the interface.</li> <li>• <b>Output packets</b>—Number of packets and rate, in pps, at which packets are transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<p>Input errors on the interface:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of incoming frame aborts and frame check sequence (FCS) errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid FCS.</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that Junos OS does not handle.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>detail extensive</b>
<b>Output errors</b>	<p>Output errors on the interface:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b> —Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the PIC is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	<p>Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>

Table 3: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Queue counters</b>	CoS queue number and its associated user-configured forwarding class name. <ul style="list-style-type: none"> <li><b>Queued packets</b>—Number of queued packets.</li> <li><b>Transmitted packets</b>—Number of transmitted packets.</li> <li><b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>detail extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface (which reflects its initialization sequence).	<b>detail extensive</b> none
<b>SNMP ifIndex</b>	SNMP interface index number of the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the “Logical Interface Flags Field” section under Common Output Fields Description.	All levels
<b>VLAN-Tag</b>	Tag Protocol Identifier (TPID) and VLAN identifier.	All levels
<b>Demux</b>	IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following: <ul style="list-style-type: none"> <li><b>Source Family Inet</b></li> <li><b>Destination Family Inet</b></li> </ul>	<b>detail extensive</b> none
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels
<b>Statistics</b>	Information about the number of packets, packets per second, number of bytes, and bytes per second on this aggregate interface. <ul style="list-style-type: none"> <li><b>Bundle</b>—Information about input and output bundle rates.</li> <li><b>Link</b>—(<b>detail</b> and <b>extensive</b> only) Information about specific links in the aggregate, including link state and input and output rates.</li> <li><b>Marker Statistics</b>—(<b>detail</b> and <b>extensive</b> only) Information about 802.3ad marker protocol statistics on the specified links. <ul style="list-style-type: none"> <li><b>Marker Rx</b>—Number of valid marker protocol data units (PDUs) received on this aggregation port.</li> <li><b>Resp Tx</b>—Number of marker response PDUs transmitted on this aggregation port.</li> <li><b>Unknown Rx</b>—Number of frames received that either carry the slow protocols Ethernet type value (43B.4) but contain an unknown PDU, or are addressed to the slow protocols group MAC address (43B.3) but do not carry the slow protocols Ethernet type.</li> <li><b>Illegal Rx</b>—Number of frames received that carry the slow protocols Ethernet type value (43B.4) but contain a badly formed PDU or an illegal value of protocol subtype (43B.4).</li> </ul> </li> </ul>	<b>detail extensive</b> none
<b>protocol-family</b>	Protocol family configured on the logical interface. Possible values are described in the “Protocol Field” section under Common Output Fields Description.	<b>brief</b>

Table 3: show interfaces (Aggregated Ethernet) Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Protocol</b>	Protocol family configured on the logical interface. Possible values are described in the "Protocol Field" section under Common Output Fields Description.	<b>detail extensive</b> none
<b>MTU</b>	Maximum transmission unit size on the logical interface.	<b>detail extensive</b> none
<b>Maximum labels</b>	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route Table</b>	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	<b>detail extensive</b>
<b>Flags</b>	Information about protocol family flags. Possible values are described in the "Family Flags Field" section under Common Output Fields Description.	<b>detail extensive</b> none
<b>Mac-Validate Failures</b>	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	<b>detail extensive</b> none
<b>Addresses, Flags</b>	Information about address flags. Possible values are described in the "Addresses Flags" section under Common Output Fields Description.	<b>detail extensive</b> none
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive</b> none
<b>Local</b>	IP address of the logical interface.	<b>detail extensive</b> none
<b>Broadcast</b>	Broadcast address of the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

## Sample Output

### show interfaces (Aggregated Ethernet)

```

user@host> show interfaces ae0
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 59
  Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps 16384
  Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0
  Last flapped   : Never
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)

Logical interface ae0.0 (Index 72) (SNMP ifIndex 60)
  Flags: SNMP-Traps 16384 Encapsulation: ENET2
  Statistics
  Bundle:
    Input :          0          0          0          0
    Output:          0          0          0          0
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.100.1/24, Local: 10.100.1.2, Broadcast: 10.100.1.255

```

### show interfaces brief (Aggregated Ethernet)

```

user@host> show interfaces ae0 brief
Physical interface: ae0, Enabled, Physical link is Up
  Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps 16384

Logical interface ae0.0
  Flags: SNMP-Traps 16384 Encapsulation: ENET2
  inet 10.100.1.2/24

```

### show interfaces detail (Aggregated Ethernet)

```

user@host> show interfaces ae0 detail
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 59, Generation: 36
  Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps 16384
  Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes :          0          0 bps
    Output bytes:          0          0 bps
    Input packets:          0          0 pps
    Output packets:          0          0 pps
  Queue counters:
    Queued packets  Transmitted packets  Dropped packets

    0 best-effort          7375          7375          0
    1 expedited-fo          0          0          0
    2 assured-forw          0          0          0

```

3 network-cont	2268	2268	0
----------------	------	------	---

Logical interface ae0.0 (Index 72) (SNMP ifIndex 60) (Generation 18)

Flags: SNMP-Traps 16384 Encapsulation: ENET2

Statistics	Packets	pps	Bytes	bps
------------	---------	-----	-------	-----

Bundle:

Input :	0	0	0	0
---------	---	---	---	---

Output:	0	0	0	0
---------	---	---	---	---

Link:

fe-0/1/0.0

Input :	0	0	0	0
---------	---	---	---	---

Output:	0	0	0	0
---------	---	---	---	---

fe-0/1/2.0

Input :	0	0	0	0
---------	---	---	---	---

Output:	0	0	0	0
---------	---	---	---	---

fe-0/1/3.0

Input :	0	0	0	0
---------	---	---	---	---

Output:	0	0	0	0
---------	---	---	---	---

Marker Statistics:	Marker Rx	Resp Tx	Unknown Rx	Illegal Rx
--------------------	-----------	---------	------------	------------

fe-0/1/0.0	0	0	0	0
------------	---	---	---	---

fe-0/1/2.0	0	0	0	0
------------	---	---	---	---

fe-0/1/3.0	0	0	0	0
------------	---	---	---	---

Protocol inet, MTU: 1500, Generation: 37, Route table: 0

Flags: Is-Primary, Mac-Validate-Strict

Mac-Validate Failures: Packets: 0, Bytes: 0

Destination: 10.100.1/24, Local: 10.100.1.2, Broadcast: 10.100.1.255,

Generation: 49

### show interfaces extensive (Aggregated Ethernet)

user@host> show interfaces ae0 extensive

Physical interface: ae0, Enabled, Physical link is Up

Interface index: 153, SNMP ifIndex: 59, Generation: 36

Link-level type: Ethernet, MTU: 1514, Speed: 300mbps, Loopback: Disabled,

Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1

Device flags : Present Running

Interface flags: SNMP-Traps 16384

Current address: 00:05:85:8b:bf:f0, Hardware address: 00:05:85:8b:bf:f0

Last flapped : Never

Statistics last cleared: Never

Traffic statistics:

Input bytes :	60	0 bps
---------------	----	-------

Output bytes :	0	0 bps
----------------	---	-------

Input packets:	1	0 pps
----------------	---	-------

Output packets:	0	0 pps
-----------------	---	-------

Input errors:

Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,

Policed discards: 0, Resource errors: 0

Output errors:

Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,

Resource errors: 0

Queue counters:	Queued packets	Transmitted packets	Dropped packets
-----------------	----------------	---------------------	-----------------

0 best-effort	7375	7375	0
---------------	------	------	---

1 expedited-fo	0	0	0
----------------	---	---	---

2 assured-forw	0	0	0
----------------	---	---	---

3 network-cont	2268	2268	0
----------------	------	------	---



```

Logical interface ae0.0 (Index 72) (SNMP ifIndex 60) (Generation 18)
Flags: SNMP-Traps 16384 Encapsulation: ENET2
Statistics
Bundle:
  Packets      pps      Bytes      bps
  Input :      1        0         60         0
  Output:      0        0          0         0
Link:
  fe-0/1/0.0
    Input :      0        0          0         0
    Output:      0        0          0         0
  fe-0/1/2.0
    Input :      0        0          0         0
    Output:      0        0          0         0
  fe-0/1/3.0
    Input :      1        0         60         0
    Output:      0        0          0         0
Marker Statistics:
  Marker Rx    Resp Tx    Unknown Rx  Illegal Rx
  fe-0/1/0.0      0          0          0          0
  fe-0/1/2.0      0          0          0          0
  fe-0/1/3.0      0          0          0          0
Protocol inet, MTU: 1500, Generation: 37, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.100.1/24, Local: 10.100.1.2, Broadcast: 10.100.1.255,
  Generation: 49

```

show interfaces  
extensive (Aggregated

```

user@host> show interfaces ae0 extensive
Physical interface: ae0, Enabled, Physical link is Up
Interface index: 155, SNMP ifIndex: 48, Generation: 186

```

Ethernet with VLAN  
Stacking)

```

Link-level type: 52, MTU: 1518, Speed: 2000mbps, Loopback: Disabled, Source
filtering: Disabled,
Flow control: Disabled, Minimum links needed: 1, Minimum bandwidth needed: 0
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Current address: 00:12:1e:19:3f:f0, Hardware address: 00:12:1e:19:3f:f0
Last flapped   : Never
Statistics last cleared: Never
Traffic statistics:
Input bytes :          2406875          40152 bps
Output bytes :        1124470          22056 bps
Input packets:           5307           5 pps
Output packets:         13295          21 pps
IPv6 transit statistics:
Input bytes :           0
Output bytes :           0
Input packets:           0
Output packets:          0
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
0, Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0
Ingress queues: 4 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort              0              859777              0
  1 expedited-fo             0              0              0
  2 assured-forw             0              0              0
  3 network-cont             0              0              0

Egress queues: 4 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort              0          1897615              0
  1 expedited-fo             0              0              0
  2 assured-forw             0              0              0
  3 network-cont             0          662505              0

Logical interface ae0.451 (Index 69) (SNMP ifIndex 167) (Generation 601)
Flags: SNMP-Traps VLAN-Tag [ 0x8100.451 ] Encapsulation: VLAN-VPLS
Statistics      Packets      pps      Bytes      bps
Bundle:
  Input :          289          0      25685      376
  Output:         1698          4     130375     3096
Link:
  ge-1/2/0.451
    Input :          289          0      25685      376
    Output:           0          0           0           0
  ge-1/2/1.451
    Input :           0          0           0           0
    Output:         1698          4     130375     3096
Marker Statistics:  Marker Rx      Resp Tx      Unknown Rx      Illegal Rx

```

```

ge-1/2/0.451          0          0          0          0
ge-1/2/1.451          0          0          0          0
Protocol vpls, MTU: 1518, Generation: 849, Route table: 3
Flags: Is-Primary

```

Logical interface ae0.452 (Index 70) (SNMP ifIndex 170) (Generation 602)

Flags: SNMP-Traps VLAN-Tag [ 0x8100.452 ] Encapsulation: VLAN-VPLS

Statistics	Packets	pps	Bytes	bps
------------	---------	-----	-------	-----

Bundle:

Input :	293	1	26003	1072
Output:	1694	3	130057	2400

Link:

ge-1/2/0.452				
Input :	293	1	26003	1072
Output:	1694	3	130057	2400

ge-1/2/1.452				
Input :	0	0	0	0
Output:	0	0	0	0

Marker Statistics:	Marker Rx	Resp Tx	Unknown Rx	Illegal Rx
ge-1/2/0.452	0	0	0	0
ge-1/2/1.452	0	0	0	0

Protocol vpls, MTU: 1518, Generation: 850, Route table: 3

Flags: None

...

## show interfaces demux0 (Demux Interfaces)

<b>Syntax</b>	<pre>show interfaces demux0 <i>logical-interface-number</i> &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0.
<b>Description</b>	(MX Series and M Series routers only) Display status information about the specified demux interface.
<b>Options</b>	<p><b>none</b>—Display standard information about the specified demux interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information about network interfaces.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration</li> </ul>
<b>List of Sample Output</b>	<a href="#">show interfaces (Demux) on page 145</a> <a href="#">show interfaces (PPPoE over Aggregated Ethernet) on page 146</a> <a href="#">show interfaces extensive (Targeted Distribution for Aggregated Ethernet Links) on page 146</a> <a href="#">show interfaces demux0 (ACI Interface Set Configured) on page 147</a>
<b>Output Fields</b>	Table 4 on page 138 lists the output fields for the <b>show interfaces</b> (demux interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 4: Demux show interfaces Output Fields

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Physical interface</b>	Name of the physical interface.	brief detail extensive none
<b>Interface index</b>	Index number of the physical interface, which reflects its initialization sequence.	brief detail extensive none

Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	<b>brief detail extensive none</b>
<b>Physical link</b>	Status of the physical link ( <b>Up</b> or <b>Down</b> ).	<b>detail extensive none</b>
<b>Admin</b>	Administrative state of the interface ( <b>Up</b> or <b>Down</b> ).	<b>terse</b>
<b>Interface index</b>	Index number of the physical interface, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>Link</b>	Status of the physical link ( <b>Up</b> or <b>Down</b> ).	<b>terse</b>
<b>Targeting summary</b>	Status of aggregated Ethernet links that are configured with targeted distribution ( <b>primary</b> or <b>backup</b> )	<b>extensive</b>
<b>Bandwidth</b>	Bandwidth allocated to the aggregated Ethernet links that are configured with targeted distribution.	<b>extensive</b>
<b>Proto</b>	Protocol family configured on the interface.	<b>terse</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Type</b>	Type of interface. <b>Software-Pseudo</b> indicates a standard software interface with no associated hardware device.	<b>brief detail extensive none</b>
<b>Link-level type</b>	Encapsulation being used on the physical interface.	<b>brief detail extensive</b>
<b>MTU</b>	Maximum transmission unit size on the physical interface.	<b>brief detail extensive</b>
<b>Clocking</b>	Reference clock source: <b>Internal</b> (1) or <b>External</b> (2).	<b>brief detail extensive</b>
<b>Speed</b>	Speed at which the interface is running.	<b>brief detail extensive</b>
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under Common Output Fields Description.	<b>brief detail extensive none</b>
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Interface Flags” section under Common Output Fields Description.	<b>brief detail extensive none</b>
<b>Link type</b>	Data transmission type.	<b>detail extensive none</b>
<b>Link flags</b>	Information about the link. Possible values are described in the “Link Flags” section under Common Output Fields Description.	<b>detail extensive none</b>
<b>Physical info</b>	Information about the physical interface.	<b>detail extensive</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down, in milliseconds.	<b>detail extensive</b>

Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Current address	Configured MAC address.	detail extensive
Hardware address	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 <b>Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	detail extensive none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> <li>• <b>IPv6 transit statistics</b>—Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</li> </ul> <p><b>NOTE:</b> These fields include dropped traffic and exception traffic, as those fields are not separately defined.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	detail extensive
Input errors	<p>Input errors on the interface whose definitions are as follows:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant packet threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	extensive
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	none

Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Output errors</b>	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output Rate</b>	Output rate in bps and pps.	none
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	<b>brief detail extensive</b> none
<b>Index</b>	Index number of the logical interface, which reflects its initialization sequence.	<b>detail extensive</b> none
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under Common Output Fields Description.	<b>brief detail extensive</b> none
<b>Encapsulation</b>	Encapsulation on the logical interface.	<b>brief extensive</b> none
<b>ACI VLAN: Dynamic Profile</b>	Name of the dynamic profile that defines the agent circuit identifier (ACI) interface set. If configured, the ACI interface set enables the underlying demux interface to create dynamic VLAN subscriber interfaces based on ACI information.	<b>brief detail extensive</b> none
<b>Demux</b>	Specific IP demultiplexing (demux) values: <ul style="list-style-type: none"> <li>• <b>Underlying interface</b>—The underlying interface that the demux interface uses.</li> <li>• <b>Index</b>—Index number of the logical interface.</li> <li>• <b>Family</b>—Protocol family configured on the logical interface.</li> <li>• <b>Source prefixes, total</b>—Total number of source prefixes for the underlying interface.</li> <li>• <b>Destination prefixes, total</b>—Total number of destination prefixes for the underlying interface.</li> <li>• <b>Prefix—in</b>et family prefix.</li> </ul>	<b>detail extensive</b> none

Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<i>protocol-family</i>	Protocol family configured on the logical interface.	<b>brief</b>
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the specified interface set.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes, Output bytes</b>—Number of bytes received and transmitted on the interface set.</li> <li>• <b>Input packets, Output packets</b>—Number of packets received and transmitted on the interface set.</li> <li>• <b>IPv6 transit statistics</b>—Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.</li> </ul> <p><b>NOTE:</b> The packet and byte counts in these fields include traffic that is dropped and does not leave the router.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Local statistics</b>	<p>Number of transit bytes and packets received and transmitted on the local interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Transit statistics</b>	<p>Number and rate of bytes and packets transiting the switch.</p> <p><b>NOTE:</b> The packet and byte counts in these fields include traffic that is dropped and does not leave the router.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>IPv6 Transit statistics</b>	<p>Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.</p> <p><b>NOTE:</b> The packet and byte counts in these fields include traffic that is dropped and does not leave the router.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input packets</b>	Number of packets received on the interface.	none



Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Output packets</b>	Number of packets transmitted on the interface.	none
<b>Protocol</b>	Protocol family. Possible values are described in the “Protocol Field” section under Common Output Fields Description.	detail extensive none
<b>MTU</b>	Maximum transmission unit size on the logical interface.	detail extensive none
<b>Maximum labels</b>	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	detail extensive none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	detail extensive
<b>Route table</b>	Route table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	detail extensive
<b>Flags</b>	Information about protocol family flags. Possible values are described in the “Family Flags” section under Common Output Fields Description.	detail extensive none
<b>Mac-Validate Failures</b>	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	detail extensive none
<b>Addresses, Flags</b>	Information about the address flags. Possible values are described in the “Addresses Flags” section under Common Output Fields Description.	detail extensive none
<b>Destination</b>	IP address of the remote side of the connection.	detail extensive statistics none
<b>Local</b>	IP address of the logical interface.	detail extensive terse none
<b>Remote</b>	IP address of the remote interface.	terse
<b>Broadcast</b>	Broadcast address of the logical interface.	detail extensive none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	detail extensive
<b>Link</b>	Name of the physical interfaces for member links in an aggregated Ethernet bundle for a PPPoE over aggregated Ethernet configuration. PPPoE traffic goes out on these interfaces.	detail extensive none
<b>Dynamic-profile</b>	Name of the PPPoE dynamic profile assigned to the underlying interface.	detail extensive none
<b>Service Name Table</b>	Name of the PPPoE service name table assigned to the PPPoE underlying interface.	detail extensive none
<b>Max Sessions</b>	Maximum number of dynamic PPPoE logical interfaces that the router can activate on the underlying interface.	detail extensive none

Table 4: Demux show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Duplicate Protection</b>	State of duplicate protection: <b>On</b> or <b>Off</b> . Duplicate protection prevents the activation of another dynamic PPPoE logical interface on the same underlying interface when a dynamic PPPoE logical interface for a client with the same MAC address is already active on that interface.	<b>detail extensive none</b>
<b>AC Name</b>	Name of the access concentrator.	<b>detail extensive none</b>

## Sample Output

### show interfaces (Demux)

```

user@host> show interfaces demux0
Physical interface: demux0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 79, Generation: 129
  Type: Software-Pseudo, Link-level type: Unspecified, MTU: 9192, Clocking: 1,
  Speed: Unspecified
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link type      : Full-Duplex
  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                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, 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 demux0.0 (Index 87) (SNMP ifIndex 84) (Generation 312)
  Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
  Demux:
    Underlying interface: ge-2/0/1.0 (Index 74)
    Family Inet Source prefixes, total 1
    Prefix: 1.1.1/24
    Traffic statistics:
      Input bytes   :                0
      Output bytes  :             1554
      Input packets :                0
      Output packets:             37
    IPv6 transit statistics:
      Input bytes   :                0
      Output bytes  :                0
      Input packets :                0
      Output packets:                0
    Local statistics:
      Input bytes   :                0
      Output bytes  :             1554
      Input packets :                0
      Output packets:             37
    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: 395, Route table: 0
  Flags: Is-Primary, Mac-Validate-Strict
  Mac-Validate Failures: Packets: 0, Bytes: 0
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 11.1.1/24, Local: 11.1.1.1, Broadcast: 11.1.1.255,
    Generation: 434
```

**show interfaces**  
**(PPPoE over**  
**Aggregated Ethernet)**

```
user@host> show interfaces demux0.100
Logical interface demux0.100 (Index 76) (SNMP ifIndex 61160)
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]
  Encapsulation: ENET2
  Demux:
    Underlying interface: ae0 (Index 199)
  Link:
    ge-1/0/0
    ge-1/1/0
  Input packets : 0
  Output packets: 0
  Protocol pppoe
    Dynamic Profile: pppoe-profile,
    Service Name Table: service-table1,
    Max Sessions: 100, Duplicate Protection: On,
    AC Name: pppoe-server-1
```

**show interfaces**  
**extensive (Targeted**  
**Distribution for**

```
user@host> show interfaces demux0.1073741824 extensive

Logical interface demux0.1073741824 (Index 75) (SNMP ifIndex 558) (Generation
346)
```


### Aggregated Ethernet Links)

```
Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ] Encapsulation: ENET2
Demux:
  Underlying interface: ae0 (Index 201)
Link:
  ge-1/0/0
  ge-1/1/0
  ge-2/0/7
  ge-2/0/8
Targeting summary:
  ge-1/1/0, primary, Physical link is Up
  ge-2/0/8, backup, Physical link is Up
Bandwidth: 1000mbps
```

### show interfaces demux0 (ACI Interface Set Configured)

```
user@host> show interfaces demux0.1073741827
Logical interface demux0.1073741827 (Index 346) (SNMP ifIndex 527)
Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1802 0x8100.302 ] Encapsulation:
ENET2
Demux: Source Family Inet
ACI VLAN:
  Dynamic Profile: aci-vlan-set-profile
Demux:
  Underlying interface: ge-1/0/0 (Index 138)
Input packets : 18
Output packets: 16
Protocol inet, MTU: 1500
  Flags: Sendbcst-pkt-to-re, Unnumbered
  Donor interface: lo0.0 (Index 322)
  Preferred source address: 100.20.200.202
  Addresses, Flags: Primary Is-Default Is-Primary
    Local: 10.4.12.119
Protocol 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
```

## show interfaces diagnostics optics (Gigabit Ethernet, 10-Gigabit Ethernet, and 100 Gigabit Ethernet)

<b>Syntax</b>	<code>show interfaces diagnostics optics <i>interface-name</i></code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(M120, M320, MX Series, T320, T640, and T1600 routers only) Display diagnostics data, warnings, and alarms for Gigabit Ethernet, 10-Gigabit Ethernet, and 100 Gigabit Ethernet interfaces.
<b>Options</b>	<i>interface-name</i> —Interface name: <i>ge-fpc/pic/port</i> or <i>xe-fpc/pic/port</i> .
<b>Additional Information</b>	<p>The transceivers are polled in 1-second intervals for diagnostics data, warnings, and alarms. The alarms do not cause the links to go down or the LEDs to change color, nor generate SNMP traps. Changes in alarm and warning status will generate system log messages.</p> <p>Thresholds that trigger a high alarm, low alarm, high warning, or low warning are set by the transceiver vendors. Generally, a high alarm or low alarm indicates that the optics module is not operating properly. This information can be used to diagnose why a device is not working.</p> <div style="margin-top: 20px;">  <p><b>NOTE:</b> Some transceivers do not support all optical diagnostics features described in the output fields.</p> <p>The <code>show interfaces diagnostics optics</code> command for optical interfaces does not report the decibel (dBm) value of the received signal if the received power is zero milliwatts (0.0000 mW).</p> </div>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces diagnostics optics (DWDM and DWDM OTN) on page 160</a> <a href="#">show interfaces diagnostics optics (Bidirectional SFP) on page 161</a> <a href="#">show interfaces diagnostics optics (SFP) on page 162</a> <a href="#">show interfaces diagnostics optics (SFP) on page 162</a> <a href="#">show interfaces diagnostics optics (XFP and CFP Optics) on page 163</a>
<b>Output Fields</b>	Table 5 on page 149 lists the output fields for the <code>show interfaces diagnostics optics</code> command for DWDM and DWDM OTN PICs. Output fields are listed in the approximate order in which they appear.

**Table 5: 10-Gigabit Ethernet DWDM and DWDM OTN PICs show interfaces diagnostics optics Output Fields**

Field Name	Field Description
Physical interface	Name of the physical interface.
Laser bias current	Magnitude of the laser bias power setting current, in milliamperes. The laser bias provides direct modulation of laser diodes and modulates currents.
Laser output power	Laser output power, in milliwatts (mW) and decibels, referenced to 1.0 mW (dBm). This is a software equivalent to the <b>LsPOWMON</b> pin in hardware.
Receiver signal average optical power	Average received optical power, in mW and dBm. This indicator is a software equivalent to the <b>RxPOWMON</b> pin in hardware. Average optical power is vendor-specific.
Laser end-of-life alarm	Laser end-of-life alarm: <b>On</b> or <b>Off</b> .
Laser wavelength alarm	Laser wavelength alarm: <b>On</b> or <b>Off</b> .
Laser bias current alarm	Laser bias current alarm: <b>On</b> or <b>Off</b> .
Laser temperature alarm	Laser temperature alarm: <b>On</b> or <b>Off</b> .
Laser power alarm	Laser power alarm: <b>On</b> or <b>Off</b> .
Modulator temperature alarm	Modulator temperature alarm: <b>On</b> or <b>Off</b> . Transceivers from some vendors do not support this field.
Modulator bias alarm	Modulator bias alarm: <b>On</b> or <b>Off</b> .
Tx multiplexer FIFO error alarm	Transmit multiplexer first in, first out (FIFO) error alarm: <b>On</b> or <b>Off</b> .
Tx loss of PLL lock alarm	Transmit loss of phase-locked loop (PLL) lock alarm: <b>On</b> or <b>Off</b> .
Rx loss of average optical power alarm	Receive loss of average optical power alarm: <b>On</b> or <b>Off</b> .
Rx loss of AC power alarm	Receive loss of AC power alarm: <b>On</b> or <b>Off</b> . Transceivers from some vendors do not support this field.
Rx loss of PLL lock alarm	Receive loss of phase-locked loop (PLL) lock alarm: <b>On</b> or <b>Off</b> .

Table 6 on page 150 lists the output fields for the **show interfaces diagnostics optics** command when the router is operating with bidirectional SFP optics. Output fields are listed in the approximate order in which they appear.

Table 6: Gigabit Ethernet Bidirectional SFP Optics show interfaces diagnostics optics Output Fields

Field Name	Field Description
Physical interface	Name of the physical interface.
Laser bias current	Magnitude of the laser bias power setting current, in milliamperes. The laser bias provides direct modulation of laser diodes and modulates currents.
Laser output power	Laser output power, in milliwatts (mW) and decibels, referenced to 1.0 mW (dBm).
Module temperature	Temperature of the optics module, in Celsius and Fahrenheit.
Module voltage	Internally measured module voltage.
Receiver signal average optical power	Average received optical power, in mW and dBm.
Laser bias current high alarm	Laser bias power setting high alarm. Displays <b>on</b> or <b>off</b> .
Laser bias current low alarm	Laser bias power setting low alarm. Displays <b>on</b> or <b>off</b> .
Laser bias current high warning	Laser bias power setting high warning. Displays <b>on</b> or <b>off</b> .
Laser bias current low warning	Laser bias power setting low warning. Displays <b>on</b> or <b>off</b> .
Laser output power high alarm	Laser output power high alarm. Displays <b>on</b> or <b>off</b> .
Laser output power low alarm	Laser output power low alarm. Displays <b>on</b> or <b>off</b> .
Laser output power high warning	Laser output power high warning. Displays <b>on</b> or <b>off</b> .
Laser output power low warning	Laser output power low warning. Displays <b>on</b> or <b>off</b> .
Module temperature high alarm	Module temperature high alarm. Displays <b>on</b> or <b>off</b> .
Module temperature low alarm	Module temperature low alarm. Displays <b>on</b> or <b>off</b> .
Module temperature high warning	Module temperature high warning. Displays <b>on</b> or <b>off</b> .



**Table 6: Gigabit Ethernet Bidirectional SFP Optics show interfaces diagnostics optics Output Fields (*continued*)**

Field Name	Field Description
Module temperature low warning	Module temperature low warning. Displays <b>on</b> or <b>off</b> .
Module voltage high alarm	Module voltage high alarm. Displays <b>on</b> or <b>off</b> .
Module voltage low alarm	Module voltage low alarm. Displays <b>on</b> or <b>off</b> .
Module voltage high warning	Module voltage high warning. Displays <b>on</b> or <b>off</b> .
Module voltage low warning	Module voltage high warning. Displays <b>on</b> or <b>off</b> .
Laser rx power high alarm	Receive laser power high alarm. Displays <b>on</b> or <b>off</b> .
Laser rx power low alarm	Receive laser power low alarm. Displays <b>on</b> or <b>off</b> .
Laser rx power high warning	Receive laser power high warning. Displays <b>on</b> or <b>off</b> .
Laser rx power low warning	Receive laser power low warning. Displays <b>on</b> or <b>off</b> .
Laser bias current high alarm threshold	Vendor-specified threshold for the laser bias current high alarm: <b>70.000 mA</b> .
Laser bias current low alarm threshold	Vendor-specified threshold for the laser bias current low alarm: <b>0.0002 mA</b> .
Laser bias current high warning threshold	Vendor-specified threshold for the laser bias current high warning: <b>65.000 mA</b> .
Laser bias current low warning threshold	Vendor-specified threshold for the laser bias current low warning: <b>0.0002 mA</b> .
Laser output power high alarm threshold	Vendor-specified threshold for the laser output power high alarm: <b>1.0000 mW</b> or <b>0.00 dBm</b> .
Laser output power low alarm threshold	Vendor-specified threshold for the laser output power low alarm: <b>0.0560 mW</b> or <b>-12.52 dBm</b> .
Laser output power high warning threshold	Vendor-specified threshold for the laser output power high warning: <b>0.6300 mW</b> or <b>-2.01 dBm</b> .

**Table 6: Gigabit Ethernet Bidirectional SFP Optics show interfaces diagnostics optics Output Fields (*continued*)**

Field Name	Field Description
Laser output power low warning threshold	Vendor-specified threshold for the laser output power low warning: <b>0.0890 mW</b> or <b>-10.51 dBm</b> .
Module temperature high alarm threshold	Vendor-specified threshold for the module temperature high alarm: <b>100° C</b> or <b>212° F</b> .
Module temperature low alarm threshold	Vendor-specified threshold for the module temperature low alarm: <b>-50° C</b> or <b>-58° F</b> .
Module temperature high warning threshold	Vendor-specified threshold for the module temperature high warning: <b>95 ° C</b> or <b>203 ° F</b> .
Module temperature low warning threshold	Vendor-specified threshold for the module temperature low warning: <b>-48° C</b> or <b>-54° F</b> .
Module voltage high alarm threshold	Module voltage high alarm threshold: <b>3.700 v</b> .
Module voltage low alarm threshold	Module voltage low alarm threshold: <b>2.900 v</b> .
Module voltage high warning threshold	Module voltage high warning threshold: <b>3.7600 v</b> .
Module voltage low warning threshold	Module voltage low warning threshold: <b>3.000 v</b> .
Laser rx power high alarm threshold	Vendor-specified threshold for the laser Rx power high alarm: <b>1.9953 mW</b> or <b>3.00 dBm</b> .
Laser rx power low alarm threshold	Vendor-specified threshold for the laser Rx power low alarm: <b>0.0001 mW</b> or <b>-40.00 dBm</b> .
Laser rx power high warning threshold	Vendor-specified threshold for the laser Rx power high warning: <b>1.0000 mW</b> or <b>0.00 dBm</b> .
Laser rx power low warning threshold	Vendor-specified threshold for the laser Rx power low warning: <b>0.0010 mW</b> or <b>-30.00 dBm</b> .

[Table 7 on page 152](#) lists the output fields for the **show interfaces diagnostics optics** command for SFP transceivers. Output fields are listed in the approximate order in which they appear.

**Table 7: Gigabit Ethernet SFP show interfaces diagnostics Output Fields**

Field Name	Field Description
Physical interface	Name of the physical interface.

Table 7: Gigabit Ethernet SFP show interfaces diagnostics Output Fields (*continued*)

Field Name	Field Description
Laser bias current	Measured laser bias current in uA.
Laser output power	Measured laser output power in mW.
Module temperature	Internally measured module temperature.
Module voltage	Internally measured module voltage.
Laser rx power	Measured receive optical power in mW.
Laser bias current high alarm	Laser bias current high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser bias current low alarm	Laser bias current low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser output power high alarm	Laser output power high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser output power low alarm	Laser output power low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Module temp high alarm	Module temperature high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Module temp low alarm	Module temperature low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser rx power high alarm	Laser receive power high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser rx power low alarm	Laser receive power low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser bias current high warning	Laser bias current high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser bias current low warning	Laser bias current low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser output power high warning	Laser output power high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser output power low warning	Laser output power low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Module temperature high warning	Module temperature high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Module temperature low warning	Module temperature low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.

Table 7: Gigabit Ethernet SFP show interfaces diagnostics Output Fields (*continued*)

Field Name	Field Description
Laser rx power high warning	Laser receive power high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser rx power low warning	Laser receive power low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser bias current high alarm threshold	Laser bias current high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser bias current low alarm threshold	Laser bias current low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser bias current high warning threshold	Laser bias current high warning threshold. Warning ranges are vendor-specific.
Laser bias current low warning threshold	Laser bias current low warning threshold. Warning ranges are vendor-specific.
Laser output power high alarm threshold	Laser output power high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser output power low alarm threshold	Laser output power low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser output power high warning threshold	Laser output power high warning threshold. Warning ranges are vendor-specific.
Laser output power low warning threshold	Laser output power low warning threshold. Warning ranges are vendor-specific.
Module temperature high alarm threshold	Module temperature high alarm threshold. Alarm threshold ranges are vendor-specific.
Module temperature low alarm threshold	Module temperature low alarm threshold. Alarm threshold ranges are vendor-specific.
Module temperature high warning threshold	Module temperature high warning threshold. Warning ranges are vendor-specific.
Module temperature low warning threshold	Module temperature low warning threshold. Warning ranges are vendor-specific.
Module voltage high alarm threshold	Module voltage high alarm threshold. Alarm ranges are vendor-specific.
Module voltage low alarm threshold	Module voltage low alarm threshold. Alarm ranges are vendor-specific.

Table 7: Gigabit Ethernet SFP show interfaces diagnostics Output Fields (*continued*)

Field Name	Field Description
Module voltage high warning threshold	Module voltage high warning threshold. Warning ranges are vendor-specific.
Module voltage low warning threshold	Module voltage low warning threshold. Warning ranges are vendor-specific.
Laser rx power high alarm threshold	Laser receive power high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser rx power low alarm threshold	Laser receive power low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser rx power high warning threshold	Laser receive power high warning threshold. Warning threshold ranges are vendor-specific.
Laser rx power high low threshold	Laser receive power high warning threshold. Warning threshold ranges are vendor-specific.

Table 8 on page 155 lists the output fields for the **show interfaces diagnostics optics** command for 10-Gigabit Ethernet transceivers. Output fields are listed in the approximate order in which they appear.

Table 8: 10-Gigabit Ethernet Transceivers show interfaces diagnostics optics Output Fields

Field Name	Field Description
Physical interface	Name of the physical interface.
Laser bias current	Measured laser bias current in mA.
Laser output power	Measured laser output power in mW.
Module temperature	Internally measured module temperature.
Laser rx power	Measured receive optical power in mW.
Laser bias current high alarm	Laser bias current high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser bias current low alarm	Laser bias current low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser output power high alarm	Laser output power high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser output power low alarm	Laser output power low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.

**Table 8: 10-Gigabit Ethernet Transceivers show interfaces diagnostics optics Output Fields (*continued*)**

Field Name	Field Description
Module temp high alarm	Module temperature high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Module temp low alarm	Module temperature low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser rx power high alarm	Laser receive power high alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser rx power low alarm	Laser receive power low alarm: <b>On</b> or <b>Off</b> . Alarm ranges are vendor-specific.
Laser bias current high warning	Laser bias current high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser bias current low warning	Laser bias current low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser output power high warning	Laser output power high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser output power low warning	Laser output power low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Module temperature high warning	Module temperature high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Module temperature low warning	Module temperature low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser rx power high warning	Laser receive power high warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser rx power low warning	Laser receive power low warning: <b>On</b> or <b>Off</b> . Warning ranges are vendor-specific.
Laser bias current high alarm threshold	Laser bias current high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser bias current low alarm threshold	Laser bias current low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser output power high alarm threshold	Laser output power high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser output power low alarm threshold	Laser output power low alarm threshold. Alarm threshold ranges are vendor-specific.

**Table 8: 10-Gigabit Ethernet Transceivers show interfaces diagnostics optics Output Fields** (*continued*)

Field Name	Field Description
Module temperature high alarm threshold	Module temperature high alarm threshold. Alarm threshold ranges are vendor-specific.
Module temperature low alarm threshold	Module temperature low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser rx power high alarm threshold	Laser receive power high alarm threshold. Alarm threshold ranges are vendor-specific.
Laser rx power low alarm threshold	Laser receive power low alarm threshold. Alarm threshold ranges are vendor-specific.
Laser bias current high warning threshold	Laser bias current high warning threshold. Warning ranges are vendor-specific.
Laser bias current low warning threshold	Laser bias current low warning threshold. Warning ranges are vendor-specific.
Laser output power high warning threshold	Laser output power high warning threshold. Warning ranges are vendor-specific.
Laser output power low warning threshold	Laser output power low warning threshold. Warning ranges are vendor-specific.
Module temperature high warning threshold	Module temperature high warning threshold. Warning ranges are vendor-specific.
Module temperature low warning threshold	Module temperature low warning threshold. Warning ranges are vendor-specific.
Laser rx power high warning threshold	Laser receive power high warning threshold. Warning threshold ranges are vendor-specific.
Laser rx power low warning threshold	Laser receive power low warning threshold. Warning threshold ranges are vendor-specific.

[Table 9 on page 157](#) lists the output fields for the **show interfaces diagnostics optics** command for XFP transceivers. Output fields are listed in the approximate order in which they appear.

**Table 9: 10-Gigabit Ethernet XFP Transceivers show interfaces diagnostics optics Output Fields**

Field Name	Field Description
Physical interface	Name of the physical interface.
Laser bias current	Magnitude of the laser bias power setting current, in milliamperes. The laser bias provides direct modulation of laser diodes and modulates currents.

**Table 9: 10-Gigabit Ethernet XFP Transceivers show interfaces diagnostics optics Output Fields** (*continued*)

Field Name	Field Description
<b>Laser output power</b>	Laser output power, in milliwatts (mW) and decibels, referenced to 1.0 mW (dBm). This is a software equivalent to the <b>LsPOWMON</b> pin in hardware.
<b>Module temperature</b>	Temperature of the XFP optics module, in Celsius and Fahrenheit.
<b>Laser rx power</b>	Laser received optical power, in mW and dBm.
<b>Laser bias current high alarm</b>	Laser bias power setting high alarm. Displays <b>on</b> or <b>off</b> .
<b>Laser bias current low alarm</b>	Laser bias power setting low alarm. Displays <b>on</b> or <b>off</b> .
<b>Laser bias current high warning</b>	Laser bias power setting high warning. Displays <b>on</b> or <b>off</b> .
<b>Laser bias current low warning</b>	Laser bias power setting low warning. Displays <b>on</b> or <b>off</b> .
<b>Laser output power high alarm</b>	Laser output power high alarm. Displays <b>on</b> or <b>off</b> .
<b>Laser output power low alarm</b>	Laser output power low alarm. Displays <b>on</b> or <b>off</b> .
<b>Laser output power high warning</b>	Laser output power high warning. Displays <b>on</b> or <b>off</b> .
<b>Laser output power low warning</b>	Laser output power low warning. Displays <b>on</b> or <b>off</b> .
<b>Module temperature high alarm</b>	Module temperature high alarm. Displays <b>on</b> or <b>off</b> .
<b>Module temperature low alarm</b>	Module temperature low alarm. Displays <b>on</b> or <b>off</b> .
<b>Module temperature high warning</b>	Module temperature high warning. Displays <b>on</b> or <b>off</b> .
<b>Module temperature low warning</b>	Module temperature low warning. Displays <b>on</b> or <b>off</b> .
<b>Laser rx power high alarm</b>	Receive laser power high alarm. Displays <b>on</b> or <b>off</b> .
<b>Laser rx power low alarm</b>	Receive laser power low alarm. Displays <b>on</b> or <b>off</b> .



**Table 9: 10-Gigabit Ethernet XFP Transceivers show interfaces diagnostics optics Output Fields (*continued*)**

Field Name	Field Description
Laser rx power high warning	Receive laser power high warning. Displays <b>on</b> or <b>off</b> .
Laser rx power low warning	Receive laser power low warning. Displays <b>on</b> or <b>off</b> .
Module not ready alarm	Module not ready alarm. When <b>on</b> , indicates the module has an operational fault. Displays <b>on</b> or <b>off</b> .
Module power down alarm	Module power down alarm. When <b>on</b> , module is in a limited power mode, low for normal operation. Displays <b>on</b> or <b>off</b> .
Tx data not ready alarm	Any condition leading to invalid data on the transmit path. Displays <b>on</b> or <b>off</b> .
Tx not ready alarm	Any condition leading to invalid data on the transmit path. Displays <b>on</b> or <b>off</b> .
Tx laser fault alarm	Laser fault condition. Displays <b>on</b> or <b>off</b> .
Tx CDR loss of lock alarm	Transmit clock and data recovery (CDR) loss of lock. Loss of lock on the transmit side of the CDR. Displays <b>on</b> or <b>off</b> .
Rx not ready alarm	Any condition leading to invalid data on the receive path. Displays <b>on</b> or <b>off</b> .
Rx loss of signal alarm	Receive Loss of Signal alarm. When <b>on</b> , indicates insufficient optical input power to the module. Displays <b>on</b> or <b>off</b> .
Rx CDR loss of lock alarm	Receive CDR loss of lock. Loss of lock on the receive side of the CDR. Displays <b>on</b> or <b>off</b> .
Laser bias current high alarm threshold	Vendor-specified threshold for the laser bias current high alarm: <b>130.000 mA</b> .
Laser bias current low alarm threshold	Vendor-specified threshold for the laser bias current low alarm: <b>10.000 mA</b> .
Laser bias current high warning threshold	Vendor-specified threshold for the laser bias current high warning: <b>120.000 mA</b> .
Laser bias current low warning threshold	Vendor-specified threshold for the laser bias current low warning: <b>12.000 mA</b> .
Laser output power high alarm threshold	Vendor-specified threshold for the laser output power high alarm: <b>0.8910 mW</b> or <b>-0.50 dBm</b> .
Laser output power low alarm threshold	Vendor-specified threshold for the laser output power low alarm: <b>0.2230 mW</b> or <b>-6.52 dBm</b> .
Laser output power high warning threshold	Vendor-specified threshold for the laser output power high warning: <b>0.7940 mW</b> or <b>-100 dBm</b> .

**Table 9: 10-Gigabit Ethernet XFP Transceivers show interfaces diagnostics optics Output Fields (*continued*)**

Field Name	Field Description
Laser output power low warning threshold	Vendor-specified threshold for the laser output power low warning: <b>0.2510 mW</b> or <b>-600 dBm</b> .
Module temperature high alarm threshold	Vendor-specified threshold for the module temperature high alarm: <b>90° C</b> or <b>194° F</b> .
Module temperature low alarm threshold	Vendor-specified threshold for the module temperature low alarm: <b>-5° C</b> or <b>23° F</b> .
Module temperature high warning threshold	Vendor-specified threshold for the module temperature high warning: <b>85 ° C</b> or <b>185 ° F</b> .
Module temperature low warning threshold	Vendor-specified threshold for the module temperature low warning: <b>0° C</b> or <b>32° F</b> .
Laser rx power high alarm threshold	Vendor-specified threshold for the laser Rx power high alarm: <b>1.2589 mW</b> or <b>1.00 dBm</b> .
Laser rx power low alarm threshold	Vendor-specified threshold for the laser Rx power low alarm: <b>0.0323 mW</b> or <b>-14.91 dBm</b> .
Laser rx power high warning threshold	Vendor-specified threshold for the laser Rx power high warning: <b>1.1220 mW</b> or <b>0.50 dBm</b> .
Laser rx power low warning threshold	Vendor-specified threshold for the laser Rx power low warning: <b>0.0363 mW</b> or <b>-14.40 dBm</b> .

## Sample Output

**show interfaces  
diagnostics optics**

```
user@host> show interfaces diagnostics optics ge-5/0/0
Physical interface: ge-5/0/0
Laser bias current           : 79.938 mA
```

**(DWDM and DWDM OTN)**

```

Laser output power           : 1.592 mW / 2.02 dBm
Receiver signal average optical power : 1.3854 mW / 1.42 dBm
Laser end-of-life alarm      : Off
Laser wavelength alarm       : Off
Laser bias current alarm     : Off
Laser temperature alarm      : Off
Laser power alarm            : Off
Modulator temperature alarm   : Off
Modulator bias alarm         : Off
Tx multiplexer FIFO error alarm : Off
Tx loss of PLL lock alarm    : Off
Rx loss of average optical power alarm: Off
Rx loss of AC power alarm    : Off
Rx loss of PLL lock alarm    : Off

```

**show interfaces  
diagnostics optics  
(Bidirectional SFP)**

```
user@host> show interfaces diagnostics optics ge-3/0/6
```

```
Physical interface: ge-3/0/6
```

```

Laser bias current           : 13.356 mA
Laser output power           : 0.2210 mW / -6.56 dBm
Module temperature           : 36 degrees C / 96 degrees F
Module voltage               : 3.2180 V
Receiver signal average optical power : 0.2429 mW / -6.15 dBm
Laser bias current high alarm : Off
Laser bias current low alarm  : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm  : Off
Laser output power low alarm   : Off
Laser output power high warning : Off
Laser output power low warning : Off
Module temperature high alarm  : Off
Module temperature low alarm   : Off
Module temperature high warning : Off
Module temperature low warning : Off
Module voltage high alarm      : Off
Module voltage low alarm       : Off
Module voltage high warning    : Off
Module voltage low warning     : Off
Laser rx power high alarm      : Off
Laser rx power low alarm       : Off
Laser rx power high warning    : Off
Laser rx power low warning     : Off
Laser bias current high alarm threshold : 70.000 mA
Laser bias current low alarm threshold : 0.002 mA
Laser bias current high warning threshold : 65.000 mA
Laser bias current low warning threshold : 0.002 mA
Laser output power high alarm threshold : 1.0000 mW / 0.00 dBm
Laser output power low alarm threshold : 0.0560 mW / -12.52 dBm
Laser output power high warning threshold : 0.6300 mW / -2.01 dBm
Laser output power low warning threshold : 0.0890 mW / -10.51 dBm
Module temperature high alarm threshold : 100 degrees C / 212 degrees F
Module temperature low alarm threshold : -50 degrees C / -58 degrees F
Module temperature high warning threshold : 95 degrees C / 203 degrees F
Module temperature low warning threshold : -48 degrees C / -54 degrees F
Module voltage high alarm threshold : 3.700 V
Module voltage low alarm threshold : 2.900 V
Module voltage high warning threshold : 3.600 V
Module voltage low warning threshold : 3.000 V
Laser rx power high alarm threshold : 1.9953 mW / 3.00 dBm
Laser rx power low alarm threshold : 0.0001 mW / -40.00 dBm
Laser rx power high warning threshold : 1.0000 mW / 0.00 dBm

```

Laser rx power low warning threshold : 0.0010 mW / -30.00 dBm

**show interfaces  
diagnostics optics  
(SFP)**

user@host> show interfaces diagnostics optics ge-0/3/0

Physical interface: ge-0/3/0

```

Laser bias current           : 23.408 mA
Laser output power          : 1.479 mW / 1.70 dBm
Module temperature          : 37 degrees C / 99 degrees F
Laser rx power              : 0.121 mW / -9.16 dBm
Laser bias current high alarm : Off
Laser bias current low alarm  : Off
Laser output power high alarm : Off
Laser output power low alarm  : Off
Module temperature high alarm : Off
Module temperature low alarm  : Off
Laser rx power high alarm     : Off
Laser rx power low alarm      : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high warning : Off
Laser output power low warning : Off
Module temperature high warning : Off
Module temperature low warning : Off
Laser rx power high warning    : Off
Laser rx power low warning     : Off
Laser bias current high alarm threshold : 31.000 mA
Laser bias current low alarm threshold  : 10.000 mA
Laser output power high alarm threshold : 6.000 mW / 7.78 dBm
Laser output power low alarm threshold  : 0.100 mW / -10.00 dBm
Module temperature high alarm threshold : 85 degrees C / 185 degrees F
Module temperature low alarm threshold  : 0 degrees C / 32 degrees F
Laser rx power high alarm threshold     : 1.000 mW / 0.00 dBm
Laser rx power low alarm threshold       : 0.001 mW / -30.00 dBm
Laser bias current high warning threshold : 28.000 mA
Laser bias current low warning threshold  : 11.000 mA
Laser output power high warning threshold : 5.000 mW / 6.99 dBm
Laser output power low warning threshold  : 0.500 mW / -3.01 dBm
Module temperature high warning threshold : 70 degrees C / 158 degrees F
Module temperature low warning threshold  : 10 degrees C / 50 degrees F
Laser rx power high warning threshold     : 0.501 mW / -3.00 dBm
Laser rx power low warning threshold       : 0.001 mW / -28.86 dBm

```

**show interfaces  
diagnostics optics  
(SFP)**

user@host> show interfaces diagnostics optics ge-1/0/0

Physical interface: ge-1/0/0

```

Laser bias current           : 49.010 mA
Laser output power          : 1.263 mW / 1.01 dBm
Module temperature          : 17 degrees C / 62 degrees F

Module voltage              : 4.21 V
Laser rx power              : 0.060 mW / -12.21 dBm
Laser bias current high alarm : Off
Laser bias current low alarm  : Off
Laser output power high alarm : Off
Laser output power low alarm  : Off
Module temperature high alarm : Off
Module temperature low alarm  : Off
Module voltage high alarm     : Off
Module voltage low alarm      : Off
Laser rx power high alarm     : Off
Laser rx power low alarm      : Off
Laser bias current high warning : Off

```

```

Laser bias current low warning           : Off
Laser output power high warning          : Off
Laser output power low warning           : Off
Module temperature high warning          : Off
Module temperature low warning           : Off
Module voltage high warning              : Off
Module voltage low warning               : Off
Laser rx power high warning              : Off
Laser rx power low warning               : Off
Laser bias current high alarm threshold  : 70.000 mA
Laser bias current low alarm threshold   : 20.000 mA
Laser bias current high warning threshold : 65.000 mA
Laser bias current low warning threshold : 25.000 mA
Laser output power high alarm threshold  : 1.4120 mW / 1.50 dBm
Laser output power low alarm threshold   : 0.1990 mW / -7.01 dBm
Laser output power high warning threshold : 1.2580 mW / 1.00 dBm
Laser output power low warning threshold : 0.2230 mW / -6.52 dBm
Module temperature high alarm threshold   : 78 degrees C / 172 degrees F

Module temperature low alarm threshold    : 13 degrees C / 9 degrees F
Module temperature high warning threshold : 75 degrees C / 167 degrees F

Module temperature low warning threshold  : 10 degrees C / 14 degrees F

Module voltage high alarm threshold       : 5.71 V
Module voltage low alarm threshold        : 2.05 V
Module voltage high warning threshold     : 5.20 V
Module voltage low warning threshold      : 3.11 V
Laser rx power high alarm threshold       : 1.7783 mW / 2.50 dBm
Laser rx power low alarm threshold        : 0.0100 mW / -20.00 dBm
Laser rx power high warning threshold     : 1.5849 mW / 2.00 dBm
Laser rx power low warning threshold      : 0.0158 mW / -18.01 dBm

```

**show interfaces  
diagnostics optics  
(XFP and CFP Optics)**

user@host> show interfaces diagnostics optics xe-2/1/0

Physical interface: xe-2/1/0

```

Laser bias current           : 52.060 mA
Laser output power           : 0.5640 mW / -2.49 dBm
Module temperature           : 31 degrees C / 88 degrees F
Laser rx power               : 0.0844 mW / -10.74 dBm
Laser bias current high alarm : Off
Laser bias current low alarm  : Off
Laser bias current high warning : Off
Laser bias current low warning : Off
Laser output power high alarm  : Off
Laser output power low alarm   : Off
Laser output power high warning : Off
Laser output power low warning : Off
Module temperature high alarm  : Off
Module temperature low alarm   : Off
Module temperature high warning : Off
Module temperature low warning : Off
Laser rx power high alarm      : Off
Laser rx power low alarm       : Off
Laser rx power high warning    : Off
Laser rx power low warning     : Off
Module not ready alarm         : Off
Module power down alarm        : Off
Tx data not ready alarm        : Off
Tx not ready alarm             : Off
Tx laser fault alarm           : Off
Tx CDR loss of lock alarm      : Off

```

```
Rx not ready alarm           : Off
Rx loss of signal alarm      : Off
Rx CDR loss of lock alarm    : Off
Laser bias current high alarm threshold : 130.000 mA
Laser bias current low alarm threshold  : 10.000 mA
Laser bias current high warning threshold : 120.000 mA
Laser bias current low warning threshold : 12.000 mA
Laser output power high alarm threshold : 0.8910 mW / -0.50 dBm
Laser output power low alarm threshold  : 0.2230 mW / -6.52 dBm
Laser output power high warning threshold : 0.7940 mW / -1.00 dBm
Laser output power low warning threshold : 0.2510 mW / -6.00 dBm
Module temperature high alarm threshold : 90 degrees C / 194 degrees F
Module temperature low alarm threshold  : -5 degrees C / 23 degrees F
Module temperature high warning threshold : 85 degrees C / 185 degrees F
Module temperature low warning threshold : 0 degrees C / 32 degrees F
Laser rx power high alarm threshold     : 1.2589 mW / 1.00 dBm
Laser rx power low alarm threshold      : 0.0323 mW / -14.91 dBm
Laser rx power high warning threshold   : 1.1220 mW / 0.50 dBm
Laser rx power low warning threshold    : 0.0363 mW / -14.40 dBm
```

## show interfaces (Fast Ethernet)

<b>Syntax</b>	<pre>show interfaces <i>interface-type</i> &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	Display status information about the specified Fast Ethernet interface.
<b>Options</b>	<p><b><i>interface-type</i></b>—On M Series and T Series routers, the interface type is <b><i>fe-fpc/pic/port</i></b>. On the J Series routers, the interface type is <b><i>fe-pim/O/port</i></b>.</p> <p><b><i>brief   detail   extensive   terse</i></b>—(Optional) Display the specified level of output.</p> <p><b><i>descriptions</i></b>—(Optional) Display interface description strings.</p> <p><b><i>media</i></b>—(Optional) Display media-specific information about network interfaces.</p> <p><b><i>snmp-index snmp-index</i></b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b><i>statistics</i></b>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<p><a href="#">show interfaces (Fast Ethernet) on page 179</a></p> <p><a href="#">show interfaces brief (Fast Ethernet) on page 179</a></p> <p><a href="#">show interfaces detail (Fast Ethernet) on page 179</a></p> <p><a href="#">show interfaces extensive (Fast Ethernet) on page 180</a></p>
<b>Output Fields</b>	<p><a href="#">Table 10 on page 165</a> lists the output fields for the <b>show interfaces Fast Ethernet</b> command. Output fields are listed in the approximate order in which they appear.</p>

Table 10: show interfaces Fast Ethernet Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
<b>Physical interface</b>	Name of the physical interface.	All levels
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
<b>Interface index</b>	Index number of the physical interface, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Link-level type</b>	Encapsulation being used on the physical interface.	All levels
<b>MTU</b>	Maximum transmission unit size on the physical interface.	All levels
<b>Link-mode</b>	Type of link connection configured for the physical interface: <b>Full-duplex</b> or <b>Half-duplex</b>	<b>extensive</b>
<b>Speed</b>	Speed at which the interface is running.	All levels
<b>Loopback</b>	Loopback status: <b>Enabled</b> or <b>Disabled</b> . If loopback is enabled, type of loopback: <b>Local</b> or <b>Remote</b> .	All levels
<b>Source filtering</b>	Source filtering status: <b>Enabled</b> or <b>Disabled</b> .	All levels
<b>LAN-PHY mode</b>	10-Gigabit Ethernet interface operating in Local Area Network Physical Layer Device (LAN PHY) mode. LAN PHY allows 10-Gigabit Ethernet wide area links to use existing Ethernet applications.	All levels
<b>WAN-PHY mode</b>	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
<b>Unidirectional</b>	Unidirectional link mode status for 10-Gigabit Ethernet interface: <b>Enabled</b> or <b>Disabled</b> for parent interface; <b>Rx-only</b> or <b>Tx-only</b> for child interfaces.	All levels
<b>Flow control</b>	Flow control status: <b>Enabled</b> or <b>Disabled</b> .	All levels
<b>Auto-negotiation</b>	(Gigabit Ethernet interfaces) Autonegotiation status: <b>Enabled</b> or <b>Disabled</b> .	All levels
<b>Remote-fault</b>	(Gigabit Ethernet interfaces) Remote fault status: <ul style="list-style-type: none"> <li>• <b>Online</b>—Autonegotiation is manually configured as online.</li> <li>• <b>Offline</b>—Autonegotiation is manually configured as offline.</li> </ul>	All levels
<b>Device flags</b>	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	All levels
<b>Link flags</b>	Information about the link. Possible values are described in the "Links Flags" section under Common Output Fields Description.	All levels
<b>Wavelength</b>	(10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm).	All levels



Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Frequency</b>	(10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz).	All levels
<b>CoS queues</b>	Number of CoS queues configured.	<b>detail extensive</b> none
<b>Schedulers</b>	(GigabitEthernet intelligent queuing 2 (IQ2) interfaces only) Number of CoS schedulers configured.	<b>extensive</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down, in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive</b> none
<b>Hardware address</b>	Hardware MAC address.	<b>detail extensive</b> none
<b>Last flapped</b>	Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	<b>detail extensive</b> none
<b>Input Rate</b>	Input rate in bits per second (bps) and packets per second (pps).	None specified
<b>Output Rate</b>	Output rate in bps and pps.	None specified
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> <p>Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes.</p> <p>For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see Table 31 under the <a href="#">show interfaces (10-Gigabit Ethernet)</a> command.</p>	<b>detail extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Input errors</b>	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.</li> <li>• <b>L3 incompletes</b>—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 <b>ignore-l3-incompletes</b> statement.</li> <li>• <b>L2 channel errors</b>—Number of times the software did not find a valid logical interface for an incoming frame.</li> <li>• <b>L2 mismatch timeouts</b>—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Output errors</b>	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Collisions</b>—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.</li> <li>• <b>Aged packets</b>—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>HS link CRC errors</b>—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Egress queues</b>	Total number of egress queues supported on the specified interface.	<b>detail extensive</b>
<b>Queue counters (Egress)</b>	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>detail extensive</b>
<b>Ingress queues</b>	Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces.	<b>extensive</b>
<b>Queue counters (Ingress)</b>	<p>CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Active alarms and Active defects</b>	<p>Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the 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 <b>None</b> or <b>Link</b>.</p> <ul style="list-style-type: none"> <li>• <b>None</b>—There are no active defects or alarms.</li> <li>• <b>Link</b>—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.</li> </ul>	<b>detail extensive none</b>
<b>OTN FEC statistics</b>	<p>The forward error correction (FEC) counters provide the following statistics:</p> <ul style="list-style-type: none"> <li>• <b>Corrected Errors</b>—The count of corrected errors in the last second.</li> <li>• <b>Corrected Error Ratio</b>—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits.</li> </ul>	
<b>PCS statistics</b>	<p>(10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device.</p> <ul style="list-style-type: none"> <li>• <b>Bit errors</b>—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode.</li> <li>• <b>Errored blocks</b>—Loss of block lock. The number of errored blocks when PCS receiver is operating in normal mode.</li> </ul>	<b>detail extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
MAC statistics	<p>Receive and Transmit statistics reported by the PIC's MAC subsystem, including the following:</p> <ul style="list-style-type: none"> <li>• <b>Total octets</b> and <b>total packets</b>—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see Table 31 under the <a href="#">show interfaces (10-Gigabit Ethernet)</a> command.</li> <li>• <b>Unicast packets</b>, <b>Broadcast packets</b>, and <b>Multicast packets</b>—Number of unicast, broadcast, and multicast packets.</li> <li>• <b>CRC/Align errors</b>—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).</li> <li>• <b>FIFO error</b>—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning.</li> <li>• <b>MAC control frames</b>—Number of MAC control frames.</li> <li>• <b>MAC pause frames</b>—Number of MAC control frames with <b>pause</b> operational code.</li> <li>• <b>Oversized frames</b>—Number of frames that exceed 1518 octets.</li> <li>• <b>Jabber frames</b>—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.</li> <li>• <b>Fragment frames</b>—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.</li> <li>• <b>VLAN tagged frames</b>—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not.</li> <li>• <b>Code violations</b>—Number of times an event caused the PHY to indicate "Data reception error" or "invalid data symbol error."</li> </ul>	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 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Filter statistics</b>	<p><b>Receive</b> and <b>Transmit</b> 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.</p> <ul style="list-style-type: none"> <li>• <b>Input packet count</b>—Number of packets received from the MAC hardware that the filter processed.</li> <li>• <b>Input packet rejects</b>—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address.</li> <li>• <b>Input DA rejects</b>—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).</li> <li>• <b>Input SA rejects</b>—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.</li> <li>• <b>Output packet count</b>—Number of packets that the filter has given to the MAC hardware.</li> <li>• <b>Output packet pad count</b>—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.</li> <li>• <b>Output packet error count</b>—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.</li> <li>• <b>CAM destination filters, CAM source filters</b>—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.</li> </ul>	<b>extensive</b>
<b>PMA PHY</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>PHY Lock</b>—Phase-locked loop</li> <li>• <b>PHY Light</b>—Loss of optical signal</li> </ul>	<b>extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>WIS section</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B1</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>SEF</b>—Severely errored framing</li> <li>• <b>LOL</b>—Loss of light</li> <li>• <b>LOF</b>—Loss of frame</li> <li>• <b>ES-S</b>—Errored seconds (section)</li> <li>• <b>SES-S</b>—Severely errored seconds (section)</li> <li>• <b>SEFS-S</b>—Severely errored framing seconds (section)</li> </ul>	<b>extensive</b>
<b>WIS line</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. State other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B2</b>—Bit interleaved parity for SONET line overhead</li> <li>• <b>REI-L</b>—Remote error indication (near-end line)</li> <li>• <b>RDI-L</b>—Remote defect indication (near-end line)</li> <li>• <b>AIS-L</b>—Alarm indication signal (near-end line)</li> <li>• <b>BERR-SF</b>—Bit error rate fault (signal failure)</li> <li>• <b>BERR-SD</b>—Bit error rate defect (signal degradation)</li> <li>• <b>ES-L</b>—Errored seconds (near-end line)</li> <li>• <b>SES-L</b>—Severely errored seconds (near-end line)</li> <li>• <b>UAS-L</b>—Unavailable seconds (near-end line)</li> <li>• <b>ES-LFE</b>—Errored seconds (far-end line)</li> <li>• <b>SES-LFE</b>—Severely errored seconds (far-end line)</li> <li>• <b>UAS-LFE</b>—Unavailable seconds (far-end line)</li> </ul>	<b>extensive</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>WIS path</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B3</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>REI-P</b>—Remote error indication</li> <li>• <b>LOP-P</b>—Loss of pointer (path)</li> <li>• <b>AIS-P</b>—Path alarm indication signal</li> <li>• <b>RDI-P</b>—Path remote defect indication</li> <li>• <b>UNEQ-P</b>—Path unequipped</li> <li>• <b>PLM-P</b>—Path payload (signal) label mismatch</li> <li>• <b>ES-P</b>—Errored seconds (near-end STS path)</li> <li>• <b>SES-P</b>—Severely errored seconds (near-end STS path)</li> <li>• <b>UAS-P</b>—Unavailable seconds (near-end STS path)</li> <li>• <b>SES-PFE</b>—Severely errored seconds (far-end STS path)</li> <li>• <b>UAS-PFE</b>—Unavailable seconds (far-end STS path)</li> </ul>	<b>extensive</b>



Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
Autonegotiation information	<p>Information about link autonegotiation.</p> <ul style="list-style-type: none"> <li>• <b>Negotiation status:</b> <ul style="list-style-type: none"> <li>• <b>Incomplete</b>—Ethernet interface has the speed or link mode configured.</li> <li>• <b>No autonegotiation</b>—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.</li> <li>• <b>Complete</b>—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> </ul> </li> <li>• <b>Link partner status</b>—OK when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> <li>• <b>Link partner:</b> <ul style="list-style-type: none"> <li>• <b>Link mode</b>—Depending on the capability of the attached Ethernet device, either <b>Full-duplex</b> or <b>Half-duplex</b>.</li> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Fast Ethernet interfaces, the type is <b>None</b>. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive).</li> <li>• <b>Remote fault</b>—Remote fault information from the link partner—<b>Failure</b> indicates a receive link error. <b>OK</b> indicates that the link partner is receiving. <b>Negotiation error</b> indicates a negotiation error. <b>Offline</b> indicates that the link partner is going offline.</li> </ul> </li> <li>• <b>Local resolution</b>—Information from the link partner: <ul style="list-style-type: none"> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive).</li> <li>• <b>Remote fault</b>—Remote fault information. <b>Link OK</b> (no error detected on receive), <b>Offline</b> (local interface is offline), and <b>Link Failure</b> (link error detected on receive).</li> </ul> </li> </ul>	extensive
Received path trace, Transmitted path trace	<p>(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.</p>	extensive
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> <li>• <b>Destination slot</b>—FPC slot number.</li> </ul>	extensive

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>CoS information</b>	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> <li>• <b>CoS transmit queue</b>—Queue number and its associated user-configured forwarding class name.</li> <li>• <b>Bandwidth %</b>—Percentage of bandwidth allocated to the queue.</li> <li>• <b>Bandwidth bps</b>—Bandwidth allocated to the queue (in bps).</li> <li>• <b>Buffer %</b>—Percentage of buffer space allocated to the queue.</li> <li>• <b>Buffer usec</b>—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.</li> <li>• <b>Priority</b>—Queue priority: <b>low</b> or <b>high</b>.</li> <li>• <b>Limit</b>—Displayed if rate limiting is configured for the queue. Possible values are <b>none</b> and <b>exact</b>. If <b>exact</b> is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If <b>none</b> is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under Common Output Fields Description.	All levels
<b>VLAN-Tag</b>	Rewrite profile applied to incoming or outgoing frames on the outer ( <b>Out</b> ) VLAN tag or for both the outer and inner ( <b>In</b> ) VLAN tags. <ul style="list-style-type: none"> <li>• <b>push</b>—An outer VLAN tag is pushed in front of the existing VLAN tag.</li> <li>• <b>pop</b>—The outer VLAN tag of the incoming frame is removed.</li> <li>• <b>swap</b>—The outer VLAN tag of the incoming frame is overwritten with the user specified VLAN tag information.</li> <li>• <b>push-pop</b>—An outer VLAN tag is pushed in front of the existing VLAN tag, and then removed.</li> <li>• <b>push-push</b>—Two VLAN tags are pushed in from the incoming frame.</li> <li>• <b>swap-push</b>—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.</li> <li>• <b>swap-swap</b>—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user specified VLAN tag value.</li> <li>• <b>pop-swap</b>—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.</li> <li>• <b>pop-pop</b>—Both the outer and inner VLAN tags of the incoming frame are removed.</li> </ul>	<b>brief detail extensive none</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Demux:</b>	IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following: <ul style="list-style-type: none"> <li>Source Family Inet</li> <li>Destination Family Inet</li> </ul>	<b>detail extensive none</b>
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels
<b>Protocol</b>	Protocol family. Possible values are described in the "Protocol Field" section under Common Output Fields Description.	<b>detail extensive none</b>
<b>MTU</b>	Maximum transmission unit size on the logical interface.	<b>detail extensive none</b>
<b>Maximum labels</b>	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	<b>detail extensive none</b>
<b>Traffic statistics</b>	Number and rate of bytes and packets received and transmitted on the specified interface set. <ul style="list-style-type: none"> <li><b>Input bytes, Output bytes</b>—Number of bytes received and transmitted on the interface set</li> <li><b>Input packets, Output packets</b>—Number of packets received and transmitted on the interface set.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.	<b>extensive</b>
<b>Local statistics</b>	Number and rate of bytes and packets destined to the router.	<b>extensive</b>
<b>Transit statistics</b>	Number and rate of bytes and packets transiting the switch. <p><b>NOTE:</b> 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 <b>Output bytes</b> and <b>Output packets</b> 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.</p>	<b>extensive</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route Table</b>	Route table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	<b>detail extensive none</b>
<b>Flags</b>	Information about protocol family flags. Possible values are described in the "Family Flags" section under Common Output Fields Description.	<b>detail extensive</b>
<b>Donor interface</b>	(Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address.	<b>detail extensive none</b>

Table 10: show interfaces Fast Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Preferred source address</b>	(Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface.	<b>detail extensive none</b>
<b>Input Filters</b>	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.	<b>detail extensive</b>
<b>Output Filters</b>	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.	<b>detail extensive</b>
<b>Mac-Validate Failures</b>	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	<b>detail extensive none</b>
<b>Addresses, Flags</b>	Information about the address flags. Possible values are described in the “Addresses Flags” section under Common Output Fields Description.	<b>detail extensive none</b>
<b><i>protocol-family</i></b>	Protocol family configured on the logical interface. If the protocol is <b>inet</b> , the IP address of the interface is also displayed.	<b>brief</b>
<b>Flags</b>	Information about address flag (possible values are described in the “Addresses Flags” section under Common Output Fields Description.	<b>detail extensive none</b>
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive none</b>
<b>Local</b>	IP address of the logical interface.	<b>detail extensive none</b>
<b>Broadcast</b>	Broadcast address of the logical interlace.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

## Sample Output

### show interfaces (Fast Ethernet)

```
user@host> show interfaces fe-0/0/0
Physical interface: fe-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 22
  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
  Current address: 00:05:85:02:38:00, Hardware address: 00:05:85:02:38:00
  Last flapped   : 2006-01-20 14:50:58 PST (2w4d 00:44 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
Logical interface fe-0/0/0.0 (Index 66) (SNMP ifIndex 198)
  Flags: SNMP-Traps Encapsulation: ENET2
  Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255
```

### show interfaces brief (Fast Ethernet)

```
user@host> show interfaces fe-0/0/0 brief
Physical interface: fe-0/0/0, Enabled, Physical link is Up
  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
Logical interface fe-0/0/0.0
  Flags: SNMP-Traps Encapsulation: ENET2
  inet 10.10.10.1/24
```

### show interfaces detail (Fast Ethernet)

```
user@host> show interfaces fe-0/0/0 detail
Physical interface: fe-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 22, Generation: 5391
  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: 00:05:85:02:38:00, Hardware address: 00:05:85:02:38:00
  Last flapped   : 2006-01-20 14:50:58 PST (2w4d 00:45 ago)
  Statistics last cleared: Never
Traffic statistics:
  Input bytes   : 0 0 bps
  Output bytes  : 42 0 bps
  Input packets: 0 0 pps
  Output packets: 1 0 pps
Active alarms  : None
Active defects : None
Logical interface fe-0/0/0.0 (Index 66) (SNMP ifIndex 198) (Generation 67)
  Flags: SNMP-Traps Encapsulation: ENET2
  Protocol inet, MTU: 1500, Generation: 105, Route table: 0
    Flags: Is-Primary, Mac-Validate-Strict
    Mac-Validate Failures: Packets: 0, Bytes: 0
    Addresses, Flags: Is-Preferred Is-Primary
```

Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255,  
Generation: 136

**show interfaces  
extensive  
(Fast Ethernet)**

```
user@host> show interfaces fe-0/0/0 extensive
Physical interface: fe-0/0/0, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 22, Generation: 5391
Link-level type: Ethernet, MTU: 1514, Link-mode: Full-duplex, 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: 00:05:85:02:38:00, Hardware address: 00:05:85:02:38:00
Last flapped   : 2006-01-20 14:50:58 PST (2w4d 00:46 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes   :          0          0 bps
Output bytes  :         42          0 bps
Input packets :          0          0 pps
Output packets:          1          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
Active alarms : None
Active defects : None
MAC statistics:

```

	Receive	Transmit
Total octets	0	64
Total packets	0	1
Unicast packets	0	0
Broadcast packets	0	1
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     1
Output packet pad count 0
Output packet error count 0
CAM destination filters: 1, CAM source filters: 0
Autonegotiation information:
Negotiation status: Complete
Link partner:
Link partner: Full-duplex, Flow control: None, Remote fault: Ok
Local resolution:
Packet Forwarding Engine configuration:
```

```
Destination slot: 0
CoS information:
      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 fe-0/0/0.0 (Index 66) (SNMP ifIndex 198) (Generation 67)
Flags: SNMP-Traps Encapsulation: ENET2
Protocol inet, MTU: 1500, Generation: 105, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255,
  Generation: 136
```

## show interfaces (10-Gigabit Ethernet)

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<b>Syntax</b>	<code>show interfaces <i>xe-fpc/pic/port</i></code> <code>&lt;brief   detail   extensive   terse&gt;</code> <code>&lt;descriptions&gt;</code> <code>&lt;media&gt;</code> <code>&lt;snmp-index <i>snmp-index</i>&gt;</code> <code>&lt;statistics&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 8.0.
<b>Description</b>	(M320, M120, MX Series, and T Series routers only) Display status information about the specified 10-Gigabit Ethernet interface.
<b>Options</b>	<p><code><i>xe-fpc/pic/port</i></code>—Display standard information about the specified 10-Gigabit Ethernet interface.</p> <p><code>brief   detail   extensive   terse</code>—(Optional) Display the specified level of output.</p> <p><code>descriptions</code>—(Optional) Display interface description strings.</p> <p><code>media</code>—(Optional) Display media-specific information about network interfaces.</p> <p><code>snmp-index <i>snmp-index</i></code>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><code>statistics</code>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<p><a href="#">show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, IQ2) on page 197</a></p> <p><a href="#">show interfaces extensive (10-Gigabit Ethernet, WAN PHY Mode) on page 200</a></p> <p><a href="#">show interfaces extensive (10-Gigabit Ethernet, DWDM OTN PIC) on page 202</a></p> <p><a href="#">show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode) on page 205</a></p> <p><a href="#">show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Transmit-Only) on page 205</a></p> <p><a href="#">show interfaces extensive (10-Gigabit Ethernet, LAN PHY Mode, Unidirectional Mode, Receive-Only) on page 206</a></p>
<b>Output Fields</b>	See <a href="#">Table 11 on page 183</a> for the output fields for the <b>show interfaces</b> (10-Gigabit Ethernet) command.



Table 11: show interfaces Gigabit Ethernet Output Fields

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

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Link flags</b>	Information about the link. Possible values are described in the “Links Flags” section under Common Output Fields Description.	All levels
<b>Wavelength</b>	(10-Gigabit Ethernet dense wavelength-division multiplexing [DWDM] interfaces) Displays the configured wavelength, in nanometers (nm).	All levels
<b>Frequency</b>	(10-Gigabit Ethernet DWDM interfaces only) Displays the frequency associated with the configured wavelength, in terahertz (THz).	All levels
<b>CoS queues</b>	Number of CoS queues configured.	detail extensive none
<b>Schedulers</b>	(Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces only) Number of CoS schedulers configured.	extensive
<b>Hold-times</b>	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
<b>Current address</b>	Configured MAC address.	detail extensive none
<b>Hardware address</b>	Hardware MAC address.	detail extensive none
<b>Last flapped</b>	Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	detail extensive none
<b>Input Rate</b>	Input rate in bits per second (bps) and packets per second (pps).	None specified
<b>Output Rate</b>	Output rate in bps and pps.	None specified
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	detail extensive
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul> <p>Gigabit Ethernet and 10-Gigabit Ethernet IQ PICs count the overhead and CRC bytes.</p> <p>For Gigabit Ethernet IQ PICs, the input byte counts vary by interface type. For more information, see <a href="#">Table 11 on page 183</a>.</p>	detail extensive

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Input errors</b>	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.</li> <li>• <b>L3 incompletes</b>—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 <b>ignore-l3-incompletes</b> statement.</li> <li>• <b>L2 channel errors</b>—Number of times the software did not find a valid logical interface for an incoming frame.</li> <li>• <b>L2 mismatch timeouts</b>—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Output errors</b>	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Collisions</b>—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.</li> <li>• <b>Aged packets</b>—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.</li> <li>• <b>FIFO errors</b>—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.</li> <li>• <b>HS link CRC errors</b>—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Egress queues</b>	Total number of egress queues supported on the specified interface.	<b>detail extensive</b>
<b>Queue counters (Egress)</b>	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>detail extensive</b>
<b>Ingress queues</b>	Total number of ingress queues supported on the specified interface. Displayed on IQ2 interfaces.	<b>extensive</b>
<b>Queue counters (Ingress)</b>	<p>CoS queue number and its associated user-configured forwarding class name. Displayed on IQ2 interfaces.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Active alarms and Active defects</b>	<p>Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the 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 <b>None</b> or <b>Link</b>.</p> <ul style="list-style-type: none"> <li>• <b>None</b>—There are no active defects or alarms.</li> <li>• <b>Link</b>—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.</li> </ul>	<b>detail extensive none</b>
<b>OTN alarms</b>	Active OTN alarms identified on the interface.	<b>detail extensive</b>
<b>OTN defects</b>	OTN defects received on the interface.	<b>detail extensive</b>
<b>OTN FEC Mode</b>	<p>The FECmode configured on the interface.</p> <ul style="list-style-type: none"> <li>• <b>efec</b>—Enhanced forward error correction (EFEC) is configured to detect and correct bit errors.</li> <li>• <b>gfec</b>—G.709 Forward error correction (GFEC) mode is configured to detect and correct bit errors.</li> <li>• <b>none</b>—FEC mode is not configured.</li> </ul>	<b>detail extensive</b>
<b>OTN Rate</b>	<p>OTN mode.</p> <ul style="list-style-type: none"> <li>• <b>fixed-stuff-bytes</b>—Fixed stuff bytes 11.0957 Gbps.</li> <li>• <b>no-fixed-stuff-bytes</b>—No fixed stuff bytes 11.0491 Gbps.</li> <li>• <b>pass-through</b>—Enable OTN passthrough mode.</li> <li>• <b>no-pass-through</b>—Do not enable OTN passthrough mode.</li> </ul>	<b>detail extensive</b>
<b>OTN Line Loopback</b>	Status of the line loopback, if configured for the DWDM OTN PIC. Its value can be: <b>enabled</b> or <b>disabled</b> .	<b>detail extensive</b>
<b>OTN FEC statistics</b>	<p>The forward error correction (FEC) counters for the DWDM OTN PIC.</p> <ul style="list-style-type: none"> <li>• <b>Corrected Errors</b>—The count of corrected errors in the last second.</li> <li>• <b>Corrected Error Ratio</b>—The corrected error ratio in the last 25 seconds. For example, 1e-7 is 1 error per 10 million bits.</li> </ul>	<b>detail extensive</b>
<b>OTN FEC alarms</b>	<p>OTN FEC excessive or degraded error alarms triggered on the interface.</p> <ul style="list-style-type: none"> <li>• <b>FEC Degrade</b>—OTU FEC Degrade defect.</li> <li>• <b>FEC Excessive</b>—OTU FEC Excessive Error defect.</li> </ul>	<b>detail extensive</b>
<b>OTN OC</b>	<p>OTN OC defects triggered on the interface.</p> <ul style="list-style-type: none"> <li>• <b>LOS</b>—OC Loss of Signal defect.</li> <li>• <b>LOF</b>—OC Loss of Frame defect.</li> <li>• <b>LOM</b>—OC Loss of Multiframe defect.</li> <li>• <b>Wavelength Lock</b>—OC Wavelength Lock defect.</li> </ul>	<b>detail extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>OTN OTU</b>	OTN OTU defects detected on the interface <ul style="list-style-type: none"> <li>• <b>AIS</b>—OTN AIS alarm.</li> <li>• <b>BDI</b>—OTN OTU BDI alarm.</li> <li>• <b>IAE</b>—OTN OTU IAE alarm.</li> <li>• <b>TTIM</b>—OTN OTU TTIM alarm.</li> <li>• <b>SF</b>—OTN ODU bit error rate fault alarm.</li> <li>• <b>SD</b>—OTN ODU bit error rate defect alarm.</li> <li>• <b>TCA-ES</b>—OTN ODU ES threshold alarm.</li> <li>• <b>TCA-SES</b>—OTN ODU SES threshold alarm.</li> <li>• <b>TCA-UAS</b>—OTN ODU UAS threshold alarm.</li> <li>• <b>TCA-BBE</b>—OTN ODU BBE threshold alarm.</li> <li>• <b>BIP</b>—OTN ODU BIP threshold alarm.</li> <li>• <b>BBE</b>—OTN OTU BBE threshold alarm.</li> <li>• <b>ES</b>—OTN OTU ES threshold alarm.</li> <li>• <b>SES</b>—OTN OTU SES threshold alarm.</li> <li>• <b>UAS</b>—OTN OTU UAS threshold alarm.</li> </ul>	<b>detail extensive</b>
<b>Received DAPI</b>	Destination Access Port Interface (DAPI) from which the packets were received.	<b>detail extensive</b>
<b>Received SAPI</b>	Source Access Port Interface (SAPI) from which the packets were received.	<b>detail extensive</b>
<b>Transmitted DAPI</b>	Destination Access Port Interface (DAPI) to which the packets were transmitted.	<b>detail extensive</b>
<b>Transmitted SAPI</b>	Source Access Port Interface (SAPI) to which the packets were transmitted.	<b>detail extensive</b>
<b>PCS statistics</b>	(10-Gigabit Ethernet interfaces) Displays Physical Coding Sublayer (PCS) fault conditions from the WAN PHY or the LAN PHY device. <ul style="list-style-type: none"> <li>• <b>Bit errors</b>—High bit error rate. Indicates the number of bit errors when the PCS receiver is operating in normal mode.</li> <li>• <b>Errored blocks</b>—Loss of block lock. The number of errored blocks when PCS receiver is operating in normal mode.</li> </ul>	<b>detail extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>MAC statistics</b>	<p>Receive and Transmit statistics reported by the PIC's MAC subsystem, including the following:</p> <ul style="list-style-type: none"> <li>• <b>Total octets and total packets</b>—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. For more information, see <a href="#">Table 12 on page 197</a></li> <li>• <b>Unicast packets, Broadcast packets, and Multicast packets</b>—Number of unicast, broadcast, and multicast packets.</li> <li>• <b>CRC/Align errors</b>—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).</li> <li>• <b>FIFO error</b>—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning.</li> <li>• <b>MAC control frames</b>—Number of MAC control frames.</li> <li>• <b>MAC pause frames</b>—Number of MAC control frames with <b>pause</b> operational code.</li> <li>• <b>Oversized frames</b>—Number of frames that exceed 1518 octets.</li> <li>• <b>Jabber frames</b>—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.</li> <li>• <b>Fragment frames</b>—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.</li> <li>• <b>VLAN tagged frames</b>—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not.</li> <li>• <b>Code violations</b>—Number of times an event caused the PHY to indicate "Data reception error" or "invalid data symbol error."</li> </ul>	<b>extensive</b>
<b>OTN Received Overhead Bytes</b>	APS/PCC0: 0x02, APS/PCC1: 0x11, APS/PCC2: 0x47, APS/PCC3: 0x58 Payload Type: 0x08	<b>extensive</b>
<b>OTN Transmitted Overhead Bytes</b>	APS/PCC0: 0x00, APS/PCC1: 0x00, APS/PCC2: 0x00, APS/PCC3: 0x00 Payload Type: 0x08	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Filter statistics</b>	<p><b>Receive</b> and <b>Transmit</b> 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.</p> <ul style="list-style-type: none"> <li>• <b>Input packet count</b>—Number of packets received from the MAC hardware that the filter processed.</li> <li>• <b>Input packet rejects</b>—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address.</li> <li>• <b>Input DA rejects</b>—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).</li> <li>• <b>Input SA rejects</b>—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.</li> <li>• <b>Output packet count</b>—Number of packets that the filter has given to the MAC hardware.</li> <li>• <b>Output packet pad count</b>—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.</li> <li>• <b>Output packet error count</b>—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.</li> <li>• <b>CAM destination filters, CAM source filters</b>—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.</li> </ul>	<b>extensive</b>
<b>PMA PHY</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>PHY Lock</b>—Phase-locked loop</li> <li>• <b>PHY Light</b>—Loss of optical signal</li> </ul>	<b>extensive</b>



Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>WIS section</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) SONET error information:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B1</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>SEF</b>—Severely errored framing</li> <li>• <b>LOL</b>—Loss of light</li> <li>• <b>LOF</b>—Loss of frame</li> <li>• <b>ES-S</b>—Errored seconds (section)</li> <li>• <b>SES-S</b>—Severely errored seconds (section)</li> <li>• <b>SEFS-S</b>—Severely errored framing seconds (section)</li> </ul>	<b>extensive</b>
<b>WIS line</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. State other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B2</b>—Bit interleaved parity for SONET line overhead</li> <li>• <b>REI-L</b>—Remote error indication (near-end line)</li> <li>• <b>RDI-L</b>—Remote defect indication (near-end line)</li> <li>• <b>AIS-L</b>—Alarm indication signal (near-end line)</li> <li>• <b>BERR-SF</b>—Bit error rate fault (signal failure)</li> <li>• <b>BERR-SD</b>—Bit error rate defect (signal degradation)</li> <li>• <b>ES-L</b>—Errored seconds (near-end line)</li> <li>• <b>SES-L</b>—Severely errored seconds (near-end line)</li> <li>• <b>UAS-L</b>—Unavailable seconds (near-end line)</li> <li>• <b>ES-LFE</b>—Errored seconds (far-end line)</li> <li>• <b>SES-LFE</b>—Severely errored seconds (far-end line)</li> <li>• <b>UAS-LFE</b>—Unavailable seconds (far-end line)</li> </ul>	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>WIS path</b>	<p>(10-Gigabit Ethernet interfaces, WAN PHY mode) Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. Any state other than <b>OK</b> indicates a problem.</li> </ul> <p>Subfields are:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B3</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>REI-P</b>—Remote error indication</li> <li>• <b>LOP-P</b>—Loss of pointer (path)</li> <li>• <b>AIS-P</b>—Path alarm indication signal</li> <li>• <b>RDI-P</b>—Path remote defect indication</li> <li>• <b>UNEQ-P</b>—Path unequipped</li> <li>• <b>PLM-P</b>—Path payload label mismatch</li> <li>• <b>ES-P</b>—Errored seconds (near-end STS path)</li> <li>• <b>SES-P</b>—Severely errored seconds (near-end STS path)</li> <li>• <b>UAS-P</b>—Unavailable seconds (near-end STS path)</li> <li>• <b>SES-PFE</b>—Severely errored seconds (far-end STS path)</li> <li>• <b>UAS-PFE</b>—Unavailable seconds (far-end STS path)</li> </ul>	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
Autonegotiation information	<p>Information about link autonegotiation.</p> <ul style="list-style-type: none"> <li>• <b>Negotiation status:</b> <ul style="list-style-type: none"> <li>• <b>Incomplete</b>—Ethernet interface has the speed or link mode configured.</li> <li>• <b>No autonegotiation</b>—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.</li> <li>• <b>Complete</b>—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> </ul> </li> <li>• <b>Link partner status</b>—OK when Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.</li> <li>• <b>Link partner:</b> <ul style="list-style-type: none"> <li>• <b>Link mode</b>—Depending on the capability of the attached Ethernet device, either <b>Full-duplex</b> or <b>Half-duplex</b>.</li> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Fast Ethernet interfaces, the type is <b>None</b>. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive).</li> <li>• <b>Remote fault</b>—Remote fault information from the link partner—<b>Failure</b> indicates a receive link error. <b>OK</b> indicates that the link partner is receiving. <b>Negotiation error</b> indicates a negotiation error. <b>Offline</b> indicates that the link partner is going offline.</li> </ul> </li> <li>• <b>Local resolution</b>—Information from the link partner: <ul style="list-style-type: none"> <li>• <b>Flow control</b>—Types of flow control supported by the remote Ethernet device. For Gigabit Ethernet interfaces, types are <b>Symmetric</b> (link partner supports <b>PAUSE</b> on receive and transmit), <b>Asymmetric</b> (link partner supports <b>PAUSE</b> on transmit), and <b>Symmetric/Asymmetric</b> (link partner supports both <b>PAUSE</b> on receive and transmit or only <b>PAUSE</b> receive).</li> <li>• <b>Remote fault</b>—Remote fault information. <b>Link OK</b> (no error detected on receive), <b>Offline</b> (local interface is offline), and <b>Link Failure</b> (link error detected on receive).</li> </ul> </li> </ul>	extensive
Received path trace, Transmitted path trace	<p>(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.</p>	extensive
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> <li>• <b>Destination slot</b>—FPC slot number.</li> </ul>	extensive

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>CoS information</b>	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> <li>• <b>CoS transmit queue</b>—Queue number and its associated user-configured forwarding class name.</li> <li>• <b>Bandwidth %</b>—Percentage of bandwidth allocated to the queue.</li> <li>• <b>Bandwidth bps</b>—Bandwidth allocated to the queue (in bps).</li> <li>• <b>Buffer %</b>—Percentage of buffer space allocated to the queue.</li> <li>• <b>Buffer usec</b>—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.</li> <li>• <b>Priority</b>—Queue priority: <b>low</b> or <b>high</b>.</li> <li>• <b>Limit</b>—Displayed if rate limiting is configured for the queue. Possible values are <b>none</b> and <b>exact</b>. If <b>exact</b> is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If <b>none</b> is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under Common Output Fields Description.	All levels

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>VLAN-Tag</b>	<p>Rewrite profile applied to incoming or outgoing frames on the outer (<b>Out</b>) VLAN tag or for both the outer and inner (<b>In</b>) VLAN tags.</p> <ul style="list-style-type: none"> <li>• <b>push</b>—An outer VLAN tag is pushed in front of the existing VLAN tag.</li> <li>• <b>pop</b>—The outer VLAN tag of the incoming frame is removed.</li> <li>• <b>swap</b>—The outer VLAN tag of the incoming frame is overwritten with the user specified VLAN tag information.</li> <li>• <b>push</b>—An outer VLAN tag is pushed in front of the existing VLAN tag.</li> <li>• <b>push-push</b>—Two VLAN tags are pushed in from the incoming frame.</li> <li>• <b>swap-push</b>—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.</li> <li>• <b>swap-swap</b>—Both the inner and the outer VLAN tags of the incoming frame are replaced by the user specified VLAN tag value.</li> <li>• <b>pop-swap</b>—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.</li> <li>• <b>pop-pop</b>—Both the outer and inner VLAN tags of the incoming frame are removed.</li> </ul>	<b>brief detail extensive none</b>
<b>Demux:</b>	<p>IP demultiplexing (demux) value that appears if this interface is used as the demux underlying interface. The output is one of the following:</p> <ul style="list-style-type: none"> <li>• Source Family Inet</li> <li>• Destination Family Inet</li> </ul>	<b>detail extensive none</b>
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels
<b>Protocol</b>	Protocol family. Possible values are described in the “Protocol Field” section under Common Output Fields Description.	<b>detail extensive none</b>
<b>MTU</b>	Maximum transmission unit size on the logical interface.	<b>detail extensive none</b>
<b>Maximum labels</b>	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	<b>detail extensive none</b>
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the specified interface set.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes, Output bytes</b>—Number of bytes received and transmitted on the interface set</li> <li>• <b>Input packets, Output packets</b>—Number of packets received and transmitted on the interface set.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.	<b>extensive</b>
<b>Local statistics</b>	Number and rate of bytes and packets destined to the router.	<b>extensive</b>

Table 11: show interfaces Gigabit Ethernet Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Transit statistics</b>	Number and rate of bytes and packets transiting the switch.  <b>NOTE:</b> 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 <b>Output bytes</b> and <b>Output packets</b> 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.	<b>extensive</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route Table</b>	Route table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	<b>detail extensive none</b>
<b>Flags</b>	Information about protocol family flags. Possible values are described in the “Family Flags” section under Common Output Fields Description.	<b>detail extensive</b>
<b>Donor interface</b>	(Unnumbered Ethernet) Interface from which an unnumbered Ethernet interface borrows an IPv4 address.	<b>detail extensive none</b>
<b>Preferred source address</b>	(Unnumbered Ethernet) Secondary IPv4 address of the donor loopback interface that acts as the preferred source address for the unnumbered Ethernet interface.	<b>detail extensive none</b>
<b>Input Filters</b>	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.	<b>detail extensive</b>
<b>Output Filters</b>	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.	<b>detail extensive</b>
<b>Mac-Validate Failures</b>	Number of MAC address validation failures for packets and bytes. This field is displayed when MAC address validation is enabled for the logical interface.	<b>detail extensive none</b>
<b>Addresses, Flags</b>	Information about the address flags. Possible values are described in the “Addresses Flags” section under Common Output Fields Description.	<b>detail extensive none</b>
<b><i>protocol-family</i></b>	Protocol family configured on the logical interface. If the protocol is <b>inet</b> , the IP address of the interface is also displayed.	<b>brief</b>
<b>Flags</b>	Information about address flag (possible values are described in the “Addresses Flags” section under Common Output Fields Description.	<b>detail extensive none</b>
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive none</b>
<b>Local</b>	IP address of the logical interface.	<b>detail extensive none</b>
<b>Broadcast</b>	Broadcast address of the logical interlace.	<b>detail extensive none</b>

Table 11: 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 12 on page 197](#) 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 12 on page 197](#), 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 12: Gigabit Ethernet IQ PIC Traffic and MAC Statistics by Interface Type

Interface Type	Sample Command	Byte and Octet Counts Include	Comments
Inbound physical interface	<b>show interfaces ge-0/3/0 extensive</b>	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	<b>show interfaces ge-0/3/0.50 extensive</b>	Traffic statistics:  Input bytes: 478 bytes per packet, representing the Layer 3 packet	
Outbound physical interface	<b>show interfaces ge-0/0/0 extensive</b>	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	<b>show interfaces ge-0/0/0.50 extensive</b>	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
Bit errors          Seconds
                    0

```



```

    Errored blocks                                0
MAC statistics:
    Receive
    Transmit
    Total octets                                6970332384
    Total packets                              81050506
    Unicast packets                            81050000
    Broadcast packets                          506
    Multicast packets                          0
    CRC/Align errors                          0
    FIFO errors                              0
    MAC control frames                        0
    MAC pause frames                         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
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
    Output bytes : 0
    Input packets: 0
    Output packets: 0
    0 bps
    0 bps
    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
    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
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

```

user@host> show interfaces xe-7/0/0-rx extensive
Physical interface: xe-7/0/0-rx, Enabled, Physical link is Up

```



extensive (10-Gigabit  
Ethernet, LAN PHY

Interface index: 174, SNMP ifIndex: 118, Generation: 175  
Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps,  
Unidirectional: Rx-Only

**Mode, Unidirectional  
Mode, Receive-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 interface-set (Ethernet Interface Set)

<b>Syntax</b>	<code>show interfaces interface-set <i>interface-set-name</i></code> <code>&lt;detail   terse&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 8.5.
<b>Description</b>	<p>Display information about the specified gigabit or 10-Gigabit Ethernet interface set. Supported in MX Series routers with enhanced queuing DPCs or MPCs.</p> <p>You can also use the <b>show interfaces interface-set</b> command to display information about agent circuit identifier (ACI) interface sets configured on MX Series routers with MPCs/MICs.</p>
<b>Options</b>	<p><b>interface-set <i>interface-set-name</i></b>—Display information about the specified Gigabit Ethernet, 10-Gigabit Ethernet, or ACI interface set.</p> <p><b>detail   terse</b>—(Optional) Display the specified level of output.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration</li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show interfaces interface-set terse on page 211</a></p> <p><a href="#">show interfaces interface-set detail on page 211</a></p> <p><a href="#">show interfaces interface-set (ACI Interface Set) on page 211</a></p>
<b>Output Fields</b>	<a href="#">Table 13 on page 209</a> describes the information for the <b>show interfaces interface-set</b> command.

**Table 13: Ethernet show interfaces interface-set Output Fields**

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Interface set</b>	Name of the interface set or sets.	All levels
<b>Interface set index</b>	<p>Index number of the interface set. For ACI interface sets, the following fields are displayed:</p> <ul style="list-style-type: none"> <li><b>ACI VLAN</b>—ACI interface set that the router uses to create dynamic VLAN subscriber interfaces based on the agent circuit identifier value.</li> <li><b>PPPoE</b>—Dynamic PPPoE subscriber interface that the router creates using the ACI interface set.</li> </ul>	<b>detail none</b>
<b>Agent Circuit ID</b>	For ACI interface sets, string in DHCP or PPPoE control packets that uniquely identifies the subscriber's access node and the DSL line on the access node.	<b>detail none</b>
<b>Max Sessions</b>	For dynamic PPPoE subscriber interfaces, maximum number of PPPoE logical interfaces that that can be activated on the underlying interface.	<b>detail none</b>

Table 13: Ethernet show interfaces interface-set Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Max Sessions VSA Ignore</b>	For dynamic PPPoE subscriber interfaces, whether the router is configured to ignore (clear) the PPPoE maximum session value returned by RADIUS in the Max-Clients-Per-Interface Juniper Networks VSA [26-143] and restore the PPPoE maximum session value on the underlying interface to the value configured with the <b>max-sessions</b> statement: <b>Off</b> (default) or <b>On</b> .	<b>detail none</b>
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the specified interface set.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes, Output bytes</b>—Number of bytes and number of bytes per second received and transmitted on the interface set</li> <li>• <b>Input packets, Output packets</b>—Number of packets and number of packets per second received and transmitted on the interface set.</li> </ul>	<b>detail</b>
<b>Egress queues supported</b>	Total number of egress queues supported on the specified interface set.	<b>detail</b>
<b>Egress queues in use</b>	Total number of egress queues used on the specified interface set.	<b>detail</b>
<b>Queue counters</b>	<b>Queued packets, Transmitted packets, and Dropped packets</b> statistics for the four forwarding classes.	<b>detail</b>
<b>Members</b>	List of all interface sets or, for ACI interface sets, list of all subscriber interfaces belonging to the specified ACI interface set.	<b>detail none</b>

## Sample Output

### show interfaces interface-set terse

```
user@host> show interfaces interface-set terse
Interface set:
  iflset-xe-11/3/0-0
  ge-1/0/1-0
  ge-1/0/1-2
```

### show interfaces interface-set detail

```
user@host> show interfaces interface-set iflset-xe-11/3/0-0 detail
Interface set: iflset-xe-11/3/0-0
Interface set index: 19
Traffic statistics:
  Output bytes :          751017840          401673504 bps
  Output packets:         11044380          738377 pps
Egress queues: 4 supported, 4 in use
Queue counters:
  Queued packets  Transmitted packets  Dropped packets
0 best-effort    211091327          11044380        199995746
1 expedited-fo      0                  0                0
2 assured-forw      0                  0                0
3 network-cont      0                  0                0
Members:
  xe-11/3/0.0
```

### show interfaces interface-set (ACI Interface Set)

```
user@host> show interfaces interface-set
Interface set: aci-1001-demux0.1073741826
Interface set index: 1
ACI VLAN:
  Agent Circuit ID: aci-ppp-dhcp-dvlan-60
PPPoE:
  Max Sessions: 3, Max Sessions VSA Ignore: Off
Members:
  pp0.1073741827
```

## show interfaces interface-set queue

---

<b>Syntax</b>	<code>show interfaces interface-set queue <i>interface-set-name</i></code> <code>&lt;aggregate   remaining-traffic&gt;</code> <code>&lt;forwarding-class <i>class-name</i>&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 8.5.
<b>Description</b>	Display information about the gigabit or 10-Gigabit Ethernet interface set queue. Supported in MX Series routers with enhanced queuing DPCs.
<b>Options</b>	<p><b><i>interface-set-name</i></b>—(Optional) Display information about the specified gigabit or 10-Gigabit Ethernet interface set. Wildcard values can be used in the interface set name.</p> <p><b><i>aggregate</i></b>—(Optional) Display the aggregated queuing statistics of all member logical interfaces for interface sets that have traffic-control profiles configured.</p> <p><b><i>both-ingress-egress</i></b>—(Optional) On Gigabit Ethernet Intelligent Queuing 2 (IQ2) PICs, display both ingress and egress queue statistics.</p> <p><b><i>egress</i></b>—(Optional) Display egress queue statistics.</p> <p><b><i>forwarding-class class-name</i></b>—(Optional) Display queuing statistics for the specified forwarding class.</p> <p><b><i>ingress</i></b>—(Optional) On Gigabit Ethernet IQ2 PICs, display ingress queue statistics.</p> <p><b><i>remaining-traffic</i></b>—(Optional) Display the queuing statistics of all member logical interfaces for interface sets that do not have traffic-control profiles configured.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers</li></ul>
<b>List of Sample Output</b>	<p><a href="#">show interfaces interface-set queue (Gigabit Ethernet) on page 214</a></p> <p><a href="#">show interfaces interface-set queue both-ingress-egress (Enhanced DPC) on page 214</a></p> <p><a href="#">show interfaces interface-set queue egress (Enhanced DPC) on page 216</a></p> <p><a href="#">show interfaces interface-set queue forwarding-class (Gigabit Ethernet) on page 218</a></p> <p><a href="#">show interfaces interface-set queue (Enhanced DPC) on page 219</a></p> <p><a href="#">show interfaces interface-set queue remaining-traffic (Gigabit Ethernet) on page 220</a></p>
<b>Output Fields</b>	Table 14 on page 213 describes the information for the <b>show interfaces interface-set queue</b> command.

Table 14: Ethernet show interfaces interface-set queue Output Fields

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Interface set</b>	Name of the interface set.	All levels
<b>Interface set index</b>	Index number of the interface set.	All levels
<b>Forwarding classes supported</b>	Total number of forwarding classes supported on the specified interface set.	All levels
<b>Forwarding classes in use</b>	Total number of forwarding classes used on the specified interface set.	All levels
<b>Egress queues supported</b>	Total number of egress queues supported on the specified interface set.	All levels
<b>Egress queues in use</b>	Total number of egress queues used on the specified interface set.	All levels
<b>Ingress queues supported</b>	Total number of ingress queues supported on the specified interface set.	All levels
<b>Ingress queues in use</b>	Total number of ingress queues used on the specified interface set.	All levels
<b>Queue</b>	Egress or ingress queue number for the statistics being displayed.	All levels
<b>Forwarding classes</b>	Forwarding class name for the statistics being displayed.	All levels
<b>Queued</b>	<b>Packet</b> and <b>Byte</b> statistics for the specified queue. <ul style="list-style-type: none"> <li><b>Packets</b>—Number of packets queued and input rate in packets per second.</li> <li><b>Bytes</b>—Number of bytes queued and input rate in bytes per second.</li> </ul>	All levels
<b>Transmitted</b>	<b>Packet</b> and <b>Byte</b> statistics for the specified forwarding class. <ul style="list-style-type: none"> <li><b>Packets</b>—Number of packets transmitted and transmit rate in packets per second.</li> <li><b>Bytes</b>—Number of bytes transmitted and transmit rate in bytes per second.</li> <li><b>Tail-dropped packets</b>—Number of packets tail dropped.</li> <li><b>RED-dropped packets</b>—Number of RED-dropped packets for the <b>low</b>, <b>medium-low</b>, <b>medium-high</b>, and <b>high</b> loss priorities.</li> <li><b>RED-dropped bytes</b>—Number of RED-dropped bytes for the <b>low</b>, <b>medium-low</b>, <b>medium-high</b>, and <b>high</b> loss priorities.</li> </ul>	All levels

## Sample Output

**show interfaces**  
**interface-set queue**  
**(Gigabit Ethernet)**

```
user@host> show interfaces interface-set queue ge-2/2/0-0
Interface set: ge-2/2/0-0
Interface set index: 3
Forwarding classes: 8 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
  Queued:
    Packets          :          3998482          1 pps
    Bytes            :          271896884        688 bps
  Transmitted:
    Packets          :          1077474          1 pps
    Bytes            :          73268340        688 bps
    Tail-dropped packets :          0          0 pps
    RED-dropped packets :          2921008          0 pps
      Low            :          2921008          0 pps
      Medium-low     :          0          0 pps
      Medium-high    :          0          0 pps
      High           :          0          0 pps
    RED-dropped bytes :          198628544          0 bps
      Low            :          198628544          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:
    ...
```

**show interfaces**  
**interface-set queue**

```
user@host> show interfaces interface-set queue ge-2/2/0-0 both-ingress-egress
Interface set: ge-2/2/0-0
Interface set index: 3
```



**both-ingress-egress  
(Enhanced DPC)**

```

Forwarding classes: 16 supported, 4 in use
Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
  Queued:
    Packets      :      185968478      473161 pps
    Bytes        :      10042313520    204441336 bps
  Transmitted:
    Packets      :      5441673        13780 pps
    Bytes        :      293850342      5952960 bps
    Tail-dropped packets :      0      0 pps
    RED-dropped packets :      180526772  459372 pps
    RED-dropped bytes  :      9748446282 198451512 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
    RED-dropped bytes  :      0      0 bps
Queue: 2, Forwarding classes: assured-forwarding
  Queued:
    Packets      :      522021472      473602 pps
    Bytes        :      28190332480    204599944 bps
  Transmitted:
    Packets      :      5791772        4055 pps
    Bytes        :      312755688      1751976 bps
    Tail-dropped packets :      0      0 pps
    RED-dropped packets :      516227139  469546 pps
    RED-dropped bytes  :      27876265560 202843872 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
    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      :      5417304        13797 pps
    Bytes        :      368429508      7506096 bps
  Transmitted:
    Packets      :      5014996        12769 pps
    Bytes        :      341019728      6946560 bps
    Tail-dropped packets :      0      0 pps
    RED-dropped packets :      402189      1028 pps
    Low          :      402189      1028 pps
    Medium-low   :      0      0 pps
    Medium-high  :      0      0 pps
    High         :      0      0 pps
    RED-dropped bytes  :      27348852    559536 bps
    Low          :      27348852    559536 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 : 5770534 3963 pps
  Bytes : 396943252 2156144 bps
Transmitted:
  Packets : 3945152 1457 pps
  Bytes : 268270336 792608 bps
  Tail-dropped packets : 0 0 pps
  RED-dropped packets : 1815141 2506 pps
    Low : 1815141 2506 pps
    Medium-low : 0 0 pps
    Medium-high : 0 0 pps
    High : 0 0 pps
  RED-dropped bytes : 123429524 1363536 bps
    Low : 123429524 1363536 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  
interface-set queue

```

user@host> show interfaces interface-set queue ge-2/2/0-0 egress
Interface set: ge-2/2/0-0
Interface set index: 3

```

## egress (Enhanced DPC)

```

Forwarding classes: 16 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
  Queued:
    Packets      :          3958253          13822 pps
    Bytes        :          269217592        7519712 bps
  Transmitted:
    Packets      :          3665035          12729 pps
    Bytes        :          249222380        6924848 bps
    Tail-dropped packets :          0          0 pps
    RED-dropped packets :          293091        1093 pps
      Low        :          293091        1093 pps
      Medium-low :          0          0 pps
      Medium-high :          0          0 pps
      High        :          0          0 pps
    RED-dropped bytes :          19930188        594864 bps
      Low        :          19930188        594864 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      :          5350989          3904 pps
    Bytes        :          368412924        2124048 bps
  Transmitted:
    Packets      :          3790469          1465 pps
    Bytes        :          257751892        796960 bps
    Tail-dropped packets :          0          0 pps
    RED-dropped packets :          1550282        2439 pps
      Low        :          1550282        2439 pps
      Medium-low :          0          0 pps
      Medium-high :          0          0 pps
      High        :          0          0 pps
    RED-dropped bytes :          105419176        1327088 bps
      Low        :          105419176        1327088 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**  
**interface-set queue**

```
user@host> show interfaces interface-set queue ge-2/2/0-0 forwarding-class best-effort
Interface set: ge-2/2/0-0
Interface set index: 3
```

### forwarding-class (Gigabit Ethernet)

```
Forwarding classes: 8 supported, 4 in use
Egress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
  Packets      :      101857694      1420083 pps
  Bytes       :      6927234456     772532320 bps
Transmitted:
  Packets      :      3984693       55500 pps
  Bytes       :     270959592     30192512 bps
  Tail-dropped packets :      0      0 pps
  RED-dropped packets :     97870952    1364583 pps
  Low         :     97870952    1364583 pps
  Medium-low  :      0      0 pps
  Medium-high :      0      0 pps
  High        :      0      0 pps
  RED-dropped bytes :     6655225776    742339808 bps
  Low         :     6655225776    742339808 bps
  Medium-low  :      0      0 bps
  Medium-high :      0      0 bps
  High        :      0      0 bps
```

### show interfaces interface-set queue (Enhanced DPC)

```
user@host> show interfaces interface-set queue ge-2/2/0-0 ingress
Interface set: foo
Interface set index: 3
Forwarding classes: 16 supported, 4 in use
Ingress queues: 4 supported, 4 in use
Queue: 0, Forwarding classes: best-effort
Queued:
  Packets      :      149036817      473711 pps
  Bytes       :     8048003934     204642936 bps
Transmitted:
  Packets      :      4360749       13891 pps
  Bytes       :     235480446     6000912 bps
  Tail-dropped packets :      0      0 pps
  RED-dropped packets :     144676035    459820 pps
  RED-dropped bytes :     7812506592    198642024 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
  RED-dropped bytes :      0      0 bps
Queue: 2, Forwarding classes: assured-forwarding
Queued:
  Packets      :      485089207      473605 pps
  Bytes       :     26195987476     204597576 bps
Transmitted:
  Packets      :      5480799       3959 pps
  Bytes       :     295963146     1710504 bps
  Tail-dropped packets :      0      0 pps
  RED-dropped packets :     479605853    469646 pps
  RED-dropped bytes :     25898716170    202887072 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
RED-dropped bytes	:	0	0 bps

**show interfaces  
interface-set queue  
remaining-traffic  
(Gigabit Ethernet)**

user@host> show interfaces interface-set queue ge-2/2/0-0 remaining-traffic

Interface set: ge-2/2/0-0

Interface set index: 12

Forwarding classes: 8 supported, 4 in use

Egress queues: 4 supported, 4 in use

Queue: 0, Forwarding classes: best-effort

Queued:

Packets	:	2201552	0 pps
Bytes	:	149705536	0 bps

Transmitted:

Packets	:	609765	0 pps
Bytes	:	41464020	0 bps
Tail-dropped packets	:	0	0 pps
RED-dropped packets	:	1591787	0 pps
Low	:	1591787	0 pps
Medium-low	:	0	0 pps
Medium-high	:	0	0 pps
High	:	0	0 pps
RED-dropped bytes	:	108241516	0 bps
Low	:	108241516	0 bps
Medium-low	:	0	0 bps
Medium-high	:	0	0 bps
High	:	0	0 bps

## show interfaces irb

<b>Syntax</b>	<pre>show interfaces irb &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced in Junos OS Release 8.4.
<b>Description</b>	Display integrated routing and bridging interfaces information.
<b>Options</b>	<p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display interface description strings.</p> <p><b>media</b>—(Optional) Display media-specific information about network interfaces.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information for the interface with the specified SNMP index.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Additional Information</b>	Integrated routing and bridging (IRB) provides simultaneous support for Layer 2 bridging and Layer 3 IP routing on the same interface. IRB enables you to route local packets to another routed interface or to another bridging domain that has a Layer 3 protocol configured.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces irb extensive on page 226</a> <a href="#">show interfaces irb snmp-index on page 227</a>
<b>Output Fields</b>	<a href="#">Table 15 on page 221</a> lists the output fields for the <b>show interfaces irb</b> command. Output fields are listed in the approximate order in which they appear.

**Table 15: show interfaces irb Output Fields**

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Physical interface</b>	Name of the physical interface.	All levels
<b>Enabled</b>	State of the physical interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
<b>Proto</b>	Protocol configured on the interface.	<b>terse</b>
<b>Interface index</b>	Physical interface index number, which reflects its initialization sequence.	<b>detail extensive none</b>

Table 15: show interfaces irb Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Type</b>	Physical interface type.	<b>detail extensive none</b>
<b>Link-level type</b>	Encapsulation being used on the physical interface.	<b>detail extensive brief none</b>
<b>MTU</b>	MTU size on the physical interface.	<b>detail extensive brief none</b>
<b>Clocking</b>	Reference clock source: <b>Internal</b> or <b>External</b> . Always unspecified on IRB interfaces.	<b>detail extensive brief</b>
<b>Speed</b>	Speed at which the interface is running. Always unspecified on IRB interfaces.	<b>detail extensive brief</b>
<b>Device flags</b>	Information about the physical device. Possible values are described in the "Device Flags" section under Common Output Fields Description.	<b>detail extensive brief none</b>
<b>Interface flags</b>	Information about the interface. Possible values are described in the "Interface Flags" section under Common Output Fields Description.	<b>detail extensive brief none</b>
<b>Link type</b>	Physical interface link type: <b>full duplex</b> or <b>half duplex</b> .	<b>detail extensive none</b>
<b>Link flags</b>	Information about the link. Possible values are described in the "Links Flags" section under Common Output Fields Description.	<b>detail extensive none</b>
<b>Physical Info</b>	Physical interface information.	All levels
<b>Hold-times</b>	Current interface hold-time up and hold-time down, in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive none</b>
<b>Hardware address</b>	MAC address of the hardware.	<b>detail extensive none</b>
<b>Alternate link address</b>	Backup address of the link.	<b>detail extensive</b>
<b>Last flapped</b>	Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hours:minutes:seconds timezone (hours:minutes:seconds ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .	<b>detail extensive none</b>
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>



Table 15: show interfaces irb Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	<p>Number of IPv6 transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>detail extensive</b>
<b>Output errors</b>	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the DPC is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeded the MTU of the interface.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>detail extensive</b>

#### Logical Interface

Table 15: show interfaces irb Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface (which reflects its initialization sequence).	<b>detail extensive</b> none
<b>SNMP ifIndex</b>	SNMP interface index number of the logical interface.	<b>detail extensive</b> none
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under Common Output Fields Description.	<b>detail extensive</b>
<b>Encapsulation</b>	Encapsulation on the logical interface.	<b>detail extensive</b>
<b>Bandwidth</b>	Speed at which the interface is running.	<b>detail extensive</b>
<b>Routing Instance</b>	Routing instance IRB is configured under.	<b>detail extensive</b>
<b>Bridging Domain</b>	Bridging domain IRB is participating in.	<b>detail extensive</b>
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the logical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>IPv6 transit statistics</b>	<p>Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Local statistics</b>	Statistics for traffic received from and transmitted to the Routing Engine.	<b>detail extensive</b>
<b>Transit statistics</b>	Statistics for traffic transiting the router.	<b>detail extensive</b>
<b>Protocol</b>	Protocol family configured on the local interface. Possible values are described in the "Protocol Field" section under Common Output Fields Description.	<b>detail extensive</b>
<b>MTU</b>	Maximum transmission unit size on the logical interface.	<b>detail extensive</b>
<b>Maximum labels</b>	Maximum number of MPLS labels configured for the MPLS protocol family on the logical interface.	<b>detail extensive</b> none

Table 15: show interfaces irb Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route table</b>	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0.	<b>detail extensive</b>
<b>Addresses, Flags</b>	Information about address flags. Possible values are described in the “Addresses Flags” section under Common Output Fields Description.	<b>detail extensive</b>
<b>Policer</b>	The policer that is to be evaluated when packets are received or transmitted on the interface.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under Common Output Fields Description.	<b>detail extensive</b>

## Sample Output

**show interfaces irb  
extensive**

```
user@host> show interfaces irb extensive
Physical interface: irb, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 23, Generation: 130
  Type: Ethernet, Link-level type: Ethernet, MTU: 1514, Clocking: Unspecified,
Speed: Unspecified
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link type      : Full-Duplex
  Link flags     : None
  Physical info  : Unspecified
  Hold-times    : Up 0 ms, Down 0 ms
  Current address: 02:00:00:00:00:30, Hardware address: 02:00:00:00:00:30
  Alternate link address: Unspecified
  Last flapped  : Never
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  IPv6 transit statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, 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 irb.0 (Index 68) (SNMP ifIndex 70) (Generation 143)
  Flags: Hardware-Down SNMP-Traps 0x4000 Encapsulation: ENET2
  Bandwidth: 1000mbps
  Routing Instance: customer_0 Bridging Domain: bd0
  Traffic statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  IPv6 transit statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  Local statistics:
    Input bytes   : 0
    Output bytes  : 0
    Input packets: 0
    Output packets: 0
  Transit statistics:
    Input bytes   : 0 0 bps
    Output bytes  : 0 0 bps
    Input packets: 0 0 pps
    Output packets: 0 0 pps
  IPv6 transit statistics:
    Input bytes   : 0
```

```

Output bytes : 0
Input packets: 0
Output packets: 0
Protocol inet, MTU: 1500, Generation: 154, Route table: 0
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.51.1/24, Local: 10.51.1.2, Broadcast: 10.51.1.255,
Generation: 155
Protocol multiservice, MTU: 1500, Generation: 155, Route table: 0
Flags: Is-Primary
Policer: Input: __default_arp_policer

```

### show interfaces irb snmp-index

```

user@host> show interfaces snmp-index 25
Physical interface: irb, Enabled, Physical link is Up
Interface index: 128, SNMP ifIndex: 25
Type: Ethernet, Link-level type: Ethernet, MTU: 1514
Device flags : Present Running
Interface flags: SNMP-Traps
Link type : Full-Duplex
Link flags : None
Current address: 02:00:00:00:00:30, Hardware address: 02:00:00:00:00:30
Last flapped : Never
Input packets : 0
Output packets: 0

Logical interface irb.0 (Index 68) (SNMP ifIndex 70)
Flags: Hardware-Down SNMP-Traps 0x4000 Encapsulation: ENET2
Bandwidth: 1000mbps
Routing Instance: customer_0 Bridging Domain: bd0
Input packets : 0
Output packets: 0
Protocol inet, MTU: 1500
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.51.1/24, Local: 10.51.1.2, Broadcast: 10.51.1.255
Protocol multiservice, MTU: 1500
Flags: Is-Primary

```

## show lacp interfaces

**Syntax** `show lacp interfaces`  
`<interface-name>`

**Release Information** Command introduced in Junos OS Release 7.6.

**Description** Display Link Aggregation Control Protocol (LACP) information about the specified aggregated Ethernet, Fast Ethernet, or Gigabit Ethernet interface.

**Options** **none**—Display LACP information for all interfaces.

**interface-name**—(Optional) Display LACP information for the specified interface:

- Aggregated Ethernet—**aenumber**
- Fast Ethernet—**fe-fpc/pic/port**
- Gigabit Ethernet—**ge-fpc/pic/port**



**NOTE:** The `show lacp interfaces` command returns the following error message if your system is not configured in either active or passive LACP mode:

“Warning: lacp subsystem not running – not needed by configuration”

**Required Privilege Level** view

**List of Sample Output** [show lacp interfaces \(Aggregated Ethernet\) on page 231](#)  
[show lacp interfaces \(Gigabit Ethernet\) on page 231](#)

**Output Fields** [Table 16 on page 228](#) lists the output fields for the `show lacp interfaces` command. Output fields are listed in the approximate order in which they appear.

**Table 16: show lacp interfaces Output Fields**

Field Name	Field Description
Aggregated interface	Aggregated interface value.

Table 16: show lacp interfaces Output Fields (*continued*)

Field Name	Field Description
LACP State	<p>LACP state information for each aggregated interface:</p> <ul style="list-style-type: none"> <li>• <b>Role</b>—Role played by the interface. It can be one of the following: <ul style="list-style-type: none"> <li>• <b>Actor</b>—Local device participating in LACP negotiation.</li> <li>• <b>Partner</b>—Remote device participating in LACP negotiation.</li> </ul> </li> <li>• <b>Exp</b>—Expired state. <b>Yes</b> indicates the actor or partner is in an expired state. <b>No</b> indicates the actor or partner is not in an expired state.</li> <li>• <b>Def</b>—Default. <b>Yes</b> indicates that the actor's receive machine is using the default operational partner information, administratively configured for the partner. <b>No</b> indicates the operational partner information in use has been received in an LACP PDU.</li> <li>• <b>Dist</b>—Distribution of outgoing frames. <b>No</b> indicates distribution of outgoing frames on the link is currently disabled and is not expected to be enabled. Otherwise, the value is <b>Yes</b>.</li> <li>• <b>Col</b>—Collection of incoming frames. <b>Yes</b> indicates collection of incoming frames on the link is currently enabled and is not expected to be disabled. Otherwise, the value is <b>No</b>.</li> <li>• <b>Syn</b>—Synchronization. If the value is <b>Yes</b>, the link is considered synchronized. It has been allocated to the correct link aggregation group, the group has been associated with a compatible aggregator, and the identity of the link aggregation group is consistent with the system ID and operational key information transmitted. If the value is <b>No</b>, the link is not synchronized. It is currently not in the right aggregation.</li> <li>• <b>Aggr</b>—Ability of aggregation port to aggregate (<b>Yes</b>) or to operate only as an individual link (<b>No</b>).</li> <li>• <b>Timeout</b>—LACP timeout preference. Periodic transmissions of LACP PDUs occur at either a slow or fast transmission rate, depending upon the expressed LACP timeout preference (<b>Long Timeout</b> or <b>Short Timeout</b>).</li> <li>• <b>Activity</b>—Actor or partner's port activity. <b>Passive</b> indicates the port's preference for not transmitting LAC PDUs unless its partner's control value is <b>Active</b>. <b>Active</b> indicates the port's preference to participate in the protocol regardless of the partner's control value.</li> </ul>

Table 16: show lacp interfaces Output Fields (*continued*)

Field Name	Field Description
LACP Protocol	<p>LACP protocol information for each aggregated interface:</p> <ul style="list-style-type: none"> <li>• Link state (active or standby) indicated in parentheses next to the interface when link protection is configured.</li> <li>• <b>Receive State</b>—One of the following values: <ul style="list-style-type: none"> <li>• <b>Current</b>—The state machine receives an LACP PDU and enters the <b>Current</b> state.</li> <li>• <b>Defaulted</b>—If no LACP PDU is received before the timer for the <b>Current</b> state expires a second time, the state machine enters the <b>Defaulted</b> state.</li> <li>• <b>Expired</b>—If no LACP PDU is received before the timer for the <b>Current</b> state expires once, the state machine enters the <b>Expired</b> state.</li> <li>• <b>Initialize</b>—When the physical connectivity of a link changes or a Begin event occurs, the state machine enters the <b>Initialize</b> state.</li> <li>• <b>LACP Disabled</b>—If the port is operating in half duplex, the operation of LACP is disabled on the port, forcing the state to <b>LACP Disabled</b>. This state is similar to the <b>Defaulted</b> state, except that the port is forced to operate as an individual port.</li> <li>• <b>Port Disabled</b>—If the port becomes inoperable and a Begin event has not occurred, the state machine enters the <b>Port Disabled</b> state.</li> </ul> </li> <li>• <b>Transmit State</b>—Transmit state of state machine. One of the following values: <ul style="list-style-type: none"> <li>• <b>Fast Periodic</b>—Periodic transmissions are enabled at a fast transmission rate.</li> <li>• <b>No Periodic</b>—Periodic transmissions are disabled.</li> <li>• <b>Periodic Timer</b>—Transitory state entered when the periodic timer expires.</li> <li>• <b>Slow Periodic</b>—Periodic transmissions are enabled at a slow transmission rate.</li> </ul> </li> <li>• <b>Mux State</b>—State of the multiplexer state machine for the aggregation port. The state is one of the following values: <ul style="list-style-type: none"> <li>• <b>Attached</b>—Multiplexer state machine initiates the process of attaching the port to the selected aggregator.</li> <li>• <b>Collecting—Yes</b> indicates that the receive function of this link is enabled with respect to its participation in an aggregation. Received frames are passed to the aggregator for collection. <b>No</b> indicates the receive function of this link is not enabled.</li> <li>• <b>Collecting Distributing</b>—Collecting and distributing states are merged together to form a combined state (coupled control). Because independent control is not possible, the coupled control state machine does not wait for the partner to signal that collection has started before enabling both collection and distribution.</li> <li>• <b>Detached</b>—Process of detaching the port from the aggregator is in progress.</li> <li>• <b>Distributing—Yes</b> indicates that the transmit function of this link is enabled with respect to its participation in an aggregation. Frames may be passed down from the aggregator's distribution function for transmission. <b>No</b> indicates the transmit function of this link is not enabled.</li> <li>• <b>Waiting</b>—Multiplexer state machine is in a holding process, awaiting an outcome.</li> </ul> </li> </ul>
LACP Statistics	<p>LACP statistics are returned when the <b>extensive</b> option is used and provides the following information:</p> <ul style="list-style-type: none"> <li>• <b>LACP Rx</b>—LACP received counter that increments for each normal hello.</li> <li>• <b>LACP Tx</b>—Number of LACP transmit packet errors logged.</li> <li>• <b>Unknown Rx</b>—Number of unrecognized packet errors logged.</li> <li>• <b>Illegal Rx</b>—Number of invalid packets received.</li> </ul>



## Sample Output

### show lacp interfaces (Aggregated Ethernet)

```
user@host> show lacp interfaces ae0 extensive
```

```
Aggregated interface: ae0
LACP state:      Role  Exp  Def  Dist  Col  Syn  Aggr  Timeout  Activity
ge-1/0/1        Actor  No   Yes  No    No   No   Yes    Fast    Active
ge-1/0/1        Partner No   Yes  No    No   No   Yes    Fast    Passive
ge-1/0/2        Actor  No   Yes  No    No   No   Yes    Fast    Active
ge-1/0/2        Partner No   Yes  No    No   No   Yes    Fast    Passive

LACP protocol:   Receive State   Transmit State   Mux State
ge-1/0/1        CURRENT          Fast periodic    Collecting
distributing
ge-1/0/2        CURRENT          Fast periodic    Collecting
distributing
ge-1/0/1 (active) CURRENT          Fast periodic    Collecting
distributing
ge-1/0/2 (standby) CURRENT          Fast periodic    WAITING
LACP Statistics: LACP Rx    LACP Tx    Unknown Rx  Illegal Rx
ge-1/0/1        0          0          0          0
ge-1/0/2        0          0          0          0
```

### show lacp interfaces (Gigabit Ethernet)

```
user@host> show lacp interfaces ge-0/3/0
```

```
Aggregated interface: ae0
LACP State:      Role  Exp  Def  Dist  Col  Syn  Aggr  Timeout  Activity
ge-0/3/0        Actor  No   No   Yes  Yes  Yes  Yes    Fast    Active
ge-0/3/0        Partner No   No   Yes  Yes  Yes  Yes    Fast    Active
LACP Protocol:   Receive State   Transmit State   Mux State
ge-0/3/0        Current          Fast periodic    Collecting distributing
```

## show interfaces mac-database (Gigabit Ethernet)

<b>Syntax</b>	<code>show interfaces mac-database (ge-fpc/pic/port   ge-fpc/pic/port.n) &lt;mac-address mac-address&gt;</code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced on PTX Series Packet Transport Switches for Junos OS Release 12.1.
<b>Description</b>	(M Series, T Series, MX Series routers, and PTX Series Packet Transport Switches only) Display media access control (MAC) address information for the specified Gigabit Ethernet interface.
<b>Options</b>	<p><b>ge-fpc/pic/port</b>—Display MAC addresses that have been learned on all logical interfaces on a particular physical interface.</p> <p><b>ge-fpc/pic/port.n</b>—Display MAC addresses that have been learned on a particular logical interface.</p> <p><b>mac-address mac-address</b>—(Optional) Display detailed MAC address statistics, including policer information.</p>
<b>Additional Information</b>	On IQ2 PIC interfaces, the default value for maximum retention of entries in the MAC address table has changed, for cases in which the table is not full. The new holding time is 12 hours. The previous retention time of 3 minutes is still in effect when the table is full.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces mac-database (All MAC Addresses on a Port) on page 234</a> <a href="#">show interfaces mac-database (All MAC Addresses on a Service) on page 235</a> <a href="#">show interfaces mac-database mac-address on page 236</a>
<b>Output Fields</b>	<a href="#">Table 17 on page 232</a> lists the output fields for the <b>show interfaces mac-database</b> command. Output fields are listed in the approximate order in which they appear.

Table 17: show interfaces mac-database Output Fields

Field Name	Field Description
<b>Physical Interface</b>	
<b>Physical interface</b>	Name of the physical interface.
<b>Enabled</b>	State of the physical interface. Possible values are described in the "Enabled Field" section under Common Output Fields Description.
<b>Interface index</b>	Physical interface index number, which reflects its initialization sequence.
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.
<b>Description</b>	Description and name of the interface.

Table 17: show interfaces mac-database Output Fields (*continued*)

Field Name	Field Description
<b>Link-level type</b>	Encapsulation being used on the physical interface.
<b>MTU</b>	MTU size on the physical interface.
<b>Speed</b>	Speed at which the interface is running.
<b>Loopback</b>	Whether loopback is enabled and the type of loopback: <b>local</b> or <b>remote</b> .
<b>Source filtering</b>	Whether source filtering is configured.
<b>Flow control</b>	Whether flow control is enabled or disabled.
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under Common Output Fields Description.
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Links Flags” section under Common Output Fields Description.
<b>Link flags</b>	Information about the link. Possible values are described in the “Device Flags” section under Common Output Fields Description.
<b>Logical Interface</b>	
<b>Logical interface</b>	Name of the logical interface.
<b>Index</b>	Logical interface index number, which reflects its initialization sequence.
<b>SNMP ifIndex</b>	Logical interface SNMP interface index number.
<b>Flags</b>	Information about the logical interface (possible values are described in the “Logical Interface Flags” section under Common Output Fields Description.
<b>Encapsulation</b>	Encapsulation on the logical interface.
<b>MAC address, Input frames, Input bytes, Output frames, Output bytes</b>	MAC address and corresponding number of input frames, input bytes, output frames, and output bytes.
<b>Number of MAC addresses</b>	Number of MAC addresses configured.

Table 17: show interfaces mac-database Output Fields (*continued*)

Field Name	Field Description
<b>Policer Statistics</b>	<p>(Displayed for <b>mac-address</b> option only) Display information about policers applied to a logical interface-MAC pair.</p> <ul style="list-style-type: none"><li>• <b>Policer type</b>—Type of policer that is out of spec with respect to the configuration. It can be one or more of the following:<ul style="list-style-type: none"><li>• <b>Input premium</b>—Number of high-priority rating out-of-spec frames or bytes received.</li><li>• <b>Output premium</b>—Number of high-priority rating out-of-spec frames or bytes sent.</li><li>• <b>Input aggregate</b>—Total number of out-of-spec frames or bytes received.</li><li>• <b>Output aggregate</b>—Total number of out-of-spec frames or bytes sent.</li></ul></li><li>• <b>Discarded Frames</b>—Number of discarded frames.</li><li>• <b>Discarded Bytes</b>—Number of discarded bytes.</li></ul>

## Sample Output

**show interfaces  
mac-database (All**

```
user@host> show interfaces mac-database xe-0/3/3
Physical interface: xe-0/3/3, Enabled, Physical link is Up
Interface index: 372, SNMP ifIndex: 788
```

### MAC Addresses on a Port)

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

Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)

Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2

MAC address	Input frames	Input bytes	Output frames	Output bytes
00:00:00:00:00:00	1	56	0	0
00:00:c0:01:01:02	7023810	323095260	0	0
00:00:c0:01:01:03	7023810	323095260	0	0
00:00:c0:01:01:04	7023810	323095260	0	0
00:00:c0:01:01:05	7023810	323095260	0	0
00:00:c0:01:01:06	7023810	323095260	0	0
00:00:c0:01:01:07	7023810	323095260	0	0
00:00:c0:01:01:08	7023809	323095214	0	0
00:00:c0:01:01:09	7023809	323095214	0	0
00:00:c0:01:01:0a	7023809	323095214	0	0
00:00:c0:01:01:0b	7023809	323095214	0	0
00:00:c8:01:01:02	30424784	1399540064	37448598	1722635508
00:00:c8:01:01:03	30424784	1399540064	37448598	1722635508
00:00:c8:01:01:04	30424716	1399536936	37448523	1722632058
00:00:c8:01:01:05	30424789	1399540294	37448598	1722635508
00:00:c8:01:01:06	30424788	1399540248	37448597	1722635462
00:00:c8:01:01:07	30424783	1399540018	37448597	1722635462
00:00:c8:01:01:08	30424783	1399540018	37448596	1722635416
00:00:c8:01:01:09	8836796	406492616	8836795	406492570
00:00:c8:01:01:0a	30424712	1399536752	37448521	1722631966
00:00:c8:01:01:0b	30424715	1399536890	37448523	1722632058

Number of MAC addresses : 21

### show interfaces mac-database (All

user@host> show interfaces mac-database xe-0/3/3

Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)

Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2

## MAC Addresses on a Service)

MAC address	Input frames	Input bytes	Output frames	Output bytes
00:00:00:00:00:00	1	56	0	0
00:00:c0:01:01:02	7023810	323095260	0	0
00:00:c0:01:01:03	7023810	323095260	0	0
00:00:c0:01:01:04	7023810	323095260	0	0
00:00:c0:01:01:05	7023810	323095260	0	0
00:00:c0:01:01:06	7023810	323095260	0	0
00:00:c0:01:01:07	7023810	323095260	0	0
00:00:c0:01:01:08	7023809	323095214	0	0
00:00:c0:01:01:09	7023809	323095214	0	0
00:00:c0:01:01:0a	7023809	323095214	0	0
00:00:c0:01:01:0b	7023809	323095214	0	0
00:00:c8:01:01:02	31016568	1426762128	38040381	1749857526
00:00:c8:01:01:03	31016568	1426762128	38040382	1749857572
00:00:c8:01:01:04	31016499	1426758954	38040306	1749854076
00:00:c8:01:01:05	31016573	1426762358	38040381	1749857526
00:00:c8:01:01:06	31016573	1426762358	38040381	1749857526
00:00:c8:01:01:07	31016567	1426762082	38040380	1749857480
00:00:c8:01:01:08	31016567	1426762082	38040379	1749857434
00:00:c8:01:01:09	9428580	433714680	9428580	433714680
00:00:c8:01:01:0a	31016496	1426758816	38040304	1749853984
00:00:c8:01:01:0b	31016498	1426758908	38040307	1749854122

show interfaces  
mac-database  
mac-address

```

user@host> show interfaces mac-database xe-0/3/3 mac-address 00:00:c8:01:01:09
Physical interface: xe-0/3/3, Enabled, Physical link is Up
  Interface index: 372, SNMP ifIndex: 788
  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

Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)
  Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
  MAC address: 00:00:c8:01:01:09, Type: Configured,
    Input bytes   : 202324652
    Output bytes  : 202324560
    Input frames  : 4398362
    Output frames : 4398360
  Policer statistics:
    Policer type   Discarded frames   Discarded bytes
    Output aggregate      3992386           183649756

```

## show interfaces mc-ae

<b>Syntax</b>	<b>show interfaces mc-ae id <i>identifier</i> unit <i>number</i></b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.6.
<b>Description</b>	On MX Series routers with multi-chassis aggregated Ethernet ( <b>mc-aeX</b> ) interfaces, use this command to display information about the <b>mc-aeX</b> interfaces.
<b>Options</b>	<b><i>identifier</i></b> —(Optional) Name of the multichassis aggregated Ethernet interface. <b><i>number</i></b> —(Optional) Specify the logical interface by unit number.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces mc-ae on page 238</a> <a href="#">show interfaces mc-ae (Active/Active Bridging and VRRP over IRB on MX Series Routers) on page 238</a>
<b>Output Fields</b>	<a href="#">Table 18 on page 237</a> lists the output fields for the <b>show interfaces mc-ae</b> command. Output fields are listed in the approximate order in which they appear.

**Table 18: show interfaces mc-ae Output Fields**

Output Field Name	Field Description
<b>Member Links</b>	Identifiers of the configured multichassis link aggregate interfaces configured interfaces.
<b>Local Status</b>	Status of the local link: <b>active</b> or <b>standby</b> .
<b>Peer Status</b>	Status of the peer link: <b>active</b> or <b>standby</b> .
<b>Peer State</b>	Status of the local and peer links in an <b>active/active</b> bridge or VRRP over integrated routing and bridging (IRB) configuration on MX Series routers, including:  Logical Interface—Aggregated Ethernet (AE) aggregate number and unit number.  Topology Type—The bridge or VRRP topology type configured on the AE.  Local State—Up or down state of the local device.  Peer State—Up or down state of the peer device.  Peer Ip/ICL-PL/State—Address, interface and state of the peer device.
<b>Logical Interface</b>	Identifier and unit of the mc-ae interface.
<b>Core Facing Interface</b>	Label: <b>pseudowire interface</b> or <b>Ethernet interface</b> .

Table 18: show interfaces mc-ae Output Fields (*continued*)

Output Field Name	Field Description
ICL-PL	Label: pseudowire interface or Ethernet interface.

## Sample Output

```
show interfaces mc-ae user@host> show interfaces mc-ae ae0 unit 512
Member Links      : ae0
Local Status      : active
Peer Status       : active
Logical Interface  : ae0.512
Core Facing Interface : Label Ethernet Interface
ICL-PL            : Label Ethernet Interface
```

```
show interfaces mc-ae user@host# show interfaces mc-ae ge-0/0/0.0
(Active/Active
Bridging and VRRP
over IRB on MX Series
Routers)
Member Link      : ae0
Current State Machine's State: active
Local Status     : active
Local State      : up
Peer Status      : active
Peer State       : up
Logical Interface : ae0.0
Topology Type    : bridge
Local State      : up
Peer State       : up
Peer Ip/ICL-PL/State : 192.168.100.10 ge-0/0/0.0 up
```



## show oam ethernet connectivity-fault-management delay-statistics

<b>Syntax</b>	<pre>show oam ethernet connectivity-fault-management delay-statistics &lt;count <i>entry-count</i>&gt; &lt;local-mep <i>local-mep-id</i>&gt; maintenance-association <i>ma-name</i> maintenance-domain <i>md-name</i> &lt;remote-mep <i>remote-mep-id</i>&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.5.</p> <p>Command introduced in Junos OS Release 11.4 for EX Series switches.</p>
<b>Description</b>	<p>On MX Series routers with Ethernet interfaces on Dense Port Concentrators (DPCs), display ETH-DM delay statistics.</p> <p>On EX Series switches, display delay measurement results.</p>
<b>Options</b>	<p><b>count</b> <i>entry-count</i>—(Optional) Number of entries to display from the statistics table. The range of values is 1 through 100. The default value is 100 entries.</p> <p><b>local-mep</b> <i>local-mep-id</i>—(Optional) Numeric identifier of the local MEP. On MX Series routers, the range of values is 1 through 8192. On EX Series switches, the range of values is 1 through 8191.</p> <p><b>maintenance-association</b> <i>ma-name</i>—Name of an existing CFM maintenance association.</p> <p><b>maintenance-domain</b> <i>md-name</i>—Name of an existing connectivity fault management (CFM) maintenance domain.</p> <p><b>remote-mep</b> <i>remote-mep-id</i>—(Optional) Numeric identifier of the remote MEP. On MX Series routers, the range of values is 1 through 8192. On EX Series switches, the range of values is 1 through 8191.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>clear oam ethernet connectivity-fault-management statistics</li> <li>clear oam ethernet connectivity-fault-management delay-statistics</li> <li><a href="#">show oam ethernet connectivity-fault-management interfaces on page 247</a></li> <li><a href="#">show oam ethernet connectivity-fault-management mep-database on page 259</a></li> <li><a href="#">show oam ethernet connectivity-fault-management mep-statistics on page 269</a></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management delay-statistics on page 241</a></p> <p><a href="#">show oam ethernet connectivity-fault-management delay-statistics remote-mep on page 241</a></p>
<b>Output Fields</b>	Table 19 on page 240 lists the output fields for the <b>show oam ethernet connectivity-fault-management delay-statistics</b> command and the <b>show oam ethernet</b>

**connectivity-fault-management mep-statistics** command. Output fields are listed in the approximate order in which they appear.

**Table 19: show oam ethernet connectivity-fault-management delay-statistics and mep-statistics Output Fields**

Output Field Name	Field Description
MEP identifier	Maintenance association end point (MEP) numeric identifier.
MAC address	Unicast MAC address configured for the MEP.
Remote MEP count	Number of remote MEPs (unless you specify the <b>remote-mep</b> option).
Remote MEP identifier	Numeric identifier of the remote MEP.
Remote MAC address	Unicast MAC address of the remote MEP.
Index	Index number that corresponds to the ETH-DM entry in the CFM database.
One-way delay (usec)	For a one-way ETH-DM session, the frame delay time, in microseconds, measured at the receiver MEP.  For a detailed description of one-way Ethernet frame delay measurement, see the <i>ITU-T Y.1731 Ethernet Service OAM</i> topics in the Junos® OS Network Interfaces.
Two-way delay (usec)	For a two-way ETH-DM session, the frame delay time, in microseconds, measured at the initiator MEP.  For a detailed description of two-way Ethernet frame delay measurement, see the <i>ITU-T Y.1731 Ethernet Service OAM</i> topics in the Junos® OS Network Interfaces.
Average one-way delay	Average one-way frame delay for the statistics displayed.
Average one-way delay variation	Average one-way “frame jitter” for the statistics displayed.
Best-case one-way delay	Lowest one-way frame delay for the statistics displayed.
Worst-case one-way delay	Highest one-way frame delay for the statistics displayed.
Average two-way delay	Average two-way frame delay for the statistics displayed.
Average two-way delay variation	Average two-way “frame jitter” for the statistics displayed.
Best-case two-way delay	Lowest two-way frame delay for the statistics displayed.
Worst-case two-way delay	Highest two-way frame delay calculated in this session.

## Sample Output

**show oam ethernet  
connectivity-fault-  
management  
delay-statistics**

```
user@switch> show oam ethernet connectivity-fault-management delay-statistics
maintenance-domain md6 maintenance-association ma6
```

```
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
```

```
Remote MEP count: 2
```

```
Remote MEP identifier: 101
```

```
Remote MAC address: 00:05:85:73:39:4a
```

```
Delay measurement statistics:
```

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```
Average one-way delay : 286 usec
```

```
Average one-way delay variation: 62 usec
```

```
Best case one-way delay : 259 usec
```

```
Worst case one-way delay : 313 usec
```

```
Average two-way delay : 580 usec
```

```
Average two-way delay variation: 26 usec
```

```
Best case two-way delay : 519 usec
```

```
Worst case two-way delay : 650 usec
```

```
Remote MEP identifier: 102
```

```
Remote MAC address: 00:04:55:63:39:5a
```

```
Delay measurement statistics:
```

Index	One-way delay (usec)	Two-way delay (usec)
1	29	58
2	23	59
3	27	56
4	29	62
5	33	68

```
Average one-way delay : 28 usec
```

```
Average one-way delay variation: 3 usec
```

```
Best case one-way delay : 23 usec
```

```
Worst case one-way delay : 33 usec
```

```
Average two-way delay : 60 usec
```

```
Average two-way delay variation: 3 usec
```

```
Best case two-way delay : 56 usec
```

```
Worst case two-way delay : 68 usec
```

**show oam ethernet  
connectivity-fault-  
management  
delay-statistics  
remote-mep**

```
user@switch> show oam ethernet connectivity-fault-management delay-statistics
maintenance-domain md6 maintenance-association ma6 remote-mep 101
```

```
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
```

```
Remote MEP identifier: 101
```

```
Remote MAC address: 00:05:85:73:39:4a
```

```
Delay measurement statistics:
```

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```
Average one-way delay : 286 usec
```

Average one-way delay variation: 62 usec  
Best case one-way delay : 259 usec  
Worst case one-way delay : 313 usec  
Average two-way delay : 580 usec  
Average two-way delay variation: 26 usec  
Best case two-way delay : 519 usec  
Worst case two-way delay : 650 usec

## show oam ethernet connectivity-fault-management forwarding-state

<b>Syntax</b>	<b>show oam ethernet connectivity-fault-management forwarding-state</b> <b>interface</b> <i>interface-name</i>   <b>instance</b> <i>instance-name</i> <brief   detail   extensive>
<b>Release Information</b>	Command introduced in Junos OS Release 8.4.
<b>Description</b>	On M7i and M10i with the Enhanced CFEB (CFEB-E), M320, MX Series, T320, and T640 routers, display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management forwarding state information for Ethernet interfaces.
<b>Options</b>	<p><b>interface</b> <i>interface-name</i>—Display forwarding state information for the specified Ethernet interface only.</p> <p><b>instance</b> <i>instance-name</i>—Display forwarding state information for the specified forwarding instance only.</p> <p><b>brief   detail   extensive</b>—(Optional) Display the specified level of output.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management forwarding-state instance on page 245</a></p> <p><a href="#">show oam ethernet connectivity-fault-management forwarding-state interface on page 245</a></p> <p><a href="#">show oam ethernet connectivity-fault-management forwarding-state interface detail on page 245</a></p> <p><a href="#">show oam ethernet connectivity-fault-management forwarding-state interfaceinterface-name on page 246</a></p>
<b>Output Fields</b>	Table 20 on page 243 lists the output fields for the <b>show oam ethernet connectivity-fault-management forwarding-state</b> command. Output fields are listed in the approximate order in which they appear.

Table 20: show oam ethernet connectivity-fault-management forwarding-state Output Fields

Field Name	Field Description	Level of Output
Interface name	Interface identifier.	All levels
Link (Status)	Local link status.	All levels
Filter action	Filter action for messages at the level.	All levels
Next hop type	Next-hop type.	All levels
Next index	Next-hop index number.	brief
Level	Maintenance domain (MD) level.	detail

**Table 20: show oam ethernet connectivity-fault-management forwarding-state Output Fields (*continued*)**

Field Name	Field Description	Level of Output
<b>Direction</b>	MEP direction configured.	none
<b>Instance name</b>	Forwarding instance name.	All levels
<b>CEs</b>	Number of customer edge (CE) interfaces.	All levels
<b>VEs</b>	Number of VPN endpoint (VE) interfaces.	All levels

## Sample Output

**show oam ethernet  
connectivity-fault-  
management  
forwarding-  
state instance**

```
user@host> show oam ethernet connectivity-fault-management forwarding-state instance
Instance name: __+bd1__
CEs: 3
VEs: 0
Maintenance domain forwarding state:
```

Level	Direction	Filter action	Nexthop type	Nexthop index
0		Drop	none	
1		Drop	none	
2		Drop	none	
3		Drop	none	
4		Drop	none	
5		Drop	none	
6		Drop	none	
7		Drop	none	

**show oam ethernet  
connectivity-fault-  
management  
forwarding-  
state interface**

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
Interface name: ge-3/0/0.0
Instance name: __+bd1__
Maintenance domain forwarding state:
```

Level	Direction	Filter action	Nexthop type	Nexthop index
0		Drop	none	
1		Drop	none	
2		Drop	none	
3		Drop	none	
4		Drop	none	
5		Drop	none	
6		Drop	none	
7	down	Receive	none	

```
Interface name: xe-0/0/0.0
Instance name: __+bd1__
Maintenance domain forwarding state:
```

Level	Direction	Filter action	Nexthop type	Nexthop index
0		Drop	none	
1		Drop	none	
2		Drop	none	
3		Drop	none	
4		Drop	none	
5		Drop	none	
6		Drop	none	
7	down	Receive	none	

**show oam ethernet  
connectivity-fault-  
management  
forwarding-  
state interface detail**

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
detail
Interface name: ge-3/0/0.0
Instance name: __+bd1__

Level: 0
Filter action: Drop
Nexthop type: none
```

```

Level: 1
Filter action: Drop
Nexthop type: none

Level: 2
Filter action: Drop
Nexthop type: none

Level: 3
Filter action: Drop
Nexthop type: none

Level: 4
Filter action: Drop
Nexthop type: none

Level: 5
Filter action: Drop
Nexthop type: none

Level: 6
Filter action: Drop
Nexthop type: none

Level: 7
Direction: down
Filter action: Receive
Nexthop type: none

Interface name: xe-0/0/0.0
Instance name: __+bd1__

Level: 0
Filter action: Drop
Nexthop type: none

Level: 1
Filter action: Drop
Nexthop type: none

...

```

**show oam ethernet  
connectivity-fault-  
management  
forwarding-  
state interface  
interface-name**

```

user@host> show oam ethernet connectivity-fault-management forwarding-state interface
interface-name ge-3/0/0/0.0
Interface name: ge-3/0/0.0
Instance name: __+bd1__
Maintenance domain forwarding state:

```

Level	Direction	Filter action	Nexthop type	Nexthop index
0		Drop	none	
1		Drop	none	
2		Drop	none	
3		Drop	none	
4		Drop	none	
5		Drop	none	
6		Drop	none	
7	down	Receive	none	



## show oam ethernet connectivity-fault-management interfaces

<b>Syntax</b>	<pre>show oam ethernet connectivity-fault-management interfaces &lt;ethernet-interface-name&gt; &lt;level md-level&gt; &lt;brief   detail   extensive&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 8.4.</p> <p>Support for ITU-T Y.1731 frame delay measurement added in Junos OS Release 9.5.</p>
<b>Description</b>	<p>On M7i and M10i routers with Enhanced CFEB (CFEB-E), and on M320, MX Series, ACX Series, T320, and T640 routers, display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management (CFM) database information for Ethernet interfaces.</p> <p>In addition, for Ethernet interfaces on MX Series routers, also display any ITU-T Y.1731 frame delay measurement (ETH-DM) frame counts when <b>detail</b> or <b>extensive</b> mode is specified.</p>
<b>Options</b>	<p><b>brief   detail   extensive</b>—(Optional) Specified level of output.</p> <p><b>ethernet-interface-name</b>—(Optional) CFM information only for CFM entities attached to the specified Ethernet interface.</p> <p><b>level md-level</b>—(Optional) CFM information for CFM identities enclosed within a maintenance domain of the specified level.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>clear oam ethernet connectivity-fault-management statistics</li> <li><a href="#">show oam ethernet connectivity-fault-management delay-statistics on page 239</a></li> <li><a href="#">show oam ethernet connectivity-fault-management mep-database on page 259</a></li> <li><a href="#">show oam ethernet connectivity-fault-management mep-statistics on page 269</a></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management interfaces on page 252</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces detail on page 252</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces detail (One-Way ETH-DM) on page 253</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces detail (Connection Protection TLV Configured) on page 253</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces extensive on page 255</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces level on page 255</a></p> <p><a href="#">show oam ethernet connectivity-fault-management interfaces (trunk ports) on page 255</a></p>
<b>Output Fields</b>	<p>Table 21 on page 248 lists the output fields for the <b>show oam ethernet connectivity-fault-management interfaces</b> command. Output fields are listed in the approximate order in which they appear.</p>

Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields

Field Name	Field Description	Level of Output
<b>Interface</b>	Interface identifier.	All levels
<b>Interface status</b>	Local interface status.	All levels
<b>Link status</b>	Local link status. <b>Up</b> , <b>down</b> , or <b>oam-down</b> .	All levels
<b>Maintenance domain name</b>	Maintenance domain name.	<b>detail extensive</b>
<b>Format (Maintenance domain)</b>	Maintenance domain name format configured.	<b>detail extensive</b>
<b>Level</b>	Maintenance domain level configured.	All levels
<b>Maintenance association name</b>	Maintenance association name.	<b>detail extensive</b>
<b>Format (Maintenance association)</b>	Maintenance association name format configured.	<b>detail extensive</b>
<b>Continuity-check status</b>	Continuity-check status.	<b>detail extensive</b>
<b>Interval</b>	Continuity-check message interval.	<b>detail extensive</b>
<b>Loss-threshold</b>	Lost continuity-check message threshold.	<b>detail extensive</b>
<b>Interface status TLV</b>	Status of the interface status TLV, if configured on the MEP interface: <b>none</b> , <b>up</b> , <b>down</b> , <b>testing</b> , <b>unknown</b> , <b>dormant</b> , <b>notPresent</b> , <b>lowerLayerDown</b>	<b>detail extensive</b>
<b>Port status TLV</b>	Status of the port status TLV, if configured on the MEP interface: <b>none</b> , <b>no</b> , <b>yes</b>	<b>detail extensive</b>
<b>Connection Protection TLV</b>	Status of the connection protection TLV if configured on the MEP interface: <b>no</b> , <b>yes</b>  If <b>yes</b> , then the transmitted connection protection TLV is decoded and the following three fields are displayed: <b>Prefer me</b> , <b>Protection in use</b> , <b>FRR Flag</b>	<b>detail extensive</b>
<b>Prefer me</b>	If set to <b>yes</b> , the path through which CCM was transmitted is preferred (unless the path fails). It is used for signaling a manual-switch command to the remote side.  Its value can be <b>yes</b> or <b>no</b> .	<b>detail extensive</b>
<b>Protection in use</b>	Used for protection decision coordination. Its value is set to <b>yes</b> if the endpoint transmitting the CCM is currently transmitting the user traffic to protection path.  Its value can be <b>yes</b> or <b>no</b> .	<b>detail extensive</b>

**Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields (*continued*)**

Field Name	Field Description	Level of Output
<b>FRR Flag</b>	LSR/LER forwarding the CCM Frame into a bypass tunnel is set.  Its value can be <b>yes</b> or <b>no</b> .	<b>detail extensive</b>
<b>MEP identifier</b>	Maintenance association end point (MEP) identifier.	All levels
<b>Neighbors</b>	Number of MEP neighbors.	All levels
<b>Direction</b>	MEP direction configured.	<b>detail extensive</b>
<b>MAC address</b>	MAC address configured for the MEP.	<b>detail extensive</b>
<b>MEP status</b>	Indicates the status of the connectivity fault management (CFM) protocol running on the MEP: <b>Running</b> , <b>inactive</b> , <b>disabled</b> , or <b>unsupported</b> .	<b>detail extensive</b>
<b>Remote MEP not receiving CCM</b>	Whether the remote MEP is not receiving connectivity check messages (CCMs).	<b>detail extensive</b>
<b>Erroneous CCM received</b>	Whether erroneous CCMs have been received.	<b>detail extensive</b>
<b>Cross-connect CCM received</b>	Whether cross-connect CCMs have been received.	<b>detail extensive</b>
<b>RDI sent by some MEP</b>	Whether the remote defect indication (RDI) bit is set in messages that have been received. The absence of the RDI bit in a CCM indicates that the transmitting MEP is receiving CCMs from all configured MEPs.	<b>detail extensive</b>
<b>CCMs sent</b>	Number of CCMs transmitted.	<b>detail extensive</b>
<b>CCMs received out of sequence</b>	Number of CCMs received out of sequence.	<b>detail extensive</b>
<b>LBMs sent</b>	Number of loopback request messages (LBMs) sent.	<b>detail extensive</b>
<b>Valid in-order LBRs received</b>	Number of loopback response messages (LBRs) received that were valid messages and in sequence.	<b>detail extensive</b>
<b>Valid out-of-order LBRs received</b>	Number of LBRs received that were valid messages and not in sequence.	<b>detail extensive</b>
<b>LBRs received with corrupted data</b>	Number of LBRs received that were corrupted.	<b>detail extensive</b>
<b>LBRs sent</b>	Number of LBRs transmitted.	<b>detail extensive</b>
<b>LTMs sent</b>	Linktrace messages (LTMs) transmitted.	<b>detail extensive</b>

**Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields (*continued*)**

Field Name	Field Description	Level of Output
<b>LTM's received</b>	Linktrace messages received.	<b>detail extensive</b>
<b>LTRs sent</b>	Linktrace responses (LTRs) transmitted.	<b>detail extensive</b>
<b>LTRs received</b>	Linktrace responses received.	<b>detail extensive</b>
<b>Sequence number of next LTM request</b>	Sequence number of next LTM request to be transmitted.	<b>detail extensive</b>
<b>1DMs sent</b>	<p>If the interface is attached to an initiator MEP for a one-way ETH-DM session: Number of one-way delay measurement (1DM) PDU frames sent to the peer MEP in this session.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>
<b>Valid 1DMs received</b>	<p>If the interface is attached to a receiver MEP for a one-way ETH-DM session: Number of valid 1DM frames received.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>
<b>Invalid 1DMs received</b>	<p>If the interface is attached to a receiver MEP for a one-way ETH-DM session: Number of invalid 1DM frames received.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>
<b>Out of sync 1DMs received</b>	<p>If the interface is attached to a receiver MEP for a one-way ETH-DM session: Number of out-of-sync one-way delay measurement request packets received.</p>	<b>detail extensive</b>
<b>DMMs sent</b>	<p>If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of Delay Measurement Message (DMM) PDU frames sent to the peer MEP in this session.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>
<b>Valid DMMs received</b>	<p>If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of valid two-way delay measurement request packets received.</p>	<b>detail extensive</b>
<b>Invalid DMMs received</b>	<p>If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of invalid two-way delay measurement request packets received.</p>	<b>detail extensive</b>
<b>DMRs sent</b>	<p>If the interface is attached to a responder MEP for a two-way ETH-DM session: Number of delay measurement reply (DMR) frames sent.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>
<b>Valid DMRs received</b>	<p>If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of valid DMRs received.</p> <p>For all other cases, this field displays 0.</p>	<b>detail extensive</b>

**Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields (*continued*)**

Field Name	Field Description	Level of Output
<b>Invalid DMRs received</b>	If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of invalid DMRs received.  For all other cases, this field displays 0.	<b>detail extensive</b>
<b>LMM sent</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of loss measurement message (LMM) PDU frames sent to the peer MEP in this session.	<b>detail extensive</b>
<b>Valid LMM received</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of valid loss measurement request packets received.	<b>detail extensive</b>
<b>Invalid LMM received</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of invalid loss measurement request packets received.	<b>detail extensive</b>
<b>LMR sent</b>	If the interface is attached to a responder MEP for a ETH-LM session: Number of loss measurement reply (LMR) frames sent.	<b>detail extensive</b>
<b>Valid LMR received</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of valid LMR frames received.	<b>detail extensive</b>
<b>Invalid LMR received</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of invalid LMR frames received.	<b>detail extensive</b>
<b>Remote MEP count</b>	Number of remote MEPs.	<b>extensive</b>
<b>Identifier (remote MEP)</b>	MEP identifier of the remote MEP.	<b>extensive</b>
<b>MAC address (remote MEP)</b>	MAC address of the remote MEP.	<b>extensive</b>
<b>State (remote MEP)</b>	State of the remote MEP.	<b>extensive</b>
<b>Interface (remote MEP)</b>	Interface of the remote MEP.	<b>extensive</b>

## Sample Output

```
show oam ethernet
connectivity-fault-
management
interfaces
```

```
user@host> show oam ethernet connectivity-fault-management interfaces
Interface      Link      Status      Level      MEP
Identifier      Neighbors
ge-1/1/0.0      Up        Active      0          2          1
ge-1/1/0.1      Up        Active      0          2          1
ge-1/1/0.10     Up        Active      0          2          1
ge-1/1/0.100    Up        Active      0          2          1
ge-1/1/0.101    Up        Active      0          2          1
ge-1/1/0.102    Up        Active      0          2          1
ge-1/1/0.103    Up        Active      0          2          1
ge-1/1/0.104    Up        Active      0          2          1
ge-1/1/0.105    Up        Active      0          2          1
ge-1/1/0.106    Up        Active      0          2          1
```

```
...
```

```
show oam ethernet
connectivity-fault-
management
interfaces detail
```

```
user@host> show oam ethernet connectivity-fault-management interfaces detail
Interface name: ge-5/2/9.0, Interface status: Active, Link status: Up
Maintenance domain name: md0, Format: string, Level: 5
Maintenance association name: ma1, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 1, Direction: down, MAC address: 00:90:69:0b:4b:94
MEP status: running
Defects:
  Remote MEP not receiving CCM          : no
  Erroneous CCM received                 : yes
  Cross-connect CCM received             : no
  RDI sent by some MEP                   : yes
Statistics:
  CCMs sent                             : 76
  CCMs received out of sequence          : 0
  LBMs sent                             : 0
  Valid in-order LBRs received           : 0
  Valid out-of-order LBRs received       : 0
  LBRs received with corrupted data      : 0
  LBRs sent                             : 0
  LTMs sent                             : 0
  LTMs received                         : 0
  LTRs sent                             : 0
  LTRs received                         : 0
  Sequence number of next LTM request    : 0
  1DMs sent                             : 0
  Valid 1DMs received                   : 0
  Invalid 1DMs received                  : 0
  DMMs sent                             : 0
  DMRs sent                             : 0
  Valid DMRs received                   : 0
  Invalid DMRs received                  : 0
  LMM sent                             : 10
  Valid LMM received                    : 20
  Invalid LMM received                   : 0
  LMR sent                             : 20
  Valid LMR received                    : 10
  Invalid LMR received                   : 0
Remote MEP count: 2
Identifier      MAC address      State      Interface
2001           00:90:69:0b:7f:71      ok         ge-5/2/9.0
```

4001 00:90:69:0b:09:c5 ok ge-5/2/9.0

**show oam ethernet  
connectivity-fault-  
management  
interfaces detail  
(One-Way ETH-DM)**

```
user@host show oam ethernet connectivity-fault-management interfaces detail
Interface name: ge-0/2/5.0, Interface status: Active, Link status: Up
Maintenance domain name: md6, Format: string, Level: 6
Maintenance association name: ma6, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 101, Direction: down, MAC address: 00:90:69:0a:48:57
MEP status: running
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                       : no
  Cross-connect CCM received                   : no
  RDI sent by some MEP                         : no
Statistics:
  CCMs sent                                   : 1590
  CCMs received out of sequence                : 0
  LBMs sent                                   : 0
  Valid in-order LBRs received                 : 0
  Valid out-of-order LBRs received             : 0
  LBRs received with corrupted data            : 0
  LBRs sent                                   : 0
  LTMs sent                                   : 0
  LTMs received                               : 0
  LTRs sent                                   : 0
  LTRs received                               : 0
  Sequence number of next LTM request          : 0
  1DMs sent                                   : 10
  Valid 1DMs received                         : 0
  Invalid 1DMs received                       : 0
  DMMs sent                                   : 0
  DMRs sent                                   : 0
  Valid DMRs received                         : 0
  Invalid DMRs received                       : 0
Remote MEP count: 1
  Identifier  MAC address      State  Interface
  201        00:90:69:0a:43:94 ok     ge-0/2/5.0
```

**show oam ethernet  
connectivity-fault-  
management  
interfaces detail  
(Connection  
Protection TLV  
Configured)**

```
user@host show oam ethernet connectivity-fault-management interfaces detail
Interface name: xe-6/2/0.0 , Interface status: Active, Link status: Up
Maintenance domain name: md6, Format: string, Level: 6
Maintenance association name: ma6, Format: string
Continuity-check status: enabled, Interval: 1s, Loss-threshold: 3 frames
Interface status TLV: none, Port status TLV: none
Connection Protection TLV: yes
  Prefer me: no, Protection in use: no, FRR Flag: no
MEP identifier: 1, Direction: down, MAC address: 00:19:e2:b1:14:30
MEP status: running
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                       : no
  Cross-connect CCM received                   : no
  RDI sent by some MEP                         : no
  Some remote MEP's MAC in error state         : no
Statistics:
  CCMs sent                                   : 225
  CCMs received out of sequence                : 0
  LBMs sent                                   : 0
  Valid in-order LBRs received                 : 0
```

```
Valid out-of-order LBRs received      : 0
LBRs received with corrupted data     : 0
LBRs sent                             : 0
LTMs sent                             : 0
LTMs received                         : 0
LTRs sent                             : 0
LTRs received                         : 0
Sequence number of next LTM request   : 0
1DMs sent                             : 0
Valid 1DMs received                   : 0
Invalid 1DMs received                  : 0
Out of sync 1DMs received              : 0
DMMs sent                             : 0
Valid DMMs received                   : 0
Invalid DMMs received                  : 0
DMRs sent                             : 0
Valid DMRs received                   : 0
Invalid DMRs received                  : 0
LMMs sent                             : 0
Valid LMMs received                   : 0
Invalid LMMs received                  : 0
LMRs sent                             : 0
Valid LMRs received                   : 0
Invalid LMRs received                  : 0
Remote MEP count: 1
Identifier    MAC address      State  Interface
    2        00:90:69:7f:e4:30
```



**show oam ethernet  
connectivity-fault-  
management  
interfaces  
extensive**

```

user@host> show oam ethernet connectivity-fault-management interfaces extensive
Interface name: ge-5/2/9.0, Interface status: Active, Link status: Up
Maintenance domain name: md0, Format: string, Level: 5
Maintenance association name: ma1, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
Interface status TLV: none, Port status TLV: none
Connection Protection TLV: no
MEP identifier: 1, Direction: down, MAC address: 00:90:69:0b:4b:94
MEP status: running
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                       : yes
  Cross-connect CCM received                   : no
  RDI sent by some MEP                        : yes
Statistics:
  CCMs sent                                   : 76
  CCMs received out of sequence               : 0
  LBMs sent                                   : 0
  Valid in-order LBRs received                : 0
  Valid out-of-order LBRs received            : 0
  LBRs received with corrupted data           : 0
  LBRs sent                                   : 0
  LTMs sent                                   : 0
  LTMs received                               : 0
  LTRs sent                                   : 0
  LTRs received                               : 0
  Sequence number of next LTM request         : 0
  1DMs sent                                   : 0
  Valid 1DMs received                         : 0
  Invalid 1DMs received                       : 0
  DMMs sent                                   : 0
  DMRs sent                                   : 0
  Valid DMRs received                         : 0
  Invalid DMRs received                       : 0
Remote MEP count: 2
Identifier  MAC address      State  Interface
2001       00:90:69:0b:7f:71  ok    ge-5/2/9.0
4001       00:90:69:0b:09:c5  ok    ge-5/2/9.0

```

**show oam ethernet  
connectivity-fault-  
management  
interfaces level**

```

user@host> show oam ethernet connectivity-fault-management interfaces level 7
Interface  Link      Status      Level  MEP      Neighbors
Identifier
ge-3/0/0.0  Up       Active      7      201      0
xe-0/0/0.0  Up       Active      7      203      1

```

**show oam ethernet  
connectivity-fault-  
management  
interfaces (trunk  
ports)**

```

user@host> show oam ethernet connectivity-fault-management interfaces

Interface                                Link      Status      Level  MEP      Neighbors
Identifier
ge-4/0/1.0, vlan 100                    Up       Active      5      100      0
ge-10/3/10.4091, vlan 4091              Down     Inactive    4      400      0
ge-4/0/0.0                               Up       Active      6      200      0

user@host> show oam ethernet connectivity-fault-management interfaces ge-4/0/0.0

Interface                                Link      Status      Level  MEP      Neighbors
Identifier

```

ge-4/0/0.0	Up	Active	6	200	0
------------	----	--------	---	-----	---

user@host> show oam ethernet connectivity-fault-management interfaces ge-4/0/1.0 vlan 100

Interface	Link	Status	Level	MEP Identifier	Neighbors
ge-4/0/1.0, vlan 100	Up	Active	5	100	0

user@host> show oam ethernet connectivity-fault-management interfaces ge-10/3/10.4091  
vlan 4091

Interface	Link	Status	Level	MEP Identifier	Neighbors
ge-10/3/10.4091, vlan 4091	Down	Inactive	4	400	0

## show oam ethernet connectivity-fault-management linktrace path-database

<b>Syntax</b>	<b>show oam ethernet connectivity-fault-management linktrace path-database mac-address maintenance-association <i>ma-name</i> maintenance-domain <i>md-name</i></b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0.
<b>Description</b>	On M320, MX Series, T320, and T640 routers, display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management maintenance linktrace database information.
<b>Options</b>	<p><b>mac-address</b>—Display connectivity fault management path database information for the specified MAC address of the remote host.</p> <p><b>maintenance-association <i>ma-name</i></b>—Display connectivity fault management path database information for the specified maintenance association.</p> <p><b>maintenance-domain <i>md-name</i></b>—Display connectivity fault management path database information for the specified maintenance domain.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management linktrace path-database on page 258</a></p> <p><a href="#">show oam ethernet connectivity-fault-management linktrace path-database (Two traceroute Commands) on page 258</a></p>
<b>Output Fields</b>	Table 22 on page 257 lists the output fields for the <b>show oam ethernet connectivity-fault-management linktrace path-database</b> command. Output fields are listed in the approximate order in which they appear.

**Table 22: show oam ethernet connectivity-fault-management linktrace path-database Output Fields**

Field Name	Field Description
<b>Linktrace to</b>	MAC address of the 802.1ag node to which the linktrace message is targeted.
<b>Interface</b>	Interface used by the local MEP to send the linktrace message (LTM).
<b>Maintenance Domain</b>	Maintenance domain identifier specified in the traceroute command.
<b>Maintenance Association</b>	Maintenance association identifier specified in the traceroute command.
<b>Level</b>	Maintenance domain level configured for the maintenance domain.
<b>Local Mep</b>	MEP identifier of the local MEP originating the linktrace.
<b>Hop</b>	Sequential hop count of the linktrace path.

Table 22: show oam ethernet connectivity-fault-management linktrace path-database Output Fields (*continued*)

Field Name	Field Description
TTL	Number of hops remaining in the linktrace message (LTM). The time to live (TTL) is decremented at each hop.
Source MAC address	MAC address of the 802.1ag maintenance intermediate point (MIP) that is forwarding the LTM.
Next hop MAC address	MAC address of the 802.1ag node that is the next hop in the LTM path.
Transaction Identifier	4-byte identifier maintained by the MEP. Each LTM uses a transaction identifier. The transaction identifier is maintained globally across all maintenance domains. Use the transaction identifier to match an incoming linktrace responses (LTR), with a previously sent LTM.

## Sample Output

**show oam ethernet connectivity-fault-management linktrace path-database**

```
user@host> show oam ethernet connectivity-fault-management linktrace path-database
maintenance-domain MD1 maintenance-association MA1 00:01:02:03:04:05
Linktrace to 00:01:02:03:04:05, Interface : ge-5/0/0.0
Maintenance Domain: MD1, Level: 7
Maintenance Association: MA1, Local Mep: 1
```

Hop	TTL	Source MAC address	Next hop MAC address
Transaction Identifier:100001			
1	63	00:00:aa:aa:aa:aa	00:00:bb:bb:bb:bb
2	62	00:00:bb:bb:bb:bb	00:00:cc:cc:cc:cc
3	61	00:00:cc:cc:cc:cc	00:01:02:03:04:05
4	60	00:01:02:03:04:05	00:00:00:00:00:00

**show oam ethernet connectivity-fault-management linktrace path-database (Two traceroute Commands)**

```
user@host> show oam ethernet connectivity-fault-management linktrace path-database
maintenance-domain MD2 maintenance-association MA2 00:06:07:08:09:0A
Linktrace to 00:06:07:08:09:0A, Interface : ge-5/0/1.0
Maintenance Domain: MD2, Level: 6
Maintenance Association: MA2, Local Mep: 10
```

Hop	TTL	Source MAC address	Next hop MAC address
Transaction Identifier:100002			
1	63	00:00:aa:aa:aa:aa	00:00:bb:bb:bb:bb
2	62	00:00:bb:bb:bb:bb	00:00:cc:cc:cc:cc
3	61	00:00:cc:cc:cc:cc	00:06:07:08:09:0A
4	60	00:06:07:08:09:0A	00:00:00:00:00:00
Transaction Identifier:100003			
1	63	00:00:aa:aa:aa:aa	00:00:bb:bb:bb:bb
2	62	00:00:bb:bb:bb:bb	00:00:cc:cc:cc:cc
3	61	00:00:cc:cc:cc:cc	00:06:07:08:09:0A
4	60	00:06:07:08:09:0A	00:00:00:00:00:00

## show oam ethernet connectivity-fault-management mep-database

<b>Syntax</b>	<pre>show oam ethernet connectivity-fault-management mep-database maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> &lt;local-mep <i>local-mep-id</i>&gt; &lt;remote-mep <i>remote-mep-id</i>&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 8.4.</p> <p>Support for ITU-T Y.1731 frame delay measurement added in Junos OS Release 9.5.</p>
<b>Description</b>	<p>On M7i and M10i routers with Enhanced CFEB (CFEB-E), and on M320, M120, MX Series, ACX Series, T320, and T640 routers, display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management (CFM) database information for CFM maintenance association end points (MEPs) in a CFM session.</p> <p>In addition, on M120, M320, and MX series routers, also display port status TLV, interface status TLV, and action profile information.</p> <p>In addition, for Ethernet interfaces on MX Series routers, also display any ITU-T Y.1731 frame delay measurement (ETH-DM) frame counts.</p>
<b>Options</b>	<p><b>maintenance-association <i>ma-name</i></b>—Name of the maintenance association.</p> <p><b>maintenance-domain <i>domain-name</i></b>—Name of the maintenance domain.</p> <p><b><i>local-mep-id</i></b>—(Optional) Numeric identifier of local MEP.</p> <p><b><i>remote-mep-id</i></b>—(Optional) Numeric identifier of the remote MEP.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• clear oam ethernet connectivity-fault-management statistics</li> <li>• <a href="#">show oam ethernet connectivity-fault-management delay-statistics on page 239</a></li> <li>• <a href="#">show oam ethernet connectivity-fault-management interfaces on page 247</a></li> <li>• <a href="#">show oam ethernet connectivity-fault-management mep-statistics on page 269</a></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management mep-database on page 265</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-database (One-Way ETH-DM) on page 265</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-database local-mep remote-mep on page 266</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-database remote-mep (Action Profile Event) on page 266</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-database (Connection Protection TLV Configured) on page 266</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-database on page 267</a></p>

[show oam ethernet connectivity-fault-management mep-database \(enhanced continuity measurement\) on page 268](#)

**Output Fields** [Table 23 on page 260](#) lists the output fields for the **show oam ethernet connectivity-fault-management mep-database** command. Output fields are listed in the approximate order in which they appear.

**Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields**

Field Name	Field Description
Maintenance domain name	Maintenance domain name.
Format (Maintenance domain)	Maintenance domain name format configured.
Level	Maintenance domain level configured.
Maintenance association name	Maintenance association name.
Format (Maintenance association)	Maintenance association name format configured.
Continuity-check status	Continuity-check status.
Interval	Continuity-check message interval.
Loss-threshold	Lost continuity-check message threshold.
Connection Protection TLV	Status of the connection protection TLV, if configured on the MEP interface: <b>no</b> , <b>yes</b>  If <b>yes</b> , then the transmitted connection protection TLV is decoded and the following three fields are displayed: <b>Prefer me</b> , <b>Protection in use</b> , <b>FRR Flag</b>
Prefer me	If set to <b>yes</b> , the path through which CCM was transmitted is preferred (unless the path fails). It is used for signaling a manual-switch command to remote side.  Its value can be <b>yes</b> or <b>no</b> .
Protection in use	Used for protection decision coordination. Its value is set to <b>yes</b> if the endpoint transmitting the CCM is currently transmitting the user traffic to protection path.  Its value can be <b>yes</b> or <b>no</b> .
FRR Flag	LSR/LER forwarding the CCM Frame into a bypass tunnel is set.  Its value can be <b>yes</b> or <b>no</b> .
MEP identifier	Maintenance association end point (MEP) identifier.
Direction	MEP direction configured.

**Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields (*continued*)**

Field Name	Field Description
<b>MAC address</b>	MAC address configured for the MEP.
<b>Auto-discovery</b>	Whether automatic discovery is enabled or disabled.
<b>Priority</b>	Priority used for CCMs and linktrace messages transmitted by the MEP.
<b>Interface name</b>	Interface identifier.
<b>Interface status</b>	Local interface status.
<b>Link status</b>	Local link status.
<b>Remote MEP not receiving CCM</b>	Whether the remote MEP is not receiving CCMs.
<b>Erroneous CCM received</b>	Whether erroneous CCMs have been received.
<b>Cross-connect CCM received</b>	Whether cross-connect CCMs have been received.
<b>RDI sent by some MEP</b>	Whether the remote defect indication (RDI) bit is set in messages that have been received. The absence of the RDI bit in a CCM indicates that the transmitting MEP is receiving CCMs from all configured MEPs.
<b>CCMs sent</b>	Number of CCMs transmitted.
<b>CCMs received out of sequence</b>	Number of CCMs received out of sequence.
<b>LBMs sent</b>	Number of loopback messages (LBMs) sent.
<b>Valid in-order LBRs received</b>	Number of loopback response messages (LBRs) received that were valid messages and in sequence.
<b>1DMs sent</b>	If the MEP is an initiator for a one-way ETH-DM session: Number of one-way delay measurement (1DM) PDU frames sent to the peer MEP in this session.  For all other cases, this field displays 0.
<b>Valid 1DMs received</b>	If the MEP is a receiver for a one-way ETH-DM session: Number of valid 1DM frames received.  For all other cases, this field displays 0.
<b>Invalid 1DMs received</b>	If the MEP is a receiver for a one-way ETH-DM session: Number of invalid 1DM frames received.  For all other cases, this field displays 0.

**Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields (*continued*)**

Field Name	Field Description
<b>Out of sync 1DMs received</b>	If the MEP is a receiver for a one-way ETH-DM session: Number of out-of-sync one-way delay measurement request packets received.
<b>DMMs sent</b>	If the MEP is an initiator for a two-way ETH-DM session: Number of Delay Measurement Message (DMM) PDU frames sent to the peer MEP in this session.  For all other cases, this field displays 0.
<b>Valid DMMs received</b>	If the MEP is an initiator for a two-way ETH-DM session: Number of valid two-way delay measurement packets received.
<b>Invalid DMMs received</b>	If the MEP is an initiator for a two-way ETH-DM session: Number of invalid two-way delay measurement packets received.
<b>DMRs sent</b>	If the MEP is a responder for a ETH-DM session: Number of Delay Measurement Reply (DMR) frames sent.  For all other cases, this field displays 0.
<b>Valid DMRs received</b>	If the MEP is an initiator for a two-way ETH-DM session: Number of valid DMRs received.  For all other cases, this field displays 0.
<b>Invalid DMRs received</b>	If the MEP is an initiator for a two-way ETH-DM session: Number of invalid DMRs received.  For all other cases, this field displays 0.
<b>Valid out-of-order LBRs received</b>	Number of LBRs received that were valid messages and not in sequence.
<b>LBRs received with corrupted data</b>	Number of LBRs received that were corrupted.
<b>LBRs sent</b>	Number of LBRs transmitted.
<b>LTMs sent</b>	Linktrace messages (LTMs) transmitted.
<b>LTMs received</b>	Linktrace messages received.
<b>LTRs sent</b>	Linktrace responses (LTRs) transmitted.
<b>LTRs received</b>	Linktrace responses received.
<b>Sequence number of next LTM request</b>	Sequence number of the next linktrace message request to be transmitted.
<b>LMM sent</b>	If the interface is attached to an initiator MEP for a ETH-LM session: Number of loss measurement message (LMM) PDU frames sent to the peer MEP in this session.



**Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields (*continued*)**

Field Name	Field Description
Valid LMM received	If the interface is attached to an initiator MEP for a ETH-LM session: Number of valid loss measurement request packets received.
Invalid LMM received	If the interface is attached to an initiator MEP for a ETH LM session: Number of invalid loss measurement request packets received.
LMR sent	If the interface is attached to a responder MEP for a ETH-LM session: Number of loss measurement reply (LMR) frames sent.
Valid LMR received	If the interface is attached to an initiator MEP for a ETH LM session: Number of valid LMR frames received.
Invalid LMR received	If the interface is attached to an initiator MEP for a ETH-LM session: Number of invalid LMR frames received.
Remote MEP identifier	MEP identifier of the remote MEP.
State (remote MEP)	State of the remote MEP: <b>idle</b> , <b>start</b> , <b>ok</b> , or <b>failed</b> .
MAC address	MAC address of the remote MEP.
Type	Whether the remote MEP MAC address was learned using automatic discovery or configured.
Interface	Interface of the remote MEP. A seven-digit number is appended if CFM is configured to run on a routing instance of type VPLS.
Last flapped	Date, time, and how long ago the remote MEP interface went from down to up. The format is <b>Last flapped: year-month-day hours:minutes:seconds timezone (hours:minutes:seconds ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .
Remote defect indication	Whether the remote defect indication (RDI) bit is set in messages that have been received or transmitted.
Port status TLV	<ul style="list-style-type: none"> <li>In the Maintenance domain section, displays the last transmitted port status TLV value.</li> <li>In the Remote MEP section, displays the last value of port status TLV received from the remote MEP.</li> </ul> <p>In the Action profile section, displays, the last occurred event <b>port-status-tlv blocked</b> event. This event occurred due to the reception of <b>blocked</b> value in the port status TLV from remote MEP.</p>
Interface status TLV	<ul style="list-style-type: none"> <li>In the Maintenance domain section, displays the last transmitted interface status TLV value.</li> <li>In the Remote MEP section, displays the last value of interface status TLV received from the remote MEP.</li> </ul> <p>In the Action profile section, if displays, the last occurred event interface-status-tlv event ( either <b>lower-layer-down</b> or <b>down</b>). This event occurred due to the reception of either lower or <b>down</b> value in the interface status TLV from remote MEP.</p>
Action profile	Name of the action profile occurrence associated with a remote MEP.

**Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields (*continued*)**

Field Name	Field Description
<b>Last event</b>	When an action profile occurs, displays the last event that triggered it.
<b>Last event cleared</b>	When all the configured and occurred events (under action profile) are cleared, then the action taken gets reverted (such as down interface is made up) and the corresponding time is noted and displayed.
<b>Action</b>	Action taken and the corresponding time of the action occurrence.

## Sample Output

**show oam ethernet  
connectivity-fault-  
management  
mep-database**

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain vpls-vlan2000 maintenance-association vpls-vlan200
Maintenance domain name: vpls-vlan2000, Format: string, Level: 5
Maintenance association name: vpls-vlan200, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 200, Direction: up, MAC address: 00:19:e2:b0:74:01
Auto-discovery: enabled, Priority: 0
Interface status TLV: none, Port status TLV: none
Connection Protection TLV: no Interface name: ge-0/0/1.0, Interface status:
Active, Link status: Up
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                      : no
  Cross-connect CCM received                  : no
  RDI sent by some MEP                       : no
Statistics:
  CCMs sent                                  : 1476
  CCMs received out of sequence              : 0
  LBMs sent                                  : 85
  Valid in-order LBRs received               : 78
  Valid out-of-order LBRs received           : 0
  LBRs received with corrupted data          : 0
  LBRs sent                                  : 0
  LTMs sent                                  : 1
  LTMs received                             : 0
  LTRs sent                                  : 0
  LTRs received                             : 1
  Sequence number of next LTM request        : 1
  1DMs sent                                  : 0
  Valid 1DMs received                       : 0
  Invalid 1DMs received                     : 0
  DMMs sent                                  : 0
  DMRs sent                                  : 0
  Valid DMRs received                      : 0
  Invalid DMRs received                     : 0
Remote MEP count: 1
Identifier  MAC address      State  Interface
100        00:19:e2:b2:81:4b  ok    vt-0/1/10.1049088
```

**show oam ethernet  
connectivity-fault-  
management  
mep-database  
(One-Way ETH-DM)**

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain md6 maintenance-domain ma6
Maintenance domain name: md6, Format: string, Level: 6
Maintenance association name: ma6, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 101, Direction: down, MAC address: 00:90:69:0a:48:57
Auto-discovery: enabled, Priority: 0
Interface name: ge-0/2/5.0, Interface status: Active, Link status: Up
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                      : no
  Cross-connect CCM received                  : no
  RDI sent by some MEP                       : no
Statistics:
  CCMs sent                                  : 1590
  CCMs received out of sequence              : 0
  LBMs sent                                  : 0
  Valid in-order LBRs received               : 0
```

```

Valid out-of-order LBRs received          : 0
LBRs received with corrupted data        : 0
LBRs sent                                : 0
LTMs sent                                : 0
LTMs received                             : 0
LTRs sent                                 : 0
LTRs received                             : 0
Sequence number of next LTM request       : 0
1DMs sent                                 : 10
Valid 1DMs received                       : 0
Invalid 1DMs received                     : 0
DMMs sent                                 : 0
DMRs sent                                 : 0
Valid DMRs received                       : 0
Invalid DMRs received                     : 0
Remote MEP count: 1
Identifier  MAC address  State  Interface
  201      00:90:69:0a:43:94  ok    ge-0/2/5.0

```

**show oam ethernet  
connectivity-fault-  
management  
mep-database  
local-mep remote-mep**

```

user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain vpls-vlan2000 maintenance-association vpls-vlan200 local-mep 200
remote-mep 100

```

```

Maintenance domain name: vpls-vlan2000, Format: string, Level: 5
Maintenance association name: vpls-vlan200, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 200, Direction: up, MAC address: 00:19:e2:b0:74:01
Auto-discovery: enabled, Priority: 0
Interface name: ge-0/0/1.0, Interface status: Active, Link status: Up

```

```

Remote MEP identifier: 100, State: ok
MAC address: 00:19:e2:b2:81:4b, Type: Learned
Interface: vt-0/1/10.1049088
Last flapped: Never
Remote defect indication: false
Port status TLV: none
Interface status TLV: none

```

**show oam ethernet  
connectivity-fault-  
management  
mep-database  
remote-mep  
(Action Profile Event)**

```

user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain md5 maintenance-association ma5 remote-mep 200
Maintenance domain name: md5, Format: string, Level: 5
Maintenance association name: ma5, Format: string
Continuity-check status: enabled, Interval: 1s, Loss-threshold: 3 frames
MEP identifier: 100, Direction: down, MAC address: 00:05:85:73:e8:ad
Auto-discovery: enabled, Priority: 0
Interface status TLV: none, Port status TLV: none
Interface name: ge-1/0/8.0, Interface status: Active, Link status: Up

```

```

Remote MEP identifier: 200, State: ok
MAC address: 00:05:85:73:96:1f, Type: Configured
Interface: ge-1/0/8.0
Last flapped: Never
Remote defect indication: false
Port status TLV: none
Interface status TLV: lower-layer-down
Action profile: juniper
  Last event: Interface-status-tlv lower-layer-down
  Action: Interface-down, Time: 2009-03-27 14:25:10 PDT (00:00:02 ago)

```

```

user@host> show oam ethernet connectivity-fault-management mep-database

```

show oam ethernet  
connectivity-fault-  
management  
mep-database  
(Connection  
Protection TLV  
Configured)

#### **maintenance-domain md5 maintenance-association ma5**

If connection-protection is not enabled on down MEPs, but connection-protection TLV is used, MX always sets the protection-in-use flag in connection-protection tlv, while CCMs are sent out. During reversion, this is an indicator to the receiver that protect-path is in use, otherwise the peer (receiver) assumes working is active and reversion does not work as expected. Setting this bit does not affect protection-switching/traffic-loss.

```
Maintenance domain name: md5, Format: string, Level: 5
Maintenance association name: ma5, Format: string
Continuity-check status: enabled, Interval: 1s, Loss-threshold: 3 frames
MEP identifier: 1, Direction: down, MAC address: 00:19:e2:b1:14:30
Auto-discovery: enabled, Priority: 0
Interface status TLV: none, Port status TLV: none
Connection Protection TLV: yes
  Prefer me: no, Protection in use: no, FRR Flag: no
Interface name: xe-6/2/0.0, Interface status: Active, Link status: Up
Defects:
  Remote MEP not receiving CCM                : no
  Erroneous CCM received                       : no
  Cross-connect CCM received                   : no
  RDI sent by some MEP                         : no
  Some remote MEP's MAC in error state         : no
Statistics:
  CCMs sent                                   : 251
  CCMs received out of sequence                : 0
  LBMs sent                                   : 0
  Valid in-order LBRs received                 : 0
  Valid out-of-order LBRs received             : 0
  LBRs received with corrupted data            : 0
  LBRs sent                                   : 0
  LTMs sent                                   : 0
  LTMs received                               : 0
  LTRs sent                                   : 0
  LTRs received                               : 0
  Sequence number of next LTM request          : 0
  1DMs sent                                   : 0
  Valid 1DMs received                         : 0
  Invalid 1DMs received                       : 0
  Out of sync 1DMs received                   : 0
  DMMs sent                                   : 0
  Valid DMMs received                         : 0
  Invalid DMMs received                       : 0
  DMRs sent                                   : 0
  Valid DMRs received                         : 0
  Invalid DMRs received                       : 0
  LMMs sent                                   : 0
  Valid LMMs received                         : 0
  Invalid LMMs received                       : 0
  LMRs sent                                   : 0
  Valid LMRs received                         : 0
  Invalid LMRs received                       : 0
Remote MEP count: 1
Identifier    MAC address    State    Interface
  2          00:90:69:7f:e4:30
```

show oam ethernet  
connectivity-fault-  
management  
mep-database

#### **user@host> show oam ethernet connectivity-fault-management mep-database maintenance-domain md5 maintenance-association ma5**

```
Maintenance association name: ma1, Format: string
Continuity-check status: enabled, Interval: 1s, Loss-threshold: 3 frames
MEP identifier: 1, Direction: down, MAC address: 00:14:f6:b6:01:fe
```

Auto-discovery: enabled, Priority: 0  
 Interface name: ge-1/0/0.0, Interface status: Active, Link status: Up

Defects:

Remote MEP not receiving CCM : no  
 Erroneous CCM received : no  
 Cross-connect CCM received : no  
 RDI sent by some MEP : no

Statistics:

CCMs sent : 328703  
 CCMs received out of sequence : 0  
 LBMs sent : 85  
 Valid in-order LBRs received : 78  
 Valid out-of-order LBRs received : 0  
 LBRs received with corrupted data : 0  
 LBRs sent : 0  
 LTMs sent : 0  
 LTMs received : 0  
 LTRs sent : 0  
 LTRs received : 0  
 Sequence number of next LTM request : 0  
 1DMs sent : 10  
 Valid 1DMs received : 10  
 Invalid 1DMs received : 0  
 DMMs sent : 20  
 DMRs sent : 0  
 Valid DMRs received : 10  
 Invalid DMRs received : 0  
 LMM sent : 10  
 Valid LMM received : 20  
 Invalid LMM received : 0  
 LMR sent : 20  
 Valid LMR received : 10  
 Invalid LMR received : 0  
 Remote MEP count : 1

Identifier	MAC address	State	Interface
2	00:12:1e:fb:ea:7d	ok	ge-1/0/0.0

**show oam ethernet  
 connectivity-fault-  
 management  
 mep-database  
 (enhanced continuity  
 measurement)**

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain md5 maintenance-association ma5 local-mep 2001 remote-mep 1001
Maintenance domain name: md5, Format: string, Level: 5
Maintenance association name: ma5, Format: string
Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
MEP identifier: 2001, Direction: down, MAC address: 00:19:e2:b2:81:4a
Auto-discovery: enabled, Priority: 0
Interface status TLV: up, Port status TLV: up
Interface name: ge-2/0/0.0, Interface status: Active, Link status: Up
```

```
Remote MEP identifier: 1001, State: ok
MAC address : 00:19:e2:b0:74:00, Type: Learned
Interface : ge-2/0/0.0
Last flapped : Never
+ Continuity : 91%, Admin-enable duration: 2100sec, Oper-down duration: 100sec
Remote defect indication: false
Port status TLV: none
Interface status TLV: none
```

## show oam ethernet connectivity-fault-management mep-statistics

<b>Syntax</b>	<pre>show oam ethernet connectivity-fault-management mep-statistics maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> &lt;mep <i>mep-id</i>&gt; &lt;remote-mep <i>remote-mep-id</i>&gt; &lt;count <i>entry-count</i>&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.5.</p> <p>Command introduced in Junos OS Release 11.4 for EX Series switches.</p>
<b>Description</b>	On MX Series and ACX Series routers and EX Series switches with Ethernet interfaces, display ETH-DM statistics and ETH-DM frame counts.
<b>Options</b>	<p><b>maintenance-domain <i>md-name</i></b>—Name of an existing CFM maintenance domain.</p> <p><b>maintenance-association <i>ma-name</i></b>—Name of an existing CFM maintenance association.</p> <p><b>mep <i>mep-id</i></b>—(Optional) Numeric identifier of the local MEP. The range of values is 1 through 8192. On EX Series switches, the range of values is 1 through 8191.</p> <p><b>remote-mep <i>remote-mep-id</i></b>—(Optional) Numeric identifier of the remote MEP. The range of values is 1 through 8192. On EX Series switches, the range of values is 1 through 8191.</p> <p><b>count <i>entry-count</i></b>—(Optional) Number of entries to display from the statistics table. The range of values is 1 through 100. The default value is 100 entries.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• clear oam ethernet connectivity-fault-management statistics</li> <li>• <a href="#">show oam ethernet connectivity-fault-management delay-statistics on page 239</a></li> <li>• <a href="#">show oam ethernet connectivity-fault-management interfaces on page 247</a></li> <li>• <a href="#">show oam ethernet connectivity-fault-management mep-database on page 259</a></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show oam ethernet connectivity-fault-management mep-statistics (CIR counters only) on page 271</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-statistics (CIR and EIR counters enabled) on page 272</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-statistics remote-mep (CIR counters only) on page 274</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-statistics remote-mep (CIR and EIR counters enabled) on page 276</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-statistics on page 278</a></p> <p><a href="#">show oam ethernet connectivity-fault-management mep-statistics remote-mep on page 279</a></p>

**Output Fields** Table 24 on page 270 lists the output fields for the **show oam ethernet connectivity-fault-management mep-statistics** command. Output fields are listed in the approximate order in which they appear.

**Table 24: show oam ethernet connectivity-fault-management delay-statistics and mep-statistics Output Fields**

Output Field Name	Field Description
MEP identifier	Maintenance association end point (MEP) numeric identifier.
MAC address	Unicast MAC address configured for the MEP.
Remote MEP count	Number of remote MEPs (unless you specify the <b>remote-mep</b> option).
Remote MEP identifier	Numeric identifier of the remote MEP.
Remote MAC address	Unicast MAC address of the remote MEP.
Index	Index number that corresponds to the ETH-DM entry in the CFM database.
One-way delay (usec)	For a one-way ETH-DM session, the frame delay time, in microseconds, measured at the receiver MEP.  For a detailed description of one-way Ethernet frame delay measurement, see the <i>ITU-T Y.1731 Ethernet Service OAM</i> topics in the Junos® OS Network Interfaces.
Two-way delay (usec)	For a two-way ETH-DM session, the frame delay time, in microseconds, measured at the initiator MEP.  For a detailed description of two-way Ethernet frame delay measurement, see the <i>ITU-T Y.1731 Ethernet Service OAM</i> topics in the Junos® OS Network Interfaces.
Average one-way delay	Average one-way frame delay for the statistics displayed.
Average one-way delay variation	Average one-way “frame jitter” for the statistics displayed.
Best-case one-way delay	Lowest one-way frame delay for the statistics displayed.
Worst-case one-way delay	Highest one-way frame delay for the statistics displayed.
Average two-way delay	Average two-way frame delay for the statistics displayed.
Average two-way delay variation	Average two-way “frame jitter” for the statistics displayed.
Best-case two-way delay	Lowest two-way frame delay for the statistics displayed.
Worst-case two-way delay	Highest two-way frame delay calculated in this session.



## Sample Output

show oam ethernet  
connectivity-fault-  
management  
mep-statistics (CIR  
counters only)

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain md1 maintenance-association ma-1 local-mep 3 remote-mep 103 count 3
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
Remote MEP count                : 1
CCMs sent                       : 6550
CCMs received out of sequence   : 0
LBMs sent                       : 0
Valid in-order LBRs received    : 0
Valid out-of-order LBRs received : 0
LBRs received with corrupted data : 0
LBRs sent                       : 0
LTMs sent                       : 0
LTMs received                   : 0
LTRs sent                       : 0
LTRs received                   : 0
Sequence number of next LTM request : 0
1DMs sent                       : 5
Valid 1DMs received             : 0
Invalid 1DMs received           : 0
DMMs sent                       : 5
DMRs sent                       : 0
Valid DMRs received             : 5
Invalid DMRs received           : 0
LMM sent                       : 5
Valid LMM received              : 5
Invalid LMM received            : 0
LMR sent                       : 0
Valid LMR received              : 5
Invalid LMR received            : 0
Remote MEP identifier           : 101
Remote MAC address              : 00:05:85:73:39:4a
```

### Delay measurement statistics:

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```
Average one-way delay          : 286 usec
Average one-way delay variation : 62 usec
Best case one-way delay         : 259 usec
Average two-way delay           : 580 usec
Average two-way delay variation : 26 usec
Best case two-way delay         : 519 usec
Worst case two-way delay        : 650 usec
```

### Loss measurement statistics:

Index	Near-end Frame loss (CIR)	Far-end Frame loss (CIR)	Near-end Frame loss (EIR)	Far-end Frame loss (EIR)
1	9	9		
2	3	5		
3	7	5		
4	9	6		
5	3	6		

```
Average near-end loss (CIR)           : 6.2
Average near-end loss ratio (CIR)      : 6.2%
Average far-end loss (CIR)             : 6.2
Average far-end loss ratio (CIR)       : 6.2%
Near-end best case loss (CIR)          : 3
Near-end best case loss ratio (CIR)    : 3%
Near-end worst case loss (CIR)         : 9
Near-end worst case loss ratio (CIR)   : 9%
Far-end best case loss (CIR)           : 5
Far-end best case loss ratio (CIR)     : 5%
Far-end worst case loss (CIR)          : 9
Far-end worst case loss ratio (CIR)    : 9%
```

```
show oam ethernet
connectivity-fault-
management
mep-statistics (CIR
```

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain mdl maintenance-association ma-1 local-mep 3 remote-mep 103 count 3
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
Remote MEP count           : 1
CCMs sent                  : 6550
```

and EIR counters  
enabled)

```

CCMs received out of sequence      : 0
LBMs sent                          : 0
Valid in-order LBRs received       : 0
Valid out-of-order LBRs received  : 0
LBRs received with corrupted data  : 0
LBRs sent                          : 0
LTMs sent                          : 0
LTMs received                      : 0
LTRs sent                          : 0
LTRs received                      : 0
Sequence number of next LTM request : 0
1DMs sent                          : 5
Valid 1DMs received                : 0
Invalid 1DMs received              : 0
DMMs sent                          : 5
DMRs sent                          : 0
Valid DMRs received                : 5
Invalid DMRs received              : 0
LMM sent                           : 5
Valid LMM received                 : 5
Invalid LMM received               : 0
LMR sent                           : 0
Valid LMR received                 : 5
Invalid LMR received               : 0
Remote MEP identifier               : 101
Remote MAC address                  : 00:05:85:73:39:4a

```

#### Delay measurement statistics:

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```

Average one-way delay              : 286 usec
Average one-way delay variation    : 62 usec
Best case one-way delay            : 259 usec
Average two-way delay              : 580 usec
Average two-way delay variation    : 26 usec
Best case two-way delay            : 519 usec
Worst case two-way delay           : 650 usec

```

#### Loss measurement statistics:

Index	Near-end Frame loss (CIR)	Far-end Frame loss (CIR)	Near-end Frame loss (EIR)	Far-end Frame loss (EIR)
1	9	9	2	4
2	3	5	4	6
3	7	5	0	2
4	9	6	8	2
5	3	6	6	4

```

Average near-end loss (CIR)        : 6.2
Average near-end loss ratio (CIR)  : 6.2%
Average far-end loss (CIR)         : 6.2
Average far-end loss ratio (CIR)   : 6.2%
Near-end best case loss (CIR)      : 3
Near-end best case loss ratio (CIR): 3%
Near-end worst case loss (CIR)     : 9

```

```
Near-end worst case loss ratio (CIR)      : 9%
Far-end best case loss (CIR)              : 5
Far-end best case loss ratio (CIR)        : 5%
Far-end worst case loss (CIR)            : 9
Far-end worst case loss ratio (CIR)       : 9%
Average near-end loss (EIR)              : 4
Average near-end loss ratio (EIR)         : 4%
Average far-end loss (EIR)               : 3.4
Average far-end loss ratio (EIR)          : 3.4%
Near-end best case loss (EIR)            : 0
Near-end best case loss ratio (EIR)       : 0%
Near-end worst case loss (EIR)           : 8
Near-end worst case loss ratio (EIR)      : 8%
Far-end best case loss (EIR)             : 2
Far-end best case loss ratio (EIR)        : 2%
Far-end worst case loss (EIR)            : 6
Far-end worst case loss ratio (EIR)       : 6%
```

```
show oam ethernet
connectivity-fault-
management
mep-statistics
```

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain md1 maintenance-association ma-1 local-mep 3 remote-mep 103 count 3
remote-mep 101
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
CCMs sent                                     : 7762
```

remote-mep (CIR  
counters only)

```

CCMs received out of sequence      : 0
LBMs sent                          : 0
Valid in-order LBRs received       : 0
Valid out-of-order LBRs received   : 0
LBRs received with corrupted data  : 0
LBRs sent                          : 0
LTMs sent                          : 0
LTMs received                      : 0
LTRs sent                          : 0
LTRs received                      : 0
Sequence number of next LTM request : 0
1DMs sent                          : 5
Valid 1DMs received                : 0
Invalid 1DMs received              : 0
DMMs sent                          : 5
DMRs sent                          : 0
Valid DMRs received                : 5
Invalid DMRs received              : 0
LMM sent                           : 5
Valid LMM received                 : 5
Invalid LMM received               : 0
LMR sent                           : 0
Valid LMR received                 : 5
Invalid LMR received               : 0
Remote MEP identifier              : 101
Remote MAC address                  : 00:05:85:73:39:4a

```

## Delay measurement statistics:

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```

Average one-way delay              : 286 usec
Average one-way delay variation    : 62 usec
Best case one-way delay            : 259 usec
Average two-way delay              : 580 usec
Average two-way delay variation    : 26 usec
Best case two-way delay            : 519 usec
Worst case two-way delay           : 650 usec

```

## Loss measurement statistics:

Index	Near-end Frame loss (CIR)	Far-end Frame loss (CIR)	Near-end Frame loss (EIR)	Far-end Frame loss (EIR)
1	9	9		
2	3	5		
3	7	5		
4	9	6		
5	3	6		

```

Average near-end loss (CIR)        : 6.2
Average near-end loss ratio (CIR)  : 6.2%
Average far-end loss (CIR)         : 6.2
Average far-end loss ratio (CIR)   : 6.2%
Near-end best case loss (CIR)      : 3
Near-end best case loss ratio (CIR): 3%
Near-end worst case loss (CIR)     : 9
Near-end worst case loss ratio (CIR): 9%

```

Far-end best case loss (CIR)	: 5
Far-end best case loss ratio (CIR)	: 5%
Far-end worst case loss (CIR)	: 9
Far-end worst case loss ratio (CIR)	: 9%
Average near-end loss (EIR)	: 4
Average near-end loss ratio (EIR)	: 4%
Average far-end loss (EIR)	: 3.4
Average far-end loss ratio (EIR)	: 3.4%
Near-end best case loss (EIR)	: 0
Near-end best case loss ratio (EIR)	: 0%
Near-end worst case loss (EIR)	: 8
Near-end worst case loss ratio (EIR)	: 8%
Far-end best case loss (EIR)	: 2
Far-end best case loss ratio (EIR)	: 2%
Far-end worst case loss (EIR)	: 6
Far-end worst case loss ratio (EIR)	: 6%

**show oam ethernet  
connectivity-fault-  
management  
mep-statistics**

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain mdl maintenance-association ma-1 local-mep 3 remote-mep 103 count 3
remote-mep 101
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
CCMs sent :7762
```

## remote-mep (CIR and EIR counters enabled)

```

CCMs received out of sequence      : 0
LBMs sent                          : 0
Valid in-order LBRs received       : 0
Valid out-of-order LBRs received   : 0
LBRs received with corrupted data  : 0
LBRs sent                          : 0
LTMs sent                          : 0
LTMs received                      : 0
LTRs sent                          : 0
LTRs received                      : 0
Sequence number of next LTM request : 0
1DMs sent                          : 5
Valid 1DMs received                : 0
Invalid 1DMs received              : 0
DMMs sent                          : 5
DMRs sent                          : 0
Valid DMRs received                : 5
Invalid DMRs received              : 0
LMM sent                           : 5
Valid LMM received                 : 5
Invalid LMM received               : 0
LMR sent                           : 0
Valid LMR received                 : 5
Invalid LMR received               : 0
Remote MEP identifier               : 101
Remote MAC address                  : 00:05:85:73:39:4a

```

## Delay measurement statistics:

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```

Average one-way delay              : 286 usec
Average one-way delay variation    : 62 usec
Best case one-way delay            : 259 usec
Average two-way delay              : 580 usec
Average two-way delay variation    : 26 usec
Best case two-way delay            : 519 usec
Worst case two-way delay           : 650 usec

```

## Loss measurement statistics:

Index	Near-end Frame loss (CIR)	Far-end Frame loss (CIR)	Near-end Frame loss (EIR)	Far-end Frame loss (EIR)
1	10	8	5	12
2	12	7	6	16
3	7	5	0	2
4	9	6	8	2
5	3	6	6	4

```

Average near-end loss (CIR)        : 6.2
Average near-end loss ratio (CIR)  : 6.2%
Average far-end loss (CIR)         : 6.2
Average far-end loss ratio (CIR)   : 6.2%
Near-end best case loss (CIR)      : 3
Near-end best case loss ratio (CIR): 3%
Near-end worst case loss (CIR)     : 9

```

```

Near-end worst case loss ratio (CIR) : 9%
Far-end best case loss (CIR) : 5
Far-end best case loss ratio (CIR) : 5%
Far-end worst case loss (CIR) : 9
Far-end worst case loss ratio (CIR) : 9%
Average near-end loss (EIR) : 4
Average near-end loss ratio (EIR) : 4%
Average far-end loss (EIR) : 3.4
Average far-end loss ratio (EIR) : 3.4%
Near-end best case loss (EIR) : 0
Near-end best case loss ratio (EIR) : 0%
Near-end worst case loss (EIR) : 8
Near-end worst case loss ratio (EIR) : 8%
Far-end best case loss (EIR) : 2
Far-end best case loss ratio (EIR) : 2%
Far-end worst case loss (EIR) : 6
Far-end worst case loss ratio (EIR) : 6%

```

**show oam ethernet  
connectivity-fault-  
management  
mep-statistics**

```

user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain md1 maintenance-association ma-1

```

```

MEP identifier: 100, MAC address: 00:05:85:73:7b:39

```

```

Remote MEP count: 1

```

```

CCMs sent : 6550
CCMs received out of sequence : 0
LBMs sent : 0
Valid in-order LBRs received : 0
Valid out-of-order LBRs received : 0
LBRs received with corrupted data : 0
LBRs sent : 0
LTMs sent : 0
LTMs received : 0
LTRs sent : 0
LTRs received : 0
Sequence number of next LTM request : 0
IDMs sent : 5
Valid IDMs received : 0
Invalid IDMs received : 0
DMMs sent : 5
DMRs sent : 0
Valid DMRs received : 5
Invalid DMRs received : 0

```

```

Remote MEP identifier: 101

```

```

Remote MAC address: 00:05:85:73:39:4a

```

```

Delay measurement statistics:

```

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```

Average one-way delay : 286 usec
Average one-way delay variation: 62 usec
Best case one-way delay : 259 usec
Worst case one-way delay : 313 usec
Average two-way delay : 580 usec
Average two-way delay variation: 26 usec
Best case two-way delay : 519 usec
Worst case two-way delay : 650 usec

```



```
show oam ethernet
connectivity-fault-
management
mep-statistics
remote-mep
```

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain md1 maintenance-association ma1 remote-mep 101
```

```
MEP identifier: 100, MAC address: 00:05:85:73:7b:39
CCMs sent : 7762
CCMs received out of sequence : 0
LBMs sent : 0
Valid in-order LBRs received : 0
Valid out-of-order LBRs received : 0
LBRs received with corrupted data : 0
LBRs sent : 0
LTMs sent : 0
LTMs received : 0
LTRs sent : 0
LTRs received : 0
Sequence number of next LTM request : 0
1DMs sent : 5
Valid 1DMs received : 0
Invalid 1DMs received : 0
DMMs sent : 5
DMRs sent : 0
Valid DMRs received : 5
Invalid DMRs received : 0
```

```
Remote MEP identifier: 101
```

```
Remote MAC address: 00:05:85:73:39:4a
```

```
Delay measurement statistics:
```

Index	One-way delay (usec)	Two-way delay (usec)
1	259	519
2	273	550
3	287	571
4	299	610
5	313	650

```
Average one-way delay : 286 usec
Average one-way delay variation: 62 usec
Best case one-way delay : 259 usec
Worst case one-way delay : 313 usec
Average two-way delay : 580 usec
Average two-way delay variation: 26 usec
Best case two-way delay : 519 usec
Worst case two-way delay : 650 usec
```

## show oam ethernet connectivity-fault-management path-database

<b>Syntax</b>	show oam ethernet connectivity-fault-management path-database <host-mac-address> <maintenance-association <i>ma-name</i> > <maintenance-domain <i>domain-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 8.4.
<b>Description</b>	On M7i and M10i with Enhanced CFEB (CFEB-E), M320, MX Series, ACX Series, T320, and T640 routers, display IEEE 802.lag Operation, Administration, and Management (OAM) connectivity fault management path database information for a host configured with an MEP.
<b>Options</b>	<p><b>host-mac-address</b>—(Optional) Display connectivity fault management path database information for a specified Ethernet host.</p> <p><b>maintenance-association <i>ma-name</i></b>—(Optional) Display connectivity fault management path database information for the specified maintenance association.</p> <p><b>maintenance-domain <i>domain-name</i></b>—(Optional) Display connectivity fault management path database information for the specified maintenance domain.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show oam ethernet connectivity-fault-management path-database on page 281</a>
<b>Output Fields</b>	<a href="#">Table 25 on page 280</a> lists the output fields for the <b>show oam ethernet connectivity-fault-management path-database</b> command. Output fields are listed in the approximate order in which they appear.

**Table 25: show oam ethernet connectivity-fault-management path-database Output Fields**

Field Name	Field Description
Linktrace to	MAC address of the remote MEPs in the path.
Interface	Interface identifier.
Maintenance domain name	Maintenance domain name.
Format (Maintenance domain)	Maintenance domain name format configured.
Level	Maintenance domain level configured.
Maintenance association name	Maintenance association name.

Table 25: show oam ethernet connectivity-fault-management path-database Output Fields (*continued*)

Field Name	Field Description
Local Mep	Local MEP identifier.

## Sample Output

**show oam ethernet  
connectivity-fault-  
management  
path-database**

```
user@host> show oam ethernet connectivity-fault-management path-database
maintenance-domain md1 maintenance-association ma1 00:05:85:79:39:ef
Linktrace to 00:05:85:79:39:ef, Interface : ge-3/0/0
    Maintenance Domain: md1, Level: 7
    Maintenance Association: ma1, Local Mep: 201
```

## show oam ethernet evc

<b>Syntax</b>	<b>show oam ethernet evc &lt;evc-id&gt;</b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.5.
<b>Description</b>	On MX Series routers with OAM Ethernet Virtual Connection (EVC) configurations, displays the EVC configuration and status information.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	View
<b>Output Fields</b>	<a href="#">Table 26 on page 282</a> lists the output fields for the <b>show oam ethernet evc</b> command. Output fields are listed in the approximate order in which they appear.

**Table 26: show oam ethernet evc Output Fields**

Field Name	Field Description
<b>EVC identifier</b>	Header for the EVC information showing the EVC name, configuration, and active/inactive status.
<b>UNI count</b>	Number of configured and active UNIs.
<b>Protocol</b>	Protocol configured between the UNIs.
<b>Local UNIs</b>	Heading for the list of local UNIs
<b>UNI Identifier</b>	Name of the UNI.
<b>Interface</b>	Interface type-dpc/pic/port.unit-number.
<b>Status</b>	Status operational or not operational.

## Sample Output

```

show oam ethernet evc user@host> show oam ethernet evc
EVC identifier: evc1, Point-to-Point, Active
UNI count: Configured(2), Active(2)
Protocol: cfm, Management domain: md, Management association: ma
Local UNIs:
  UNI Identifier      Interface      Status
  uni1               ge-1/1/1      Operational
  uni2               ge-1/1/1      Not Operational

```

## show oam ethernet link-fault-management

<b>Syntax</b>	show oam ethernet link-fault-management <brief   detail> <interface-name>
<b>Release Information</b>	Command introduced in Junos OS Release 8.2.
<b>Description</b>	On M320, M120, MX Series, T320, and T640 routers, display Operation, Administration, and Management (OAM) link fault management information for Ethernet interfaces.
<b>Options</b>	<b>brief   detail</b> —(Optional) Display the specified level of output.  <b>interface-name</b> —(Optional) Display link fault management information for the specified Ethernet interface only.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show oam ethernet link-fault-management brief on page 288</a> <a href="#">show oam ethernet link-fault-management detail on page 288</a>
<b>Output Fields</b>	<a href="#">Table 27 on page 283</a> lists the output fields for the <b>show oam ethernet link-fault-management</b> command. Output fields are listed in the approximate order in which they appear.

**Table 27: show oam ethernet link-fault-management Output Fields**

Field Name	Field Description	Level of Output
<b>Status</b>	Indicates the status of the established link.  <ul style="list-style-type: none"> <li>• <b>Fail</b>—A link fault condition exists.</li> <li>• <b>Running</b>—A link fault condition does not exist.</li> </ul>	All levels
<b>Discovery state</b>	State of the discovery mechanism:  <ul style="list-style-type: none"> <li>• <b>Passive Wait</b></li> <li>• <b>Send Any</b></li> <li>• <b>Send Local Remote</b></li> <li>• <b>Send Local Remote Ok</b></li> <li>• <b>Fault</b></li> </ul>	All levels
<b>Peer address</b>	Address of the OAM peer.	All levels

Table 27: show oam ethernet link-fault-management Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Flags</b>	<p>Information about the interface. Possible values are described in the “Link Flags” section under Common Output Fields Description.</p> <ul style="list-style-type: none"> <li>• <b>Remote-Stable</b>—Indicates remote OAM client acknowledgment of and satisfaction with local OAM state information. <b>False</b> indicates that remote DTE either has not seen or is unsatisfied with local state information. <b>True</b> indicates that remote DTE has seen and is satisfied with local state information.</li> <li>• <b>Local-Stable</b>—Indicates local OAM client acknowledgment of and satisfaction with remote OAM state information. <b>False</b> indicates that local DTE either has not seen or is unsatisfied with remote state information. <b>True</b> indicates that local DTE has seen and is satisfied with remote state information.</li> <li>• <b>Remote-State-Valid</b>—Indicates the OAM client has received remote state information found within Local Information TLVs of received Information OAM PDUs. <b>False</b> indicates that OAM client has not seen remote state information. <b>True</b> indicates that the OAM client has seen remote state information.</li> </ul>	All levels
<b>Remote loopback status</b>	Indicates the remote loopback status. An OAM entity can put its remote peer into loopback mode using the Loopback control OAM PDU. In loopback mode, every frame received is transmitted back on the same port (except for OAM PDUs, which are needed to maintain the OAM session).	All levels
<b>Remote entity information</b>	<p>Remote entity information.</p> <ul style="list-style-type: none"> <li>• <b>Remote MUX action</b>—Indicates the state of the multiplexer functions of the OAM sublayer. Device is forwarding non-OAM PDUs to the lower sublayer or discarding non-OAM PDUs.</li> <li>• <b>Remote parser action</b>—Indicates the state of the parser function of the OAM sublayer. Device is forwarding non-OAM PDUs to higher sublayer, looping back non-OAM PDUs to the lower sublayer, or discarding non-OAM PDUs.</li> <li>• <b>Discovery mode</b>—Indicates whether discovery mode is active or inactive.</li> <li>• <b>Unidirectional mode</b>—Indicates the ability to operate a link in a unidirectional mode for diagnostic purposes.</li> <li>• <b>Remote loopback mode</b>—Indicates whether remote loopback is supported or unsupported.</li> <li>• <b>Link events</b>—Indicates whether interpreting link events is supported or unsupported on the remote peer.</li> <li>• <b>Variable requests</b>—Indicates whether variable requests are supported. The Variable Request OAM PDU, is used to request one or more MIB variables from the remote peer.</li> </ul>	All levels
<b>OAM Receive Statistics</b>		
<b>Information</b>	The total number of information PDUs received.	<b>detail</b>
<b>Event</b>	The total number of loopback control PDUs received.	<b>detail</b>
<b>Variable request</b>	The total number of variable request PDUs received.	<b>detail</b>
<b>Variable response</b>	The total number of variable response PDUs received.	<b>detail</b>

Table 27: show oam ethernet link-fault-management Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Loopback control</b>	The total number of loopback control PDUs received.	<b>detail</b>
<b>Organization specific</b>	The total number of vendor organization specific PDUs received.	<b>detail</b>
<b>OAM Transmit Statistics</b>		
<b>Information</b>	The total number of information PDUs transmitted.	<b>detail</b>
<b>Event</b>	The total number of event notification PDUs transmitted.	<b>detail</b>
<b>Variable request</b>	The total number of variable request PDUs transmitted.	<b>detail</b>
<b>Variable response</b>	The total number of variable response PDUs transmitted.	<b>detail</b>
<b>Loopback control</b>	The total number of loopback control PDUs transmitted.	<b>detail</b>
<b>Organization specific</b>	The total number of vendor organization specific PDUs transmitted.	<b>detail</b>
<b>OAM Received Symbol Error Event information</b>		
<b>Events</b>	The number of symbol error event TLVs that have been received since the OAM sublayer was reset.	<b>detail</b>
<b>Window</b>	The symbol error event window in the received PDU.  The protocol default value is the number of symbols that can be received in one second on the underlying physical layer.	<b>detail</b>
<b>Threshold</b>	The number of errored symbols in the period required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The number of symbol errors in the period reported in the received event PDU.	<b>detail</b>
<b>Total errors</b>	The number of errored symbols that have been reported in received event TLVs since the OAM sublayer was reset.  Symbol errors are coding symbol errors.	<b>detail</b>
<b>OAM Received Frame Error Event Information</b>		
<b>Events</b>	The number of errored frame event TLVs that have been received since the OAM sublayer was reset.	<b>detail</b>
<b>Window</b>	The duration of the window in terms of the number of 100 ms period intervals.	<b>detail</b>
<b>Threshold</b>	The number of detected errored frames required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The number of detected errored frames in the period.	<b>detail</b>

Table 27: show oam ethernet link-fault-management Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Total errors</b>	The number of errored frames that have been reported in received event TLVs since the OAM sublayer was reset.  A frame error is any frame error on the underlying physical layer.	<b>detail</b>
<b>OAM Received Frame Period Error Event Information</b>		
<b>Events</b>	The number of frame seconds errors event TLVs that have been received since the OAM sublayer was reset.	<b>detail</b>
<b>Window</b>	The duration of the frame seconds window.	<b>detail</b>
<b>Threshold</b>	The number of frame seconds errors in the period.	<b>detail</b>
<b>Errors in period</b>	The number of frame seconds errors in the period.	<b>detail</b>
<b>Total errors</b>	The number of frame seconds errors that have been reported in received event TLVs since the OAM sublayer was reset.	<b>detail</b>
<b>OAM Transmitted Symbol Error Event Information</b>		
<b>Events</b>	The number of symbol error event TLVs that have been transmitted since the OAM sublayer was reset.	<b>detail</b>
<b>Window</b>	The symbol error event window in the transmitted PDU.	<b>detail</b>
<b>Threshold</b>	The number of errored symbols in the period required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The number of symbol errors in the period reported in the transmitted event PDU.	<b>detail</b>
<b>Total errors</b>	The number of errored symbols reported in event TLVs that have been transmitted since the OAM sublayer was reset.	<b>detail</b>
<b>OAM Current Symbol Error Event Information</b>		
<b>Events</b>	The number of symbol error TLVs that have been generated regardless of whether the threshold for sending event TLVs has been crossed.	<b>detail</b>
<b>Window</b>	The symbol error event window in the transmitted PDU.	<b>detail</b>
<b>Threshold</b>	The number of errored symbols in the period required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The total number of symbol errors in the period reported.	<b>detail</b>
<b>Total errors</b>	The number of errored symbols reported in event TLVs that have been generated regardless of whether the threshold for sending event TLVs has been crossed.	<b>detail</b>
<b>OAM Transmitted Frame Error Event Information</b>		



Table 27: show oam ethernet link-fault-management Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Events</b>	The number of errored frame event TLVs that have been transmitted since the OAM sublayer was reset.	<b>detail</b>
<b>Window</b>	The duration of the window in terms of the number of 100 ms period intervals.	<b>detail</b>
<b>Threshold</b>	The number of detected errored frames required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The number of detected errored frames in the period.	<b>detail</b>
<b>Total errors</b>	The number of errored frames that have been detected since the OAM sublayer was reset.	<b>detail</b>
<b>OAM Current Frame Error Event Information</b>		
<b>Events</b>	The number of errored frame event TLVs that have been generated regardless of whether the threshold for sending event TLVs has been crossed.	<b>detail</b>
<b>Window</b>	The duration of the window in terms of the number of 100 ms period intervals.	<b>detail</b>
<b>Threshold</b>	The number of detected errored frames required for the event to be generated.	<b>detail</b>
<b>Errors in period</b>	The number of errored frames in the period.	<b>detail</b>
<b>Total errors</b>	The number of errored frames detected regardless of whether the threshold for transmitting event TLVs has been crossed.	<b>detail</b>

## Sample Output

**show oam ethernet  
link-fault-management  
brief**

```
user@host> show oam ethernet link-fault-management brief
Interface: ge-3/1/3
Status: Running, Discovery state: Send Any
Peer address: 00:90:69:72:2c:83
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
Remote loopback status: Disabled on local port, Enabled on peer port
Remote entity information:
  Remote MUX action: discarding, Remote parser action: loopback
  Discovery mode: active, Unidirectional mode: unsupported
  Remote loopback mode: supported, Link events: supported
  Variable requests: unsupported
```

**show oam ethernet  
link-fault-management  
detail**

```
user@host> show oam ethernet link-fault-management detail
Interface: ge-6/1/0
Status: Running, Discovery state: Send Any
Peer address: 00:90:69:0a:07:14
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
OAM receive statistics:
  Information: 186365, Event: 0, Variable request: 0, Variable response: 0
  Loopback control: 0, Organization specific: 0
OAM transmit statistics:
  Information: 186347, Event: 0, Variable request: 0, Variable response: 0
  Loopback control: 0, Organization specific: 0
OAM received symbol error event information:
  Events: 0, Window: 0, Threshold: 0
  Errors in period: 0, Total errors: 0
OAM received frame error event information:
  Events: 0, Window: 0, Threshold: 0
  Errors in period: 0, Total errors: 0
OAM received frame period error event information:
  Events: 0, Window: 0, Threshold: 0
  Errors in period: 0, Total errors: 0
OAM transmitted symbol error event information:
  Events: 0, Window: 0, Threshold: 1
  Errors in period: 0, Total errors: 0
OAM current symbol error event information:
  Events: 0, Window: 0, Threshold: 1
  Errors in period: 0, Total errors: 0
OAM transmitted frame error event information:
  Events: 0, Window: 0, Threshold: 1
  Errors in period: 0, Total errors: 0
OAM current frame error event information:
  Events: 0, Window: 0, Threshold: 1
  Errors in period: 0, Total errors: 0
Remote entity information:
  Remote MUX action: forwarding, Remote parser action: forwarding
  Discovery mode: active, Unidirectional mode: unsupported
  Remote loopback mode: supported, Link events: supported
  Variable requests: unsupported
```

## show oam ethernet lmi

<b>Syntax</b>	<b>show oam ethernet lmi (interface &lt;interface-name&gt;)</b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.5.
<b>Description</b>	On MX Series routers with Gigabit Ethernet, Fast Ethernet, or aggregated Ethernet, and OAM Ethernet Local Management Interface (LMI) configuration, display the LMI information for the configured interfaces or optionally for a specified interface.
<b>Options</b>	<b>interface</b> —(Optional) Display LMI information for a specified interface. <b>interface-name</b> —(Optional) Display Ethernet LMI information for the specified interface only.
<b>Required Privilege Level</b>	View
<b>Output Fields</b>	Table 28 on page 289 lists the output fields for the <b>show oam ethernet lmi</b> command. Output fields are listed in the approximate order in which they appear.

**Table 28: show oam ethernet lmi Output Fields**

Field Name	Field Description
Physical Interface	Header for the EVC information showing the Ethernet virtual circuit (EVC) name, configuration, and active/inactive status.
UNI Identifier	Name of the UNI.
EVC map type	EVC configuration.
Polling verification timer	Polling verification timer status.
E-LMI state	Operational status of the E-LMI configuration in the interfaces or specified interface.
Priority/Untagged VLAN ID	To be provided.
Default EVC	The EVC set as the default EVC.
Associated EVCs	Heading for the list of configured EVCs.
EVC Identifier	EVC name.
Reference ID	To be provided.
Status	Status active or not active.
CE VLAN IDs	Customer edge VLAN ID numbers.

## Sample Output

```
show oam ethernet lmi interface user@host> show oam ethernet lmi interface ge-1/1/1
interface
Physical interface: ge-1/1/1, Physical link is Up
UNI identifier: uni-ce1, EVC map type: Bundling
Polling verification timer: Enabled, E-LMI state: Operational
Priority/Untagged VLAN ID: 20, Default EVC: evc1
Associated EVCs:
  EVC      Reference      Status      CE VLAN IDs
  Identifier ID
  evc1      1      Active (New)  1-2048
  evc2      2      Not Active   2049-4096
```

## show oam ethernet lmi statistics

<b>Syntax</b>	<code>show oam ethernet lmi statistics &lt;interface <i>interface-name</i>&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.5.
<b>Description</b>	On MX Series routers with Gigabit Ethernet, Fast Ethernet, or aggregated Ethernet PICs, displays OAM Ethernet Local Management Interface (LMI) statistics.
<b>Options</b>	<p><b>interface</b>—(Optional) Display LMI statistics for a specified interface.</p> <p><b>interface-name</b>—(Optional) Display Ethernet LMI information for the specified Ethernet interface only.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show oam ethernet lmi statistics on page 292</a>
<b>Output Fields</b>	<a href="#">Table 29 on page 291</a> lists the output fields for the <b>show oam ethernet lmi statistics</b> command. Output fields are listed in the approximate order in which they appear.

**Table 29: show oam ethernet lmi statistics Output Fields**

Field Name	Field Description
Physical interface	Name of the interface for the displayed statistics.
Reliability errors	Number of E-LMI reliability errors logged.
Protocol errors	Number of E-LMI protocol errors.
Status check received	Number of E-LMI status check receive errors.
Status check sent	Number of E-LMI status check sent errors.
Full status received	Number of E-LMI full status receive errors.
Full status sent	Number of E-LMI full status sent errors.
Full status continued received	Number of E-LMI status continued received errors.
Full status continued sent	Number of E-LMI full status continued sent errors.
Asynchronous status sent	Number of E-LMI asynchronous status sent errors.

## Sample Output

```
show oam ethernet lmi statistics interface ge-1/1/1
Physical interface: ge-1/1/1
  Reliability errors          4  Protocol errors
  0
  Status check received      0  Status check sent
  0
  Full status received       694 Full status sent
694
  Full status continued received 0 Full status continued sent
  0
  Asynchronous status sent    0
```

## show protection-group ethernet-ring aps

<b>Syntax</b>	<b>show protection-group ethernet-ring aps</b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.4. Command introduced in Junos OS Release 12.1 for EX Series switches.
<b>Description</b>	Display the status of the Automatic Protection Switching (APS) and Ring APS (RAPS) messages on an Ethernet ring.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring data-channel on page 295</a></li> <li>• <a href="#">show protection-group ethernet-ring interface on page 297</a></li> <li>• <a href="#">show protection-group ethernet-ring node-state on page 300</a></li> <li>• <a href="#">show protection-group ethernet-ring statistics on page 303</a></li> <li>• <a href="#">show protection-group ethernet-ring vlan on page 306</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring aps (EX Switches) on page 294</a> <a href="#">show protection-group ethernet-ring aps (Owner Node, Normal Operation on MX Routers) on page 294</a> <a href="#">show protection-group ethernet-ring aps (Ring Node, Normal Operation on MX Routers) on page 294</a> <a href="#">show protection-group ethernet-ring aps (Owner Node, Failure Condition on MX Routers) on page 294</a> <a href="#">show protection-group ethernet-ring aps (Ring Node, Failure Condition on MX Routers) on page 294</a>
<b>Output Fields</b>	<a href="#">Table 30 on page 293</a> lists the output fields for the <b>show protection-group ethernet-ring aps</b> command. Output fields are listed in the approximate order in which they appear.

**Table 30: show protection-group ethernet-ring aps Output Fields**

Field Name	Field Description
<b>Ethernet Ring Name</b>	Name configured for the Ethernet ring.
<b>Request/State</b>	Status of the Ethernet ring RAPS messages. <ul style="list-style-type: none"> <li>• <b>NR</b>—Indicates there is no request for APS on the ring.</li> <li>• <b>SF</b>—Indicates there is a signal failure on the ring.</li> </ul>
<b>No Flush</b>	State of the ring flushing: <b>No</b> (normal) or <b>Yes</b> (failure).
<b>Ring Protection Link Blocked</b>	Blocking on the ring protection link: <b>Yes</b> or <b>No</b> .

Table 30: show protection-group ethernet-ring aps Output Fields (*continued*)

Field Name	Field Description
Originator	Whether this node is the ring originator: <b>Yes</b> or <b>No</b> .
Remote Node ID	Identifier (in MAC address format) of the remote node.

## Sample Output

show protection-group  
ethernet-ring aps (EX  
Switches)

```
user@switch>> show protection-group ethernet-ring aps
Ring Name      Request/state No Flush  RPL Blocked Originator Remote Node ID
erp1           NR           no        yes        no         00:1F:12:30:B8:81
```

## Sample Output

show protection-group  
ethernet-ring aps  
(Owner Node, Normal  
Operation on MX  
Routers)

```
user@host> show protection-group ethernet-ring aps
Ethernet Ring Name Request/state No Flush Ring Protection Link Blocked
pg101              NR           No        Yes

Originator Remote Node ID
Yes
```

show protection-group  
ethernet-ringaps (Ring  
Node, Normal  
Operation on MX  
Routers)

```
user@host> show protection-group ethernet-ring aps
Ethernet Ring Name Request/state No Flush Ring Protection Link Blocked
pg102              NR           No        Yes

Originator Remote Node ID
No          00:01:01:00:00:01
```

show protection-group  
ethernet-ring aps  
(Owner Node, Failure  
Condition on MX  
Routers)

```
user@host> show protection-group ethernet-ring aps
Ethernet Ring Name Request/state No Flush Ring Protection Link Blocked
pg101              SF           No        No

Originator Remote Node ID
No          00:01:02:00:00:01
```

show protection-group  
ethernet-ringaps (Ring  
Node, Failure Condition  
on MX Routers)

```
user@host> show protection-group ethernet-ring aps
Ethernet Ring Name Request/state No Flush Ring Protection Link Blocked
pg102              SF           No        Yes

Originator Remote Node ID
Yes        00:00:00:00:00:00
```



## show protection-group ethernet-ring data-channel

<b>Syntax</b>	show protection-group ethernet-ring data-channel <brief   detail> <group-name <i>group-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 10.2.
<b>Description</b>	On MX Series routers, display data channel information for all Ethernet ring protection groups or for a specific Ethernet ring protection group.
<b>Options</b>	<b>brief   detail</b> —(Optional) Display the specified level of output.  <b>group-name</b> —(Optional) Protection group for which to display statistics. If you omit this optional field, all protection group statistics for configured groups will be displayed.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring aps on page 293</a></li> <li>• <a href="#">show protection-group ethernet-ring interface on page 297</a></li> <li>• <a href="#">show protection-group ethernet-ring node-state on page 300</a></li> <li>• <a href="#">show protection-group ethernet-ring statistics on page 303</a></li> <li>• <a href="#">show protection-group ethernet-ring vlan on page 306</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring data-channel on page 296</a>
<b>Output Fields</b>	Table 31 on page 295 lists the output fields for the <b>show protection-group ethernet-ring data-channel</b> command. Output fields are listed in the approximate order in which they appear.

**Table 31: show protection-group ethernet-ring data-channel Output Fields**

Field Name	Field Description
<b>Interface</b>	Name of the interface configured for the Ethernet ring.
<b>STP index</b>	The Spanning Tree Protocol (STP) index number used by each interface in an Ethernet ring. The STP index controls the forwarding behavior for a set of VLANs on a data channel on an Ethernet ring port. For multiple Ethernet ring instances on a physical ring port, there are multiple STP index numbers. Different ring instances will have different STP index numbers and may have different forwarding behavior.
<b>Forward State</b>	Forwarding state on the Ethernet ring. <ul style="list-style-type: none"> <li>• <b>fowarding</b>—Indicates packets are being forwarded.</li> <li>• <b>discarding</b>—Indicates packets are being discarded.</li> </ul>

## Sample Output

```
show protection-group ethernet-ring data-channel
user@host> show protection-group ethernet-ring data-channel
Ethernet ring data channel information for protection group pg301
Interface    STP index    Forward State
ge-1/0/3     71           forwarding
ge-1/0/4     82           forwarding

Ethernet ring data channel information for protection group pg302
Interface    STP index    Forward State
ge-1/0/3     52           forwarding
ge-1/0/4     91           forwarding
```

## show protection-group ethernet-ring interface

<b>Syntax</b>	<b>show protection-group ethernet-ring interface</b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.4.
<b>Description</b>	Displays the status of the Automatic Protection Switching (APS) interfaces on an Ethernet ring.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring data-channel on page 295</a></li> <li>• <a href="#">show protection-group ethernet-ring aps on page 293</a></li> <li>• <a href="#">show protection-group ethernet-ring node-state on page 300</a></li> <li>• <a href="#">show protection-group ethernet-ring statistics on page 303</a></li> <li>• <a href="#">show protection-group ethernet-ring vlan on page 306</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring interface (EX Series Switch Owner Node) on page 298</a> <a href="#">show protection-group ethernet-ring interface (Owner Node MX Series Router ) on page 298</a> <a href="#">show protection-group ethernet-ring interface (EX Series Switch Ring Node) on page 298</a> <a href="#">show protection-group ethernet-ring interface (MX Series Router Ring Node) on page 298</a>
<b>Output Fields</b>	Table 32 on page 297 lists the output fields for both the EX Series switch and the MX Series router <b>show protection-group ethernet-ring interface</b> commands. Output fields are listed in the approximate order in which they appear.

**Table 32: MX Series Routers show protection-group ethernet-ring interface Output Fields**

Field Name	Field Description
Ethernet ring port parameters for protection group <i>group-name</i>	Output is organized by configured protection group.
Interface	Physical interfaces configured for the Ethernet ring.
Control Channel	(MX Series router only) Logical unit configured on the physical interface. <ul style="list-style-type: none"> <li>• <b>NR</b>—Indicates there is no request for APS on the ring.</li> <li>• <b>SF</b>—Indicates there is a signal failure on the ring.</li> </ul>
Forward State	State of the ring forwarding on the interface: <b>discarding</b> or <b>forwarding</b> .

**Table 32: MX Series Routers show protection-group ethernet-ring interface Output Fields (*continued*)**

Field Name	Field Description
Ring Protection Link End	Whether this interface is the end of the ring: <b>Yes</b> or <b>No</b> .
Signal Failure	Whether there a signal failure exists on the link: <b>Clear</b> or <b>Set</b> .
Admin State	State of the interface: For EX switches, <b>ready</b> , <b>ifl ready</b> , or <b>waiting</b> . For MX routers, <b>IFF ready</b> or <b>IFF disabled</b> .

## Sample Output

**show protection-group ethernet-ring interface**  
(EX Series Switch Owner Node)

```
user@host> show protection-group ethernet-ring interface
Ethernet ring port parameters for protection group pg101

Interface      Forward State  RPL End  Signal Failure  Admin State
ge-0/0/3.0     discarding    Yes      Clear          ready
ge-0/0/9.0     forwarding    No       Clear          ready
```

**show protection-group ethernet-ring interface**  
(Owner Node MX Series Router )

```
user@host> show protection-group ethernet-ring interface
Ethernet ring port parameters for protection group pg101

Interface      Control Channel Forward State  Ring Protection Link End
ge-1/0/1       ge-1/0/1.1     discarding    Yes
ge-1/2/4       ge-1/2/4.1     forwarding    No

Signal Failure  Admin State
Clear           IFF ready
Clear           IFF ready
```

**show protection-group ethernet-ring interface**  
(EX Series Switch Ring Node)

```
user@host> show protection-group ethernet-ring interface
Ethernet ring port parameters for protection group pg102

Ethernet ring port parameters for protection group pg101

Interface      Forward State  RPL End  Signal Failure  Admin State
ge-0/0/3.0     discarding    Yes      Clear          ready
ge-0/0/9.0     forwarding    No       Clear          ready
```

**show protection-group ethernet-ring interface**

```
user@host> show protection-group ethernet-ring interface
Ethernet ring port parameters for protection group pg102
```

(MX Series Router Ring Node)

Interface	Control Channel	Forward State	Ring Protection Link End
ge-1/2/1	ge-1/2/1.1	forwarding	No
ge-1/0/2	ge-1/0/2.1	forwarding	No

Signal Failure	Admin State
Clear	IFF ready
Clear	IFF ready

## show protection-group ethernet-ring node-state

<b>Syntax</b>	<b>show protection-group ethernet-ring node-state</b>
<b>Release Information</b>	Command introduced in Junos OS Release 9.4. Command introduced in Junos OS Release 12.1 for EX Series switches.
<b>Description</b>	Display the status of the Automatic Protection Switching (APS) nodes on an Ethernet ring.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring data-channel on page 295</a></li> <li>• <a href="#">show protection-group ethernet-ring aps on page 293</a></li> <li>• <a href="#">show protection-group ethernet-ring interface on page 297</a></li> <li>• <a href="#">show protection-group ethernet-ring statistics on page 303</a></li> <li>• <a href="#">show protection-group ethernet-ring vlan on page 306</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring node-state (EX Series Switch) on page 301</a> <a href="#">show protection-group ethernet-ring node-state (Owner Node, Normal Operation on MX Series Router) on page 301</a> <a href="#">show protection-group ethernet-ring node-state (Ring Node, Normal Operation on MX Series Router) on page 301</a> <a href="#">show protection-group ethernet-ring node-state (Owner Node, Failure Condition on MX Series Router) on page 301</a> <a href="#">show protection-group ethernet-ring node-state (Ring Node, Failure Condition on MX Series Router) on page 301</a>
<b>Output Fields</b>	<a href="#">Table 33 on page 300</a> lists the output fields for the <b>show protection-group ethernet-ring node-state</b> command. Output fields are listed in the approximate order in which they appear.

**Table 33: show protection-group ethernet-ring node-state Output Fields**

Field Name	Field Description
<b>Ring Name</b>	Name configured for the Ethernet ring.
<b>APS State</b>	State of the Ethernet ring APS. <ul style="list-style-type: none"> <li>• <b>idle</b>—Indicates there is no APS on the ring.</li> <li>• <b>protected</b>—Indicates there is a protection switch on the ring.</li> </ul>

**Table 33: show protection-group ethernet-ring node-state Output Fields (continued)**

Field Name	Field Description
Event	Events on the ring. <ul style="list-style-type: none"> <li>• <b>NR-RB</b>—Indicates there is no APS request and the ring link is blocked on the ring owner node.</li> <li>• <b>NR</b>—Indicates there is no APS request on the ring non-owner nodes.</li> <li>• <b>SF</b>—Indicates there is signal failure on a node link.</li> </ul>
Ring Protection Link Owner	Whether this node is the ring owner: <b>Yes</b> or <b>No</b> .
Restore Timer (WTR Timer)	Restoration timer: <b>Enabled</b> or <b>Disabled</b> .
Guard Timer	Guard timer: <b>Enabled</b> or <b>Disabled</b> .
Operational State	State of the node: <b>Operational</b> or <b>Non-operational</b> .

## Sample Output

```
show protection-group ethernet-ring node-state (EX Series Switch)
user@switch> show protection-group ethernet-ring node-state
Ring Name APS State Event RPL Owner WTR Timer Guard Timer Op State
erp1 idle NR-RB yes disabled disabled operational
```

```
show protection-group ethernet-ring node-state (Owner Node, Normal Operation on MX Series Router)
user@host> show protection-group ethernet-ring node-state
Ethernet ring APS State Event Ring Protection Link Owner
pg101 idle NR-RB Yes

Restore Timer Quard Timer Operation state
disabled disabled operational
```

```
show protection-group ethernet-ring node-state (Ring Node, Normal Operation on MX Series Router)
user@host> show protection-group ethernet-ring node-state
Ethernet ring APS State Event Ring Protection Link Owner
pg102 idle NR-RB No

Restore Timer Quard Timer Operation state
disabled disabled operational
```

```
show protection-group ethernet-ring node-state (Owner Node, Failure Condition on MX Series Router)
user@host> show protection-group ethernet-ring node-state
Ethernet ring APS State Event Ring Protection Link Owner
pg101 protected SF Yes

Restore Timer Quard Timer Operation state
disabled disabled operational
```

```
show protection-group ethernet-ring
user@host> show protection-group ethernet-ring node-state
Ethernet ring APS State Event Ring Protection Link Owner
pg102 idle NR-RB No
```

node-state (Ring Node,  
Failure Condition on  
MX Series Router)

Restore Timer	Quard Timer	Operation state
disabled	disabled	operational



## show protection-group ethernet-ring statistics

<b>Syntax</b>	<b>show protection-group ethernet-ring statistics</b> <group-name <i>group-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 9.4. Command introduced in Junos OS Release 12.1 for EX Series switches.
<b>Description</b>	Display statistics regarding Automatic Protection Switching (APS) protection groups on an Ethernet ring.
<b>Options</b>	<b>group-name</b> —Protection group for which to display statistics. In you omit this optional field, all protection group statistics for configured groups will be displayed.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring data-channel on page 295</a></li> <li>• <a href="#">show protection-group ethernet-ring aps on page 293</a></li> <li>• <a href="#">show protection-group ethernet-ring node-state on page 300</a></li> <li>• <a href="#">show protection-group ethernet-ring interface on page 297</a></li> <li>• <a href="#">show protection-group ethernet-ring vlan on page 306</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring statistics (EX Switch) on page 304</a> <a href="#">show protection-group ethernet-ring statistics (Owner Node, Normal Operation on MX Router) on page 304</a> <a href="#">show protection-group ethernet-ring statistics (Ring Node, Normal Operation on MX Router) on page 304</a> <a href="#">show protection-group ethernet-ring statistics (Owner Node, Failure Condition on MX Router) on page 304</a> <a href="#">show protection-group ethernet-ring statistics (Ring Node, Failure Condition on MX Router) on page 304</a>
<b>Output Fields</b>	<a href="#">Table 34 on page 303</a> lists the output fields for the <b>show protection-group ethernet-ring statistics</b> command. Output fields are listed in the approximate order in which they appear.

**Table 34: show protection-group ethernet-ring statistics Output Fields**

Field Name	Field Description
<b>Ethernet Ring Statistics for PG</b>	Name of the protection group for which statistics are displayed.
<b>RAPS sent</b>	Number of Ring Automatic Protection Switching (RAPS) messages sent. (On MX Series switches only)
<b>RAPS received</b>	Number of RAPS messages received. (On MX Series switches only)

Table 34: show protection-group ethernet-ring statistics Output Fields (*continued*)

Field Name	Field Description
<b>Local SF</b>	Number of times a signal failure (SF) has occurred locally.
<b>Remote SF</b>	Number of times a signal failure (SF) has occurred anywhere else on the ring.
<b>NR event</b>	Number of times a No Request (NR) event has occurred on the ring.
<b>NR-RB event</b>	Number of times a No Request, Ring Blocked (NR-RB) event has occurred on the ring.

## Sample Output

**show protection-group  
ethernet-ring statistics  
(EX Switch)**

```
user@switch> show protection-group ethernet-ring statistics
Ring Name Local SF Remote SF NR Event NR-RB Event
erp1      2      1      2      3
```

**show protection-group  
ethernet-ring statistics  
(Owner Node, Normal  
Operation on MX  
Router)**

```
user@host> show protection-group ethernet-ring statistics group-name pg101
Ethernet Ring statistics for PG pg101
RAPS sent : 1
RAPS received : 0
Local SF happened: : 0
Remote SF happened: : 0
NR event happened: : 0
NR-RB event happened: : 1
```

**show protection-group  
ethernet-ring statistics  
(Ring Node, Normal  
Operation on MX  
Router)**

```
user@host> show protection-group ethernet-ring statistics group-name pg102
Ethernet Ring statistics for PG pg102
RAPS sent : 0
RAPS received : 1
Local SF happened: : 0
Remote SF happened: : 0
NR event happened: : 0
NR-RB event happened: : 1
```

**show protection-group  
ethernet-ring statistics  
(Owner Node, Failure  
Condition on MX  
Router)**

```
user@host> show protection-group ethernet-ring statistics group-name pg101
Ethernet Ring statistics for PG pg101
RAPS sent : 1
RAPS received : 1
Local SF happened: : 0
Remote SF happened: : 1
NR event happened: : 0
NR-RB event happened: : 1
```

**show protection-group  
ethernet-ring statistics  
(Ring Node, Failure**

```
user@host> show protection-group ethernet-ring statistics group-name pg102
Ethernet Ring statistics for PG pg102
RAPS sent : 1
RAPS received : 1
```

Condition on MX Router)	Local SF happened:	: 1
	Remote SF happened:	: 0
	NR event happened:	: 0
	NR-RB event happened:	: 1

## show protection-group ethernet-ring vlan

<b>Syntax</b>	show protection-group ethernet-ring vlan <brief   detail> <group-name <i>group-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 10.2.
<b>Description</b>	On MX Series routers, display all data channel logical interfaces and the VLAN IDs controlled by a ring instance data channel.
<b>Options</b>	<b>brief   detail</b> —(Optional) Display the specified level of output.  <b>group-name</b> —(Optional) Protection group for which to display statistics. In you omit this optional field, all protection group statistics for configured groups will be displayed.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show protection-group ethernet-ring aps on page 293</a></li> <li>• <a href="#">show protection-group ethernet-ring data-channel on page 295</a></li> <li>• <a href="#">show protection-group ethernet-ring interface on page 297</a></li> <li>• <a href="#">show protection-group ethernet-ring node-state on page 300</a></li> <li>• <a href="#">show protection-group ethernet-ring statistics on page 303</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show protection-group ethernet-ring vlan on page 307</a> <a href="#">show protection-group ethernet-ring vlan brief on page 307</a> <a href="#">show protection-group ethernet-ring vlan detail on page 307</a> <a href="#">show protection-group ethernet-ring vlan group-name vkm01 on page 307</a>
<b>Output Fields</b>	Table 35 on page 306 lists the output fields for the <b>show protection-group ethernet-ring vlan</b> command. Output fields are listed in the approximate order in which they appear.

**Table 35: show protection-group ethernet-ring vlan Output Fields**

Field Name	Field Description
<b>Interface</b>	Name of the interface configured for the Ethernet protection ring.
<b>Vlan</b>	Name of the VLAN associated with the interface configured for the Ethernet protection ring.
<b>STP Index</b>	The Spanning Tree Protocol (STP) index number used by each interface in an Ethernet ring. The STP index controls the forwarding behavior for a set of VLANs on a data channel on an Ethernet ring port. For multiple Ethernet ring instances on an physical ring port, there are multiple STP index numbers. Different ring instances will have different STP index numbers and may have different forwarding behavior.

**Table 35: show protection-group ethernet-ring vlan Output Fields (continued)**

Field Name	Field Description
Bridge Domain	Name of the bridge domain that is associated with the VLAN configured for the Ethernet protection ring.

## Sample Output

### show protection-group ethernet-ring vlan

```
user@host> show protection-group ethernet-ring vlan
Ethernet ring IFBD parameters for protection group vkm01
```

Interface	Vlan	STP Index	Bridge Domain
ge-2/0/8	100	130	default-switch/bd100
ge-2/0/4	100	126	default-switch/bd100

### show protection-group ethernet-ring vlan brief

```
user@host> show protection-group ethernet-ring vlan brief
Ethernet ring IFBD parameters for protection group vkm01
```

Interface	Vlan	STP Index	Bridge Domain
ge-2/0/8	100	130	default-switch/bd100
ge-2/0/4	100	126	default-switch/bd100

### show protection-group ethernet-ring vlan detail

```
user@host> show protection-group ethernet-ring vlan detail
Ethernet ring IFBD parameters for protection group vkm01
```

```
Interface name      : ge-2/0/8
Vlan                : 100
STP index           : 130
Bridge Domain       : default-switch/bd100
Interface name      : ge-2/0/4
Vlan                : 100
STP index           : 126
Bridge Domain       : default-switch/bd100
```

### show protection-group ethernet-ring vlan group-name vkm01

```
user@host> show protection-group ethernet-ring vlan vkm01
Ethernet ring IFBD parameters for protection group vkm01
```

Interface	Vlan	STP Index	Bridge Domain
ge-2/0/8	100	130	default-switch/bd100
ge-2/0/4	100	126	default-switch/bd100



## CHAPTER 6

# Command Summary

- [Ethernet Interface Operational Mode Commands on page 309](#)
- [VRRP Operational Mode Commands on page 314](#)

### Ethernet Interface Operational Mode Commands

[Table 36 on page 309](#) summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces. Commands are listed in alphabetical order.

**Table 36: Ethernet Interface Operational Mode Commands**

Task	Command
Clear dynamic VLAN interfaces.	clear auto-configuration interfaces
Clear a specified dynamic agent circuit identifier (ACI) interface set configured on the router. You can clear only those ACI interface sets that have no subscriber interface members.	clear auto-configuration interfaces interface-set
Clear Link Aggregation Control Protocol (LACP) statistics.	clear lacp statistics
Clear Link Aggregation Control Protocol (LACP) timeout entries.	clear lacp timeouts
Clear learned MAC addresses from the hardware and MAC database. Static MAC addresses are not cleared.	clear interfaces mac-database
Clear statistics that are collected for every MAC address, including policer statistics, on a given physical or logical interface.	clear interfaces mac-database statistics
Clear statistics that are collected for interface sets.	clear interfaces interface-set statistics
Clear the existing continuity measurement and restart counting the operational uptime.	clear oam ethernet connectivity-fault-management continuity-measurement

Table 36: Ethernet Interface Operational Mode Commands (*continued*)

Task	Command
Clear ITU-T Y.1731 Ethernet frame delay measurement (ETH-DM) delay statistics and ETH-DM frame counts. (MX Series routers)	clear oam ethernet connectivity-fault-management delay-statistics
Clear Operation, Administration, and Management (OAM) and connectivity fault management (CFM) linktrace database information.	clear oam ethernet connectivity-fault-management linktrace path-database
Clear all loss statistics maintained by CFM for a given maintenance domain and maintenance association.	clear oam ethernet connectivity-fault-management loss-statistics
Clear connectivity-fault-management policer statistics.	clear oam ethernet connectivity-fault-management policer
Clear all statistics maintained by CFM. (Routers that support IEEE 802.1ag OAM CFM)  In addition, for interfaces that support ITU-T Y.1731 Ethernet frame delay measurement (ETH-DM), also clear any ETH-DM statistics and frame counts for CFM maintenance association end points (MEPs).	clear oam ethernet connectivity-fault-management statistics
Clear Operation, Administration, and Management (OAM) link fault management state information and restart the link discovery process on Ethernet interfaces.	clear oam ethernet link-fault-management state
Clear Operation, Administration, and Management (OAM) statistics link fault management statistics for Ethernet interfaces.	clear oam ethernet link-fault-management statistics
Clear the statistics for all Ethernet ring protection groups or a specific Ethernet ring protection group.	clear protection-group ethernet-ring statistics
Check the reachability of a remote IEEE 802.1ag OAM maintenance association end point (MEP) or maintenance association intermediate point (MIP).	ping ethernet
Manually rebalance the subscribers on an aggregated Ethernet bundle with targeted distribution enabled.	request interface rebalance (Aggregated Ethernet for Subscriber Management)
Manually revert egress traffic from the designated backup link to the designated primary link of an aggregated Ethernet interface for which link protection is enabled, or manually switch egress traffic from the primary link to the backup link.	request interface (revert   switchover) (Aggregated Ethernet Link Protection)
Force LACP link switchover.	request lacp link-switchover



Table 36: Ethernet Interface Operational Mode Commands (*continued*)

Task	Command
Clear the lockout, force switch, manual switch, exercise, and wait-to-restore states.	request protection-group ethernet-aps clear
Test if APS is operating correctly.	request protection-group ethernet-aps exercise
Force traffic to switch from the active path to the alternate path.	request protection-group ethernet-aps force-switch
Lock the protection path, forcing the use of the working path.	request protection-group ethernet-aps lockout
Force traffic to switch from the active path to the alternate path.	request protection-group ethernet-aps manual-switch
Display status information about aggregated Fast Ethernet or Gigabit Ethernet router interfaces.	<a href="#">show interfaces (Aggregated Ethernet)</a>  show interfaces (far-end-interval)
Display status information about Fast Ethernet interfaces.	<a href="#">show interfaces (Fast Ethernet)</a>
Display status information about the specified Gigabit Ethernet interface.	show interfaces (Gigabit Ethernet)
Display status information about 10-Gigabit Ethernet router interfaces.	<a href="#">show interfaces (10-Gigabit Ethernet)</a>
Display IPv6 interface statistics for IPv6 traffic traversing through the IQ2 and IQ2E PICs on standalone T640 routers and on T640 routers in a TX Matrix or in a TXP Matrix.  Display IPv6 interface statistics for IPv6 traffic traversing through the IQ2 PICs on M10i and M120 routers.  Display IPv6 interface statistics for IPv6 traffic traversing through the IQ2E PICs on M10i, M120, and M320 routers.	show interfaces extensive
Display information about Gigabit Ethernet or 10-Gigabit Ethernet router interface sets.	<a href="#">show interfaces interface-set (Ethernet Interface Set)</a>
Display information about Gigabit Ethernet or 10-Gigabit Ethernet router interface set queues.	<a href="#">show interfaces interface-set queue</a>
Display the transceiver temperature, laser bias current, laser output power, receive optical power, and related alarms for 10-Gigabit Ethernet dense wavelength-division multiplexing (DWDM) interfaces.	<a href="#">show interfaces diagnostics optics (Gigabit Ethernet, 10-Gigabit Ethernet, and 100 Gigabit Ethernet)</a>
Display information about integrated routing and bridging interfaces.	<a href="#">show interfaces irb</a>

Table 36: Ethernet Interface Operational Mode Commands (*continued*)

Task	Command
Display status information about the distribution of subscribers on different links in an aggregated Ethernet bundle.	show interfaces targeting (Aggregated Ethernet for Subscriber Management)
Display Link Aggregation Control Protocol (LACP) information for aggregated, Fast Ethernet, or Gigabit Ethernet router interfaces.	show lacp interfaces
Display Link Aggregation Control Protocol (LACP) statistics.	show lacp statistics
Display Link Aggregation Control Protocol timeout entries.	show lacp timeouts
Display MAC address information for Gigabit Ethernet router interfaces.	show interfaces mac-database (Gigabit Ethernet)
Display information on a specified interface that is part of a multichassis link aggregation configuration.	show interfaces mc-ae
Display ETH-DM statistics for CFM MEPs. (MX Series routers, Ethernet DPCs).	show oam ethernet connectivity-fault-management delay-statistics
Display IEEE 802.1ag OAM connectivity fault management forwarding state information for Ethernet interfaces.	show oam ethernet connectivity-fault-management forwarding-state
Display OAM connectivity fault management information for Ethernet interfaces.  For interfaces that support ETH-DM, also display any ETH-DM frame counts when the <b>detail</b> or <b>extensive</b> option is included. In all other cases, ETH-DM frame counts are zero.	show oam ethernet connectivity-fault-management interfaces
Display OAM connectivity fault management linktrace path database information.	show oam ethernet connectivity-fault-management linktrace path-database
Display OAM connectivity fault management maintenance association end point (MEP) database information.  For interfaces that support ETH-DM, also display any ETH-DM frame counts. In all other cases, ETH-DM frame counts are zero.	show oam ethernet connectivity-fault-management mep-database
Display ETH-DM statistics and frame counts for CFM MEPs. (MX Series routers, Ethernet DPCs)	show oam ethernet connectivity-fault-management mep-statistics

Table 36: Ethernet Interface Operational Mode Commands (*continued*)

Task	Command
Display ETH-LM statistics for on-demand mode only.	<code>show oam ethernet connectivity-fault-management loss-statistics</code>
Display information about maintenance intermediate points (MIPs) for the Ethernet OAM 802.1ag standard for connectivity fault management (CFM).	<code>show oam ethernet connectivity-fault-management mip</code>
Display OAM connectivity fault management path database information for hosts configured with MEP.	<code>show oam ethernet connectivity-fault-management path-database</code>
Displays connectivity-fault-management policer statistics.	<code>show oam ethernet connectivity-fault-management policer</code>
Display OAM Ethernet Virtual Connection (EVC) information for hosts configured with Ethernet Local Management Interface (E-LMI). (MX series only)	<code>show oam ethernet evc</code>
Display OAM fault management statistics for Ethernet interfaces.	<code>show oam ethernet link-fault-management</code>
Display OAM Ethernet Local Management Interface status information for an LMI configured interface. (MX series only)	<code>show oam ethernet lmi</code>
Display OAM Ethernet Local Management Interface statistics for an LMI configured interface. (MX series only)	<code>show oam ethernet lmi statistics</code>
Display protection group Ethernet ring Automatic Protection Switching (APS).	<code>show protection-group ethernet-ring aps</code>
Display data channel information for all Ethernet ring protection groups or for a specific Ethernet ring protection group.	<code>show protection-group ethernet-ring data-channel</code>
Display protection group Ethernet ring interfaces.	<code>show protection-group ethernet-ring interface</code>
Display protection group Ethernet ring nodes.	<code>show protection-group ethernet-ring node-state</code>
Display protection group Ethernet ring statistics.	<code>show protection-group ethernet-ring statistics</code>
Display all data channel logical interfaces and the VLAN IDs controlled by a ring instance data channel.	<code>show protection-group ethernet-ring vlan</code>
Trace the path between two Ethernet OAM end points.	<code>traceroute ethernet</code>

## VRRP Operational Mode Commands

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Table 37 on page 314 summarizes the command-line interface (CLI) commands that you can use to monitor and troubleshoot Virtual Router Redundancy Protocol (VRRP) on Ethernet, Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, and logical tunnel interfaces. Commands are listed in alphabetical order.

**Table 37: VRRP Operational Mode Commands**

Task	Command
Clear (set to zero) VRRP groups.	clear vrrp
Display VRRP groups.	show vrrp

## PART 4

# Troubleshooting

- [Ethernet on page 317](#)
- [Interface Diagnostics on page 321](#)
- [Investigate Fast Ethernet and Gigabit Ethernet Interfaces on page 329](#)



## CHAPTER 7

# Ethernet

## traceroute ethernet

<b>Syntax</b>	<pre>traceroute ethernet (<i>mac-address</i>   <i>mep-id</i>) maintenance-association <i>ma-name</i> maintenance-domain <i>md-name</i> ttl <i>value</i> &lt;wait <i>seconds</i>&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.0.</p> <p><b>mep-id</b> option introduced in Junos OS Release 9.1.</p>
<b>Description</b>	<p>Triggers the linktrace protocol to trace the route between two maintenance points. The result of the traceroute protocol is stored in the path database. To display the path database, use the <b>show oam ethernet connectivity-fault-management path-database</b> command.</p> <p>Before using the traceroute command, you can verify the remote MEP's MAC address using the <b>show oam ethernet connectivity-fault-management path-database</b> command.</p>
<b>Options</b>	<p><b>mac-address</b>—Destination unicast MAC address of the remote maintenance point.</p> <p><b>mep-id</b>—MEP identifier of the remote maintenance point. The range of values is 1 through 8191.</p> <p><b>maintenance-association <i>ma-name</i></b>—Specifies an existing maintenance association from the set of configured maintenance associations.</p> <p><b>maintenance-domain <i>md-name</i></b>—Specifies an existing maintenance domain from the set of configured maintenance domains.</p> <p><b>ttl <i>value</i></b>—Number of hops to use in the linktrace request. The range is 1 to 255 hops. The default is 4.</p> <p><b>wait <i>seconds</i></b>—(Optional) Maximum time to wait for a response to the traceroute request. The range is 1 to 255 seconds. The default is 5.</p>
<b>Required Privilege Level</b>	network
<b>List of Sample Output</b>	<a href="#">traceroute ethernet on page 319</a>
<b>Output Fields</b>	<p><a href="#">Table 38 on page 318</a> lists the output fields for the <b>traceroute ethernet</b> command. Output fields are listed in the approximate order in which they appear.</p>

**Table 38: traceroute ethernet Output Fields**

Field Name	Field Description
Linktrace to	MAC address of the destination maintenance point.
Interface	Local interface used to send the linktrace message (LTM).



Table 38: traceroute ethernet Output Fields (*continued*)

Field Name	Field Description
<b>Maintenance Domain</b>	Maintenance domain specified in the traceroute command.
<b>Level</b>	Maintenance domain level configured.
<b>Maintenance Association</b>	Maintenance association specified in the traceroute command.
<b>Local Mep</b>	The local maintenance end point identifier.
<b>Transaction Identifier</b>	4-byte identifier maintained by the MEP. Each LTM uses a transaction identifier. The transaction identifier is maintained globally across all Maintenance Domains. Use the transaction identifier to match an incoming linktrace response (LTR), with a previously sent LTM.
<b>Hop</b>	Sequential hop count of the linktrace path.
<b>TTL</b>	Number of hops remaining in the linktrace message. The time to live (TTL) is decremented at each hop.
<b>Source MAC address</b>	MAC address of the 802.1ag maintenance point that is sending the linktrace message.
<b>Next-hop MAC address</b>	MAC address of the 802.1ag node that is the next hop in the LTM path.

## Sample Output

### traceroute ethernet

```
user@host> traceroute ethernet maintenance-domain md1 maintenance-association ma1
00:90:69:7e:01:ff
```

```
Linktrace to 00:01:02:03:04:05, Interface : ge-5/0/0.0
```

```
  Maintenance Domain: MD1, Level: 7
```

```
  Maintenance Association: MA1, Local Mep: 1
```

Hop	TTL	Source MAC address	Next hop MAC address
Transaction Identifier:100001			
1	63	00:00:aa:aa:aa:aa	00:00:bb:bb:bb:bb
2	62	00:00:bb:bb:bb:bb	00:00:cc:cc:cc:cc
3	61	00:00:cc:cc:cc:cc	00:01:02:03:04:05
4	60	00:01:02:03:04:05	00:00:00:00:00:00



## CHAPTER 8

# Interface Diagnostics

- [Interface Diagnostics on page 321](#)

## Interface Diagnostics

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

- [Configuring Loopback Testing on page 321](#)
- [Interface Diagnostics on page 323](#)

## Configuring Loopback Testing

Loopback testing allows you to verify the connectivity of a circuit. You can configure any of the following interfaces to execute a loopback test: Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, E1, E3, NxDS0, serial, SONET/SDH, T1, and T3.

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

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

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

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

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

Table 39 on page 322 shows the loopback modes supported on the various interface types.

**Table 39: Loopback Modes by Interface Type**

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	<a href="#">"Configuring Ethernet Loopback Capability" on page 16</a>
Circuit Emulation E1	Local and remote	Configuring E1 Loopback Capability
Circuit Emulation T1	Local and remote	Configuring T1 Loopback Capability
E1 and E3	Local and remote	Configuring E1 Loopback Capability and Configuring E3 Loopback Capability
NxDSO	Payload	Configuring Channelized E1 IQ and IQE Interfaces, Configuring T1 and NxDSO Interfaces, Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode), Configuring Channelized STM1 IQ and IQE Interfaces, and Configuring Channelized T3 IQ Interfaces
Serial (V.35 and X.21)	Local and remote	Configuring Serial Loopback Capability
Serial (EIA-530)	DCE local, DCE remote, local, and remote	Configuring Serial Loopback Capability
SONET/SDH	Local and remote	Configuring SONET/SDH Loopback Capability

Table 39: Loopback Modes by Interface Type (*continued*)

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

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

**loopback mode;**

You can include this statement at the following hierarchy levels:

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

## Interface Diagnostics

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

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

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

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

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

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

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

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

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

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

For specific hierarchy information, see the individual interface types.



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

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

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



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

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

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



**NOTE:** The IQE PICs support only the following algorithms:

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

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



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

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

Table 40 on page 326 shows the BERT capabilities for various interface types.

**Table 40: BERT Capabilities by Interface Type**

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



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

### Starting and Stopping a BERT Test

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

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

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

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

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

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

For example:

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

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

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

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



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

### Example: Configuring Bit Error Rate Testing

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

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

```
}  
}
```

## CHAPTER 9

# Investigate Fast Ethernet and Gigabit Ethernet Interfaces

- Monitor Fast Ethernet and Gigabit Ethernet Interfaces on page 329
- Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces on page 339
- Locate the Fast Ethernet and Gigabit Ethernet LINK Alarm and Counters on page 351

## Monitor Fast Ethernet and Gigabit Ethernet Interfaces

- Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces on page 329
- Monitor Fast Ethernet and Gigabit Ethernet Interfaces on page 330
- Fiber-Optic Ethernet Interface Specifications on page 339

## Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces

**Purpose** To monitor Fast Ethernet and Gigabit Ethernet interfaces and begin the process of isolating interface problems when they occur.

**Action** Table 41 on page 329 provides links and commands for monitoring Fast Ethernet and Gigabit Ethernet interfaces.

**Table 41: Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces**

Tasks	Command or Action
<b>“Monitor Fast Ethernet and Gigabit Ethernet Interfaces” on page 330</b>	
1. Display the Status of Fast Ethernet Interfaces on page 330	<code>show interfaces terse (fe*   ge*)</code>
2. Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface on page 332	<code>show interfaces (fe-fpc/pic/port   ge-fpc/pic/port)</code>
3. Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface on page 333	<code>show interfaces (fe-fpc/pic/port   ge-fpc/pic/port) extensive</code>
4. Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface on page 337	<code>monitor interface (fe-fpc/pic/port   ge-fpc/pic/port)</code>
5. Fiber-Optic Ethernet Interface Specifications on page 339	

**Meaning** You can use the above described commands to monitor and to display the configurations for Fast Ethernet and Gigabit Ethernet interfaces.

## Monitor Fast Ethernet and Gigabit Ethernet Interfaces

By monitoring Fast Ethernet and Gigabit Ethernet interfaces, you begin to isolate Fast Ethernet and Gigabit Ethernet interface problems when they occur.

To monitor your Fast Ethernet and Gigabit Ethernet interfaces, follow these steps:

1. [Display the Status of Fast Ethernet Interfaces on page 330](#)
2. [Display the Status of Gigabit Ethernet Interfaces on page 331](#)
3. [Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface on page 332](#)
4. [Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface on page 333](#)
5. [Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface on page 337](#)

---

### Display the Status of Fast Ethernet Interfaces

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

**Action** `user@host> show interfaces terse (fe* | ge*)`

### Sample Output

```
user@host> show interfaces terse fe*
Interface      Admin Link Proto Local Remote
fe-2/1/0       up    up
fe-2/1/0.0     up    up   inet  10.116.115.217/29
fe-3/0/2       up    down
fe-3/0/2.0     up    down
fe-3/0/3       up    up
fe-3/0/3.0     up    up   inet  192.168.223.65/30
fe-4/1/0       down  up
fe-4/1/0.0     up    down inet  10.150.59.133/30
fe-4/1/1       up    up
fe-4/1/1.0     up    up   inet  10.150.59.129/30
fe-4/1/2       up    down
fe-4/1/2.0     up    down
```

**Meaning** The sample output lists only the Fast Ethernet interfaces. It shows the status of both the physical and logical interfaces. For a description of what the output means, see [Table 42 on page 331](#).

Table 42: Status of Fast Ethernet Interfaces

Physical Interface	Logical Interface	Status Description
fe-2/1/0	fe-2/1/0.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
fe-3/0/2	fe-3/0/2.0	This interface has the physical link down, the link layer down, or both down ( <b>Link Down</b> ). The logical link is also down as a result.
Admin Up	Admin Up	
Link Down	Link Down	
fe-4/1/0	fe-4/1/0.0	This interface is administratively disabled and the physical link is healthy ( <b>Link Up</b> ), but the logical interface is not established. The logical interface is down because the physical link is disabled.
Admin Down	Admin Up	
Link Up	Link Down	
fe-4/1/2	fe-4/1/2.0	This interface has both the physical and logical links down.
Admin Up	Admin Up	
Link Down	Link Down	

### Display the Status of Gigabit Ethernet Interfaces

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

**Sample Output Action**

```

user@host> show interfaces terse ge*
Interface      Admin Link Proto Local Remote
ge-2/2/0       down down
ge-2/2/0.0     up   down inet  65.113.23.105/30
ge-2/3/0       up   up
ge-2/3/0.0     up   up   inet  65.115.56.57/30
ge-3/1/0       up   up
ge-3/1/0.0     up   up   inet  65.115.56.193/30
ge-3/2/0       up   down

```

**Meaning** This sample output lists only the Gigabit Ethernet interfaces. It shows the status of both the physical and logical interfaces. See [Table 43 on page 332](#) for a description of what the output means.

Table 43: Status of Gigabit Ethernet Interfaces

Physical Interface	Logical Interface	Status Description
<b>ge-2/2/0</b> Admin Down Link Down	<b>ge-2/2/0.0</b> Admin Up Link Down	This interface is administratively disabled ( <b>Admin Down</b> ). Both the physical and logical links are down ( <b>Link Down</b> ).
<b>ge-2/3/0</b> Admin Up Link Up	<b>ge-2/3/0.0</b> Admin Up Link Up	This interface has both the physical and logical links up and running.
<b>ge-3/2/0</b> Admin Up Link Down	<b>ge-3/2/0.0</b> Admin Up Link Down	This interface has both the physical link and the logical interface down.

#### Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface

**Purpose** To display the status of a specific Fast Ethernet or Gigabit Ethernet interface when you need to investigate its status further, use the following Junos OS CLI operational mode command:

**Action** `user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port)`

**Sample Output 1**

The following sample output is for a Fast Ethernet interface with the physical link up:

```
user@host> show interfaces fe-2/1/0
Physical interface: fe-2/1/0, Enabled, Physical link is Up
  Interface index: 31, SNMP ifIndex: 35
  Description: customer connection
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:86:71:1b, Hardware address: 00:90:69:86:71:1b
  Input rate      : 25768 bps (11 pps), Output rate: 1576 bps (3 pps)
  Active alarms   : None
  Active defects  : None
  Logical interface fe-2/1/0.0 (Index 2) (SNMP ifIndex 43)
    Flags: SNMP-Traps, Encapsulation: ENET2
    Protocol inet, MTU: 1500, Flags: Is-Primary
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.116.151.218/29, Local: 10.119.115.217
        Broadcast: 10.116.151.225
```

**Sample Output 2**

The following output is for a Gigabit Ethernet interface with the physical link up:

```
user@host> show interfaces ge-3/1/0
Physical interface: ge-3/1/0, Enabled, Physical link is Up
  Interface index: 41, SNMP ifIndex: 55
  Description: customer connection
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 1000mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:85:71:99, Hardware address: 00:90:69:85:71:99
  Input rate      : 7412216 bps (1614 pps), Output rate: 2431184 bps (1776 pps)
  Active alarms   : None
  Active defects  : None
  Logical interface ge-3/1/0.0 (Index 11) (SNMP ifIndex 57)
    Flags: SNMP-Traps, Encapsulation: ENET2
    Protocol inet, MTU: 1500
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.117.65.192/30, Local: 10.115.65.193
        Broadcast: 10.115.65.195
```

**Meaning** The first line of sample output 1 and 2 shows that the physical link is up. This means that the physical link is healthy and can pass packets. Further down the sample output, look for active alarms and defects. If you see active alarms or defects, to further diagnose the problem, see Step 3, [“Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface” on page 333](#), to display more extensive information about the Fast Ethernet interface and the physical interface that is down.

### Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface

**Purpose** To display extensive status information about a specific Fast Ethernet or Gigabit Ethernet interface, use the following Junos OS CLI operational mode command:

**Action**     `user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port) extensive`



## Sample Output

The following sample output is for a Fast Ethernet interface:

```

user@router> show interfaces fe-1/3/3 extensive
Physical interface: fe-1/3/3, Enabled, Physical link is Up
  Interface index: 47, SNMP ifIndex: 38
  Description: Test
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:de, Hardware address: 00:90:69:8d:2c:de
  Statistics last cleared: 2002-01-11 23:03:09 UTC (1w2d 23:54 ago)
  Traffic statistics:
    Input bytes   :          373012658          0 bps
    Output bytes  :          153026154        1392 bps
    Input packets :          1362858          0 pps
    Output packets:          1642918          3 pps
  Input errors:
    Errors: 0 , Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 503660
    L3 incompletes: 1 , L2 channel errors: 0 , L2 mismatch timeouts: 0
    FIFO errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Collisions: 0, Drops: 0, Aged packets: 0
    HS link CRC errors: 0, FIFO errors: 0
  Active alarms : None
  Active defects: None
  MAC statistics:
    Receive      Transmit
    Total octets  439703575  177452093
    Total packets 1866532    1642916
    Unicast packets 972137    1602563
    Broadcast packets 30        2980
    Multicast packets 894365    37373
    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      1866532
    Input packet rejects    0
    Input DA rejects        503674
    Input SA rejects        0
    Output packet count      1642916
    Output packet pad count  0
    Output packet error count 0
    CAM destination filters: 5, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete, Link partner status: OK
    Link partner: Full-duplex, Flow control: None
  PFE configuration:
    Destination slot: 1, Stream number: 15
    CoS transmit queue bandwidth:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
    CoS weighted round-robin:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  Logical interface fe-1/3/3.0 (Index 8) (SNMP ifIndex 69)

```

```

Description: Test
Flags: SNMP-Traps, Encapsulation: ENET2
Protocol inet, MTU: 1500, Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.115.107.192/29, Local: 10.115.107.193
    Broadcast: 10.115.107.199

```

**Meaning** The sample output shows where the errors might be occurring and includes autonegotiation information. See [Table 44 on page 336](#) for a description of errors to look for.

**Table 44: Errors to Look For**

Error	Meaning
Policed discards	Discarded frames that were not recognized or were not of interest.
L2 channel errors	Packets for which the router could not find a valid logical interface. For example, the packet is for a virtual LAN (VLAN) that is not configured on the interface.
MTU	The maximum transmission unit (MTU) must match the interface of either the router at the remote end of the Fast Ethernet or Gigabit Ethernet link, or that of the switch.
Input DA rejects	Number of packets with a destination Media Access Control (MAC) address that is not on the accept list. It is normal to see this number increment.
Input SA rejects	Number of packets with a source MAC address that is not on the accept list. This number only increments when source MAC address filtering is configured.

If the physical link is down, look at the active alarms and defects for the Fast Ethernet or Gigabit Ethernet interface and diagnose the Fast Ethernet or Gigabit Ethernet media accordingly. See “[Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters](#)” on page 351 for an explanation of Fast Ethernet and Gigabit Ethernet alarms.

[Table 45 on page 336](#) lists and describes some MAC statistics errors to look for.

**Table 45: MAC Statistics Errors**

Error	Meaning
CRC/Align errors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad FCS with an integral number of octets ( <b>FCS Error</b> ) or a bad FCS with a non-integral number of octets ( <b>Alignment Error</b> ).
MAC control frames	The number of MAC control frames.
MAC pause frames	The number of MAC control frames with <b>pause</b> operational code.
Jabber frames	<p>The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error.</p> <p>Note that 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 where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.</p>

Table 45: MAC Statistics Errors (*continued*)

Error	Meaning
<b>Fragment frames</b>	<p>The total number of packets received 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.</p> <p>Note that it is entirely normal for fragment frames to increment because both runts (which are normal occurrences due to collisions) and noise hits are counted.</p>

Autonegotiation is the process that connected Ethernet interfaces use to communicate the information necessary to interoperate. [Table 46 on page 337](#) explains the autonegotiation information of the **show interface *interface-name* extensive** command output.

Table 46: Autonegotiation Information

Autonegotiation Field Information	Explanation
<b>Negotiation status: Incomplete</b>	The <b>Negotiation status</b> field shows <b>Incomplete</b> when the Ethernet interface has the speed or link mode configured.
<b>Negotiation status: No autonegotiation</b>	The <b>Negotiation status</b> field shows <b>No autonegotiation</b> when the remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
<b>Negotiation status: Complete</b> <b>Link partner status: OK</b>	The <b>Negotiation status</b> field shows <b>Complete</b> and the <b>Link partner</b> field shows <b>OK</b> when the Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process completes successfully.
<b>Link partner: Half-duplex</b>	The <b>Link partner</b> field can be <b>Full-duplex</b> or <b>Half-duplex</b> depending on the capability of the attached Ethernet device.
<b>Flow control: Symmetric/asymmetric</b>	The <b>Flow control</b> field displays the types of flow control supported by the remote Ethernet device.

### 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 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:
  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 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” on page 339](#) 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](#)” on page 339 for the optical specifications.

## Fiber-Optic Ethernet Interface Specifications

Table 47 on page 339 shows the specifications for fiber-optic interfaces for Juniper Networks routers.

**Table 47: Fiber-Optic Ethernet Interface Specifications**

Fiber-Optic Ethernet Interface	Length	Wavelength	Average Launch Power	Receiver Saturation	Receiver Sensitivity
<b>Gigabit Ethernet</b>					
<b>Duplex SC connector</b>					
<b>LH optical interface</b>	49.5-mile 70-km reach on 8.2-micrometer SMF	1480 to 1580 nm	-3 to +2 dBm	-3 dBm	-23 dBm (BER 10 <sup>-12</sup> ) for SMF
<b>LX optical interface</b>	6.2-mile 10-km reach on 9/125-micrometer SMF  1804.5-ft 550-m reach on 62.5/125- and 50/125-micrometer MMF	1270 to 1355 nm	-11 to -3 dBm	-3 dBm	-19 dBm
<b>SX optical interface</b>	656-ft 200-m reach on 62.5/125-micrometer MMF  1640-ft 500-m reach on 50/125-micrometer MMF	830 to 860 nm	-9.5 to -4 dBm	-3 dBm	-17 dBm
<b>Fast Ethernet 8-Port</b>					
<b>FX optical interface with MT-RJ connector</b>	1.24-mile 2-km reach on 62.5/125-micrometer MMF	1270 to 1380 nm	-20 to -14 dBm	-14 dBm	-34 dBm

## Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

- [Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces on page 340](#)
- [Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface on page 341](#)
- [Create a Loopback on page 341](#)
- [Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 343](#)
- [Configure a Static Address Resolution Protocol Table Entry on page 345](#)
- [Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 347](#)

- [Ping the Fast Ethernet or Gigabit Ethernet Interface on page 348](#)
- [Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 349](#)
- [Diagnose a Suspected Circuit Problem on page 351](#)

## Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

**Purpose** To use loopback testing to isolate Fast Ethernet and Gigabit Ethernet interface problems.

**Action** [Table 48 on page 340](#) provides links and commands for using loopback testing for Fast Ethernet and Gigabit Ethernet interfaces.

**Table 48: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces**

Tasks	Command or Action
<b><a href="#">“Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 341</a></b>	
1. <a href="#">Create a Loopback on page 341</a>	
a. <a href="#">Create a Physical Loopback for a Fiber-Optic Interface on page 341</a>	Connect the transmit port to the receive port.
b. <a href="#">Create a Loopback Plug for an RJ-45 Ethernet Interface on page 342</a>	Cross pin 1 (TX+) and pin 3 (RX+) together, and pin 2 (TX-) and pin 6 (RX-) together.
c. <a href="#">Configure a Local Loopback on page 342</a>	<pre>[edit interfaces <i>interface-name</i> (fastether-options   gigether-options)] set loopback show commit</pre>
2. <a href="#">Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 343</a>	<pre>show interfaces (fe-<i>fpc/pic/port</i>   ge-<i>fpc/pic/port</i>)</pre>
3. <a href="#">Configure a Static Address Resolution Protocol Table Entry on page 345</a>	<pre>show interfaces ge-<i>fpc/pic/port</i> [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>] set arp <i>ip-address</i> mac <i>mac-address</i> show commit run show arp no-resolve</pre>
4. <a href="#">Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 347</a>	<pre>clear interfaces statistics fe-<i>fpc/pic/port</i>   ge-<i>fpc/pic/port</i></pre>
5. <a href="#">Ping the Fast Ethernet or Gigabit Ethernet Interface on page 348</a>	<pre>ping <i>remote-IP-address</i> bypass-routing interface (fe-<i>fpc/pic/port</i>   ge-<i>fpc/pic/port</i> count 100 rapid</pre>
6. <a href="#">Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 349</a>	<pre>show interfaces (fe-<i>fpc/pic/port</i>   ge-<i>fpc/pic/port</i> ) extensive</pre>
<b><a href="#">“Diagnose a Suspected Circuit Problem” on page 351</a></b>	Perform Steps 2 through 8 from <a href="#">“Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 341</a> .

## Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface

**Problem** When you suspect a hardware problem, take the following steps to help verify if there is a problem.

**Solution** To diagnose a suspected hardware problem with the Ethernet interface, follow these steps:

- [Create a Loopback on page 341](#)
- [Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 343](#)
- [Configure a Static Address Resolution Protocol Table Entry on page 345](#)
- [Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 347](#)
- [Ping the Fast Ethernet or Gigabit Ethernet Interface on page 348](#)
- [Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 349](#)

## Create a Loopback

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

1. [Create a Physical Loopback for a Fiber-Optic Interface on page 341](#)
2. [Create a Loopback Plug for an RJ-45 Ethernet Interface on page 342](#)
3. [Configure a Local Loopback on page 342](#)

### Create a Physical Loopback for a Fiber-Optic Interface

---

#### Action

To create a physical loopback at the port, connect the transmit port to the receive port using a known good fiber cable.



**NOTE:** Make sure you use single-mode fiber for a single-mode port and multimode fiber for a multimode port.

---

**Meaning**

When you create and then test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

### Create a Loopback Plug for an RJ-45 Ethernet Interface

**Action**

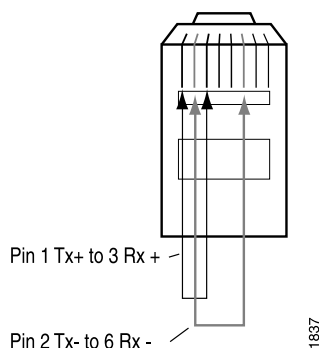
To create a loopback plug, cross pin 1 (TX+) and pin 3 (RX+) together, and cross pin 2 (TX-) and pin 6 (RX-) together. You need the following equipment to create the loopback:

- A 6-inch long CAT5 cable
- An RJ-45 connector
- A crimping tool

Figure 1 on page 342 illustrates how to create a loopback plug for an RJ-45 Ethernet interface.

**Figure 1: RJ-45 Ethernet Loopback Plug**

**RJ-45 Ethernet Loopback Plug**

**Meaning**

When you create and then test a physical loopback, you are testing the RJ-45 interface of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

### Configure a Local Loopback

**Action**

To configure a local loopback without physically connecting the transmit port to the receive port, follow these steps:

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

```
[edit]
user@host# edit interfaces interface-name (fastether-options | gigether-options)
```
2. Configure the local loopback:
 

```
[edit interfaces interface-name (fastether-options | gigether-options)]
user@host# set loopback
```



3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces fe-1/0/0 fastether-options]
user@host# show
loopback;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces fe-1/0/0 fastether-options]
user@host# commit
commit complete
```

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports. On an Ethernet interface, you cannot create a remote loopback, therefore there is no option to use a **local** or **remote** statement. Simply including the **loopback** statement at the **[edit interfaces *interface-name* (fastether-options | gigether-options)]** hierarchy level, places the interface into local loopback mode.



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

## Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up

**Purpose** Display the status of the Fast Ethernet or Gigabit Ethernet interface to provide the information you need to determine whether the physical link is up or down.

**Action** To verify that the status of the Fast Ethernet or Gigabit Ethernet interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces (fe-fpc/port | ge-fpc/pic/port)
```

### Sample Output

```
user@host# show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Up
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  MAC statistics:
    Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
  Filter statistics:
    Filtered packets: 0, Padded packets: 0, Output packet errors: 0
  Autonegotiation information:
    Negotiation status: Incomplete, Link partner status: OK
    Link partner: Full-duplex, Flow control: None
```

### Meaning

The sample output shows that the link is up and there are no alarms in this loopback configuration. When an internal loopback is configured, the physical loopback should come up without an alarm.

### Sample Output

When you see that the physical link is down, there may be a problem with the port. The following output is an example of the `show interfaces fe-fpc/pic/port` command when the physical link is down:

```
user@router> show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : LINK
  Active defects : LINK
  MAC statistics:
    Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
  Filter statistics:
    Filtered packets: 0, Padded packets: 0, Output packet errors: 0
  Autonegotiation information:
    Negotiation status: Incomplete, Link partner status: Down
    Reason: Link partner autonegotiation failure
    Link partner: Half-duplex, Flow control: None
```

**Meaning** The sample output shows that the physical link is down and there are active alarms and defects.

[Table 49 on page 345](#) presents problem situations and actions for a physical link that is down.

Table 49: Problems and Solutions for a Physical Link That Is Down

Problem	Action
Cable mismatch	Verify that the fiber connection is correct.
Damaged and/or dirty cable	Verify that the fiber can successfully loop a known good port of the same type.
Too much or too little optical attenuation	Verify that the attenuation is correct per the PIC optical specifications.
The transmit port is not transmitting within the dBm optical range per the specifications	Verify that the Tx power of the optics is within range of the PIC optical specification.
Mismatch between the cable type and the port	Verify that a single-mode fiber cable is connected to a single-mode interface and that a multimode fiber cable is connected to a multimode interface. (This problem does not always cause the physical link to go down; errors and dropped packets are sometimes the result.)

## Configure a Static Address Resolution Protocol Table Entry

### Purpose

Configure a static Address Resolution Protocol (ARP) entry to allow a packet to be sent out of a looped Ethernet interface.



**NOTE:** Remove the static ARP entry at the end of the loop test after you have completed the ping test, checked interface statistics, and monitored interface traffic.

### Action

To configure a static ARP table entry for a Gigabit Ethernet interface, follow these steps. You can follow the same procedure to configure a static ARP entry for a Fast Ethernet interface.

1. Find the Media Access Control (MAC) address for the Gigabit Ethernet interface:

```
user@host> show interfaces ge-fpc/pic/port
```

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

```
[edit]
```

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

3. Configure the static ARP entry:

```
user@host# set arp ip-address mac mac-address
```



.....

**NOTE:** The MAC address used should be the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test.

.....

4. Verify the configuration:

```
user@host# show
```

5. Commit the configuration:

```
user@host# commit
```

6. Verify that the static ARP entry is installed:

```
user@host# run show arp no-resolve
```

## Sample Output

```

user@host> show interfaces ge-7/2/1
Physical interface: ge-7/2/1, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate      : 0 bps (0 pps), Output rate: 0 bps (0 pps)
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# set arp 10.108.120.2 mac 00:90:69:8d:2c:db
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# show
arp 10.108.120.2 mac 00:90:69:8d:2c:db;
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# commit
commit complete
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# run show arp no-resolve
MAC Address      Address      Interface    Flags
00:90:69:8d:2c:db 10.108.120.2 ge-7/2/1.0   permanent
00:e0:34:bb:8c:40 209.211.135.1 fxp0.0       none
00:a0:a5:28:0c:70 209.211.135.8 fxp0.0       none
00:a0:a5:12:12:c7 209.211.135.10 fxp0.0       none
00:90:ab:3c:68:a0 209.211.135.31 fxp0.0       none
08:00:20:a1:53:15 209.211.135.65 fxp0.0       none
00:a0:cc:66:3e:85 209.211.135.98 fxp0.0       none
Total entries: 7

```

## Meaning

The sample output is for Step 1 through Step 6 and shows that a static ARP entry was configured on Gigabit Ethernet interface **ge-7/2/1**. The MAC address used is the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test. The port is working as expected if you see that the time to live (TTL) expired; if you do not receive a response to your ping test, it indicates a hardware problem.

## Clear Fast Ethernet or Gigabit Ethernet Interface Statistics

### Purpose

You must reset the Fast Ethernet and Gigabit Ethernet interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/output errors and packet statistics do not interfere with the current diagnostics.

### Action

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

```
user@host> clear interfaces statistics (fe-fpc/pic/port | ge-fpc/pic/port)
```

**Sample Output**

```
user@host> clear interfaces statistics ge-7/2/0
user@host>
```

**Meaning**

This command clears the interface statistics counters for the Gigabit Ethernet interface only.

**Ping the Fast Ethernet or Gigabit Ethernet Interface**

**Purpose** Use the ping command to verify the loopback connection.

**Action** To send ping packets from the Ethernet interface, use the following Junos OS CLI operational mode command:

```
user@host> ping remote-IP-address bypass-routing interface (fe-fpc/pic/port |
ge-fpc/pic/port) count 100 rapid
```

**Sample Output**

```
user@router> ping 10.108.120.2 bypass-routing interface ge-7/2/1 count 100 rapid
PING 10.108.120.2 (10.108.120.2): 56 data bytes
36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e871 0 0000 01 01 cc5c 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e874 0 0000 01 01 cc59 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e878 0 0000 01 01 cc55 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e87c 0 0000 01 01 cc51 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e880 0 0000 01 01 cc4d 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e884 0 0000 01 01 cc49 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
```

**Meaning** The sample output shows that the time to live (TTL) expired, indicating that the link is receiving the frames from the ping test. The MAC address used is the same as the physical address of the port being tested because this allows the port to accept the frames from the ping test. As the packet is looped over the link, you expect to receive a TTL exceeded message for each ping sent. These messages are generated because the ping packets are repeatedly looped between the router and the physical loopback. When the packet is sent to the other end of the link, which does not exist, the loopback returns the packet back to the same interface, where it is again subjected to the Packet Forwarding Engine fabric for routing. After the route lookup, the TTL is decremented, and the packet is again sent out of the looped interface. This process repeats until the packet is either lost, or the TTL expires with subsequent TTL expired message displayed. Should any errors occur, the packet is discarded and a time-out error is displayed, rather than the expected TTL expired message. Note that the default TTL for ICMP echo packets in Junos OS is 64. This means a given test packet must be successfully sent and received 63 times before

a TTL expired message can be generated. You can alter the TTL value to adjust the tolerance for loss, for example, a value of 255 is the most demanding test because now the packet must be sent and received error free 254 times.

### Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics

**Purpose** Persistent interface error statistics indicate that you need to open a case with the Juniper Networks Technical Assistance Center (JTAC).

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

```
user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port) extensive
```

## Sample Output

```

user@router> show interfaces ge-7/2/1 extensive
Physical interface: ge-7/2/1, Enabled, Physical link is Up
Interface index: 25, SNMP ifIndex: 32, Generation: 41
Description: Test
Link-level type: Ethernet, MTU: 4470, Speed: 1000mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled
Device flags   : Present Running
Interface flags: SNMP-Traps
Link flags     : None
Hold-times    : Up 0 ms, Down 0 ms
Current address: 00:90:69:4c:17:b1, Hardware address: 00:90:69:4c:17:b1
Statistics last cleared: 2002-01-07 17:53:19 UTC (2w2d 03:20 ago)
Traffic statistics:
  Input bytes   :          3799515503823          0 bps
  Output bytes  :          7325566425          0 bps
  Input packets :          4628009535          0 pps
  Output packets:          30678225          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
Output errors:
  Carrier transitions: 14, Errors: 0, Drops: 0, Collisions: 0, Aged packets:
0,
  FIFO errors: 0, HS link CRC errors: 0
Active alarms : None
Active defects : None
MAC statistics:
  Total octets          3883579444813          7880356346
  Total packets         4628009534          30678237
  Unicast packets       4627879788          29893563
  Broadcast packets      30          464
  Multicast packets     129716          784210
  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    4628009244
  Input packet rejects  0
  Input DA rejects      0
  Input SA rejects      0
  Output packet count    30678237
  Output packet pad count 856248
  Output packet error count 0
  CAM destination filters: 9, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete, Link partner status: Ok, Link partner:
Full-duplex,
Flow control: None
PFE configuration:
  Destination slot: 7
  CoS transmit queue

```

	Bandwidth		Buffer		Priority	Limit
	%	bps	%	bytes		
0 best-effort	0	0	0	0	low	none
1 expedited-forwarding	0	0	0	0	low	none



```

2 assured-forwarding      0          0 0          0      low  none
3 network-control         0          0 0          0      low  none
Logical interface ge-7/2/1.0 (Index 23) (SNMP ifIndex 48) (Generation 38)
Description: To Cosine Left 23/1
Flags: SNMP-Traps Encapsulation: ENET2
Protocol inet, MTU: 4456, Flags: None, Generation: 85 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.108.120.0/30, Local: 10.108.120.1, Broadcast: 10.108.120.3,

Generation: 81
Protocol iso, MTU: 4453, Flags: None, Generation: 86 Route table: 0

```

**Meaning** Check for any error statistics. There should not be any input or output errors. If there are any persistent input or output errors, open a case with the Juniper Networks Technical Assistance Center (JTAC) at [support@juniper.net](mailto:support@juniper.net), or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

## Diagnose a Suspected Circuit Problem

**Purpose** When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may create a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

**Action** After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Step 2 through Step 8 in [“Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 341](#). Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

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

## Locate the Fast Ethernet and Gigabit Ethernet LINK Alarm and Counters

- [Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters on page 351](#)
- [Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm on page 352](#)
- [Fast Ethernet and Gigabit Ethernet Counters on page 354](#)

## Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters

**Purpose** To locate LINK alarm and major counters associated with Fast Ethernet and Gigabit Ethernet interfaces.

**Action** [Table 50 on page 352](#) provides links and commands for locating LINK alarm and major counters for Fast Ethernet and Gigabit Ethernet interfaces.

**Table 50: Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters**

Tasks	Command or Action
<a href="#">“Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm” on page 352</a>	<code>show interfaces (fe-fpc/pic/port   ge-fpc/pic/port) extensive</code>
<a href="#">“Fast Ethernet and Gigabit Ethernet Counters” on page 354</a>	

### Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm

**Problem** To display the Fast Ethernet or Gigabit Ethernet LINK alarm, use the following Junos OS command-line interface (CLI) operational mode command:

**Solution** `user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port) extensive`

## Sample Output

The following sample output is for a Fast Ethernet interface:

```

user@host> show interfaces fe-1/3/3 extensive
Physical interface: fe-1/3/3, Enabled, Physical link is Down
  Interface index: 47, SNMP ifIndex: 38
  Description: Test
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:de, Hardware address: 00:90:69:8d:2c:de
  Statistics last cleared: 2002-01-11 23:03:09 UTC (1w2d 23:54 ago)
  Traffic statistics:
    Input bytes   :          373012658          0 bps
    Output bytes  :          153026154        1392 bps
    Input packets :          1362858          0 pps
    Output packets:          1642918          3 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 503660
    L3 incompletes: 1, L2 channel errors: 0, L2 mismatch timeouts: 0
    FIFO errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Collisions: 0, Drops: 0, Aged packets: 0
    HS link CRC errors: 0, FIFO errors: 0
  Active alarms : LINK
  Active defects : LINK
  MAC statistics:
    Total octets          Receive          Transmit
    Total octets          439703575        177452093
    Total packets         1866532          1642916
    Unicast packets       972137           1602563
    Broadcast packets      30              2980
    Multicast packets     894365           37373
    CRC/Align errors      0               0
    FIFO errors           0               0
    MAC control frames    0               0
    MAC pause frames      0               0
    Oversized frames      0               0
    Jabber frames         0               0
    Fragment frames       0               0
    VLAN tagged frames    0               0
    Code violations       0
  Filter statistics:
    Input packet count    1866532
    Input packet rejects  0
    Input DA rejects      503674
    Input SA rejects      0
    Output packet count   1642916
    Output packet pad count 0
    Output packet error count 0
    CAM destination filters: 5, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete, Link partner status: OK
    Link partner: Full-duplex, Flow control: None
  PFE configuration:
    Destination slot: 1, Stream number: 15
    CoS transmit queue bandwidth:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
    CoS weighted round-robin:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  Logical interface fe-1/3/3.0 (Index 8) (SNMP ifIndex 69)

```

```

Description: Test
Flags: SNMP-Traps, Encapsulation: ENET2
Protocol inet, MTU: 1500, Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.115.107.192/29, Local: 10.115.107.193
    Broadcast: 10.115.107.199

```

### Meaning

The sample output shows where the alarm and other errors might be occurring and any counters that are incrementing. The only alarm associated with Fast Ethernet or Gigabit Ethernet interfaces is the LINK alarm. A LINK alarm indicates a physical problem. To isolate where the physical problem might be occurring, conduct loopback testing. See [“Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces”](#) on page 340 for information on conducting a loopback test.



**NOTE:** Since link status is polled once every second, some items that require fast link down detection, such as Multiprotocol Label Switching (MPLS) fast reroute, take longer to execute.

## Fast Ethernet and Gigabit Ethernet Counters

**Problem** Table 51 on page 354 shows the major counters that appear in the output for the **show interfaces fe-fpc/pic/port extensive** and the **show interfaces ge-fpc/pic/port extensive** commands. These counters generally increment when there is a problem with a Fast Ethernet or Gigabit Ethernet interface. In the **Counters** column, the counters are listed in the order in which they are displayed in the output.

**Table 51: Major Fast Ethernet and Gigabit Ethernet Counters**

Counter	Description	Reason for Increment
<b>Input Errors:</b>		
<b>Errors</b>	The sum of the incoming frame aborts and frame check sequence (FCS) errors.	
<b>Policed discards</b>	The frames discarded by the incoming packet match code.	The frames were discarded because they were not recognized or of interest. Usually, this field reports protocols that the Junos OS does not handle.
<b>Drops</b>	The number of packets dropped by the output queue of the I/O Manager application-specific integrated circuit (ASIC).	If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism.
<b>L3 incompletes</b>	The number of packets discarded due to the packets failing Layer 3 header checks.	This counter increments when the incoming packet fails Layer 3 (usually IPv4) checks of the header. For example, a frame with less than 20 bytes of available IP header would be discarded and this counter would increment.

Table 51: Major Fast Ethernet and Gigabit Ethernet Counters (*continued*)

Counter	Description	Reason for Increment
<b>L2 channel errors</b>	The errors that occur when the software could not find a valid logical interface (such as <b>fe-1/2/3.0</b> ) for an incoming frame.	This error increments when, for example, a lookup for a virtual LAN (VLAN) fails.
<b>L2 mismatch timeouts</b>	The count of malformed or short packets.	The malformed or short packets cause the incoming packet handler to discard the frame and be unreadable.
<b>FIFO errors</b>	The number of first in, first out (FIFO) errors in the receive direction as reported by the ASIC on the Physical Interface Card (PIC).	The value in this field should always be 0. If this value is not zero, cabling could be badly organized or the PIC could be broken.
<b>Output Errors</b>		
<b>Errors</b>	The sum of outgoing frame aborts and FCS errors.	
<b>Collisions</b>	The number of Ethernet collisions.	The Fast Ethernet PIC supports only full-duplex operation, so this number should always remain 0. If it is incrementing, there is a software bug.
<b>Drops</b>	The 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.
<b>Aged packets</b>	The number of packets that remained in shared packet SDRAM for so long that the system automatically purged them.	The value in this field should never increment. If it increments, it is probably a software bug or broken hardware.
<b>HS link FCS errors, FIFO errors</b>	The number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.	The value in this field should always be 0. If it increments, either the FPC or the PIC is broken.
<b>Miscellaneous Counters</b>		
<b>Input DA rejects</b>	The number of packets that the filter rejected because the destination Media Access Control (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 Address Resolution Protocol (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).
<b>Output packet pad count</b>	The number of packets that 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 Internet Protocol (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.

Table 51: Major Fast Ethernet and Gigabit Ethernet Counters (*continued*)

Counter	Description	Reason for Increment
<b>Output packet error count</b>	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.
<b>CAM destination filters, CAM source filters</b>	The number of entries in the content-addressable memory (CAM) dedicated to destination and source MAC address filters.	There can be up to 64 source entries. If source filtering is disabled, which is the default, the value for these fields should be 0.

---

## PART 5

# Index

- [Index on page 359](#)





# Index

## Symbols

#, comments in configuration statements.....	xvi
( ), in syntax descriptions.....	xvi
10-Gigabit Ethernet interfaces.....	13
DWDM	
data and alarms, displaying.....	148
status information, displaying.....	209, 212
100-Gigabit Ethernet interfaces.....	148
802.1Q VLANs	
VLAN tagging.....	118
802.3ad statement.....	53
< >, in syntax descriptions.....	xvi
[ ], in configuration statements.....	xvi
{ }, in configuration statements.....	xvi
(pipe), in syntax descriptions.....	xvi

## A

ACI (agent circuit identifier) interface sets	
status information, displaying.....	209
Address Resolution Protocol <i>See</i> ARP	
aggregated Ethernet interfaces	
status information, displaying.....	128
aggregated-ether-options statement.....	55
aging timer	
ARP.....	20
alarms	
Fast Ethernet interfaces, checklist.....	352
Gigabit Ethernet interfaces, checklist.....	352
LINK, displaying.....	352
all (tracing flag)	
VRRP.....	20
ARP	
aging timer.....	20
ARP configuration steps.....	345
auto-negotiation statement	
Gigabit Ethernet.....	57
J Series uPIM.....	11, 58
autonegotiation, table.....	337

## B

bandwidth-limit statement	
policer for Gigabit Ethernet interface.....	59
BERT	
configuring interface diagnostics.....	323
bert-algorithm statement	
usage guidelines.....	323
bert-error-rate statement	
usage guidelines.....	323
bert-period statement	
usage guidelines.....	323
bit error rate test <i>See</i> BERT	
braces, in configuration statements.....	xvi
brackets	
angle, in syntax descriptions.....	xvi
square, in configuration statements.....	xvi
burst-size-limit statement	
policer for Gigabit Ethernet interface.....	59

## C

cables	
damaged or dirty.....	345
mismatch.....	345
multimode fiber.....	338
single-mode fiber.....	338
CFM statistics	
displaying for CFM interfaces.....	259
displaying for interfaces.....	247
checklist for alarms	
Fast Ethernet interfaces .....	352
Gigabit Ethernet interfaces .....	352
checklist for monitoring	
Fast Ethernet interfaces.....	329
Gigabit Ethernet interfaces.....	329
circuit problems	
Fast Ethernet interfaces .....	351
Gigabit Ethernet interfaces .....	351
classifier statement.....	60
clear interfaces statistics command	
Fast Ethernet interfaces.....	338
Fast Ethernet statistics.....	347
comments, in configuration statements.....	xvi
connections	
configuration statements.....	46, 50
conventions	
text and syntax.....	xv
counters.....	348
cumulative statistics	
Ethernet interfaces.....	338

curly braces, in configuration statements.....	xvi	ETH-DM statistics (only)	
customer support.....	xvii	displaying.....	239
contacting JTAC.....	xvii	ETH-DM statistics and frame counts	
<b>D</b>		displaying.....	269
database (tracing flag).....	20	example configuration.....	23
documentation		gratuitous ARP.....	19
comments on.....	xvii	multicast statistics.....	22
dot1x		RJ-45 .....	342
configuration statements.....	47	specifications, table.....	339
DWDM 10-Gigabit Ethernet interfaces		status information, displaying	
data and alarms, displaying.....	148	aggregated.....	128
<b>E</b>		Fast Ethernet.....	165
edit interfaces command		Gigabit Ethernet.....	182
Fast Ethernet interfaces .....	345	VLAN tagging.....	118
Gigabit Ethernet interfaces .....	345	ethernet ring	
edit interfaces fastether-options command .....	342	protection group APS.....	293
edit interfaces gigheter-options command.....	342	protection group data channel.....	295, 306
error statistics		protection group interface.....	297
Fast Ethernet interfaces .....	349	protection group node state.....	300
Gigabit Ethernet interfaces.....	349	protection group statistics.....	303
errors		Ethernet Ring Protection	
Ethernet interfaces.....	338	configuration statements.....	51
Fast Ethernet interfaces, table .....	336	ethernet statement.....	61
Gigabit Ethernet interfaces, table .....	336	Ethernet switching interfaces.....	11
ETH-DM frame counts (with CFM statistics)		ethernet-policer-profile statement.....	64
displaying for MEPs by enclosing CFM.....	259	ethernet-switch-profile statement.....	65
displaying for MEPs by interface or domain		<b>F</b>	
level.....	247	Fast Ethernet interfaces	
ETH-DM statistics (only)		alarms, LINK.....	352
displaying.....	239	autonegotiation, table.....	337
ETH-DM statistics and frame counts		circuit problems.....	338, 351
displaying.....	269	clear interfaces statistics command.....	347
Ethernet interface set		counters .....	354
status information, displaying.....	209	edit interfaces command .....	345
Ethernet interface set queue		example configuration.....	23
status information, displaying.....	212	ignoring Layer 3 incomplete errors.....	17
Ethernet interfaces		ingress rate-limit.....	21
autonegotiation, table.....	337	LINK alarms, checklist .....	352
CFM statistics		link modes.....	17
displaying for CFM interfaces.....	259	local loopback, configuring .....	342
displaying for interfaces.....	247	loopback mode.....	16
ETH-DM frame counts (with CFM statistics)		MAC address filtering.....	13
displaying for MEPs by enclosing		monitor checklist.....	329
CFM.....	259	monitor interface command .....	337
displaying for MEPs by interface or domain		monitoring.....	337
level.....	247	physical loopback.....	341
		ping interface command.....	348
		set arp command .....	345

- set cli terminal command .....338
  - set loopback local command .....342
  - show interfaces command .....332, 343, 349
  - show interfaces extensive
    - command.....334, 352
  - show interfaces terse command .....330
  - speed.....20
  - static ARP entry, configuring .....345
  - statistics
    - checking error .....349
    - monitoring.....349
    - resetting.....347
  - status
    - description, table.....331
    - displaying.....330
    - errors, table.....336
    - verifying.....343
  - status information, displaying.....165
  - VLAN tagging.....118
  - fast-aps-switch statement.....67
  - fastether-options statement.....68
  - fiber-optic
    - connection.....338
    - Ethernet interface specifications, table.....339
    - interface, physical loopback.....341
  - flow control.....16
  - flow-control statement.....69
    - usage guidelines.....16
  - font conventions.....xv
  - framing statement
    - 10-Gigabit Ethernet interfaces.....71
- G**
- general (tracing flag).....20
  - Gigabit Ethernet interfaces.....13
    - alarms, LINK.....352
    - autonegotiation, table.....337
    - circuit problems.....351
    - counters.....354
    - demultiplexing interface information,
      - displaying.....138
    - diagnostics information, displaying.....148
    - edit interfaces command.....345
    - example configuration.....23
    - flow control.....16
    - ignoring Layer 3 incomplete errors.....17
    - LACP, displaying.....228
    - LINK alarms, checklist .....352
    - local loopback, configuring.....342
    - loopback mode.....16
    - loopback plug, creating.....342
    - MAC address filtering.....13
    - MAC database, displaying.....232
    - monitor checklist.....329
    - monitor interface command.....337
    - monitoring.....337
    - physical loopback, creating .....341
    - ping interface command.....348
    - set arp command .....345
    - set cli terminal command.....338
    - set loopback local command.....342
    - show interfaces command.....332, 343
    - show interfaces extensive
      - command.....334, 352
    - show interfaces terse command.....331
    - static ARP entry, configuring .....345
    - statistics
      - checking error.....349
      - monitoring.....349
      - resetting.....347
    - status
      - description, table.....331
      - displaying specific.....332
      - errors, table.....336
      - extensive.....333
      - verifying.....343
    - status information, displaying.....182, 209, 212
    - VLAN tagging.....118
  - Gigabit Ethernet IQ PIC
    - traffic and MAC statistics.....182
  - Gigabit Ethernet uPIM interfaces
    - speed.....20
  - gether-options statement.....72
  - gratuitous ARP.....19
  - gratuitous-arp-reply statement.....73
    - usage guidelines.....19
- I**
- iccp
    - configuration statements.....47
  - ieee802.1p statement.....74
  - ignore-l3-incompletes statement.....74
  - ignoring Layer 3 incomplete errors.....17
  - ingress-rate-limit statement.....75
    - usage guidelines.....21
  - inner-tag-protocol-id statement.....75
  - inner-vlan-id statement.....76
  - input-priority-map statement.....77

integrated routing and bridging interfaces	
integrated routing and bridging interfaces,	
displaying.....	221
interfaces	
configuration statements.....	25
interfaces (tracing flag).....	20
interfaces statement.....	78

## J

J Series Routers.....	11
-----------------------	----

## L

LACP	
displaying.....	228
lacp statement	
Aggregated Ethernet.....	79
Layer 3 incomplete errors.....	74
link modes.....	17
link-discovery statement.....	80
link-fault-management statement.....	81
link-mode statement.....	83
usage guidelines.....	17
link-protection statement.....	85
linktrace	
database, displaying.....	257
tracing.....	318
logical systems	
configuration statements.....	41
loopback mode.....	16
loopback statement	
Aggregated Ethernet, Fast Ethernet, and Gigabit	
Ethernet.....	87
Fast Ethernet interfaces	
usage guidelines.....	16
Gigabit Ethernet interfaces	
usage guidelines.....	16
loopback testing.....	321
loopback, configuring local	
Fast Ethernet interfaces .....	342
Gigabit Ethernet interfaces.....	342
loopback, creating physical	
Fast Ethernet interfaces .....	341
Gigabit Ethernet interfaces .....	341
loopback, plug.....	342
loss-priority statement.....	87

## M

MAC address filtering	
Fast Ethernet interfaces.....	13
Gigabit Ethernet interfaces.....	13
MAC addresses	
management Ethernet interface.....	13
MAC database, displaying.....	232
mac-learn-enable statement.....	88
management Ethernet interface	
link modes.....	17
speed.....	20
manuals	
comments on.....	xvii
minimum-links statement.....	89
monitor interface command	
Fast Ethernet interfaces .....	337
Gigabit Ethernet interfaces.....	337
multi-chassis link aggregation interface	
displaying.....	237
multicast-statistics statement	
usage guidelines	
Ethernet.....	22
multimode fiber cable.....	338
MX Series Routers.....	13

## N

no-auto-mdix statement.....	90
no-auto-negotiation statement	
J Series uPIM.....	11, 58
no-flow-control statement.....	69
usage guidelines.....	16
no-gratuitous-arp-reply statement.....	73
usage guidelines.....	19
no-gratuitous-arp-request statement.....	90
usage guidelines.....	19
no-loopback statement.....	87
usage guidelines.....	16
no-mac-learn-enable statement.....	88
no-source-filtering statement.....	104
usage guidelines.....	13
normal (tracing flag)	
arp aging timer.....	20

## O

OAM	
configuration statements.....	48
oam statement.....	91
optical attenuation.....	345
optics-options statement.....	93

output-priority-map statement.....94  
 output-vlan-map statement  
   Gigabit Ethernet IQ.....95

## P

packets (tracing flag).....20  
 parentheses, in syntax descriptions.....xvi  
 pdu-interval statement.....95  
 pdu-threshold statement.....96  
 periodic statement.....97  
 physical interfaces  
   flow control.....16  
   link modes.....17  
   loopback mode.....16  
   MAC address filtering.....13  
   VLAN tagging.....118  
 physical link down  
   Fast Ethernet interfaces, table.....345  
   Gigabit Ethernet interfaces, table.....345  
 physical link up  
   Fast Ethernet interfaces.....333, 343  
   Gigabit Ethernet interfaces.....333, 343  
 physical loopback  
   Fast Ethernet interfaces.....341  
   Gigabit Ethernet interfaces.....341  
 ping interface command  
   Fast Ethernet interfaces.....348  
   Gigabit Ethernet interfaces .....348  
 policer statement  
   CoS.....98  
 pop statement  
   Gigabit Ethernet IQ interfaces.....99  
 pop-pop statement  
   Gigabit Ethernet IQ interfaces.....99  
 pop-swap statement  
   Gigabit Ethernet IQ interfaces.....100  
 premium  
   policer.....101  
 premium statement  
   output priority map.....100  
 protection group  
   ethernet ring APS.....293  
   ethernet ring interface.....297  
   ethernet ring node state.....300  
   ethernet ring statistics.....303  
   ethernet ring VLANs.....295, 306  
 protection-group  
   configuration statements.....51

protocols connections  
   configuration statements.....46, 50  
 protocols dot1x  
   configuration statements.....47  
 protocols Ethernet Ring Protection  
   configuration statements.....51  
 protocols iccp  
   configuration statements.....47  
 protocols OAM  
   configuration statements.....48  
 protocols VRRP  
   configuration statements.....48  
 push statement  
   Gigabit Ethernet IQ interfaces.....101  
 push-push statement  
   Gigabit Ethernet IQ interfaces.....102

## R

RJ-45 Ethernet interface.....342

## S

set arp command  
   Fast Ethernet interfaces .....345  
   Gigabit Ethernet interfaces.....345  
 set cli terminal command  
   Fast Ethernet interfaces .....338  
   Gigabit Ethernet interfaces .....338  
 set loopback local command  
   Fast Ethernet interfaces .....342  
   Gigabit Ethernet interfaces .....342  
 show interfaces (10-Gigabit Ethernet)  
   command.....182  
 show interfaces (Aggregated Ethernet)  
   command.....128  
 show interfaces (Fast Ethernet) command.....165  
 show interfaces command.....347  
   Fast Ethernet interfaces .....332, 343, 349  
   Gigabit Ethernet interfaces .....332, 343  
 show interfaces demux0 (Demux Interfaces)  
   command.....138  
 show interfaces diagnostics optics (Gigabit Ethernet) command.....148  
 show interfaces extensive command  
   Fast Ethernet interfaces.....334, 352  
   Gigabit Ethernet interfaces.....334  
 show interfaces interface-set command.....209  
 show interfaces interface-set queue  
   command.....212  
 show interfaces irb command.....221

show interfaces mac-database (Gigabit Ethernet) command.....	232
show interfaces mc-ae.....	237
show interfaces terse command Fast Ethernet interfaces .....	330
Gigabit Ethernet interfaces.....	331
show lacp interfaces command.....	228
show oam ethernet connectivity-fault-management delay-statistics command.....	239
show oam ethernet connectivity-fault-management forwarding-state command.....	243
show oam ethernet connectivity-fault-management interfaces command.....	247
show oam ethernet connectivity-fault-management linktrace path-database command.....	257
show oam ethernet connectivity-fault-management mep-database command.....	259
show oam ethernet connectivity-fault-management mep-statistics command.....	269
show oam ethernet connectivity-fault-management path-database command.....	280
show oam ethernet link-fault-management command.....	283
show protection-group ethernet-ring aps command.....	293
show protection-group ethernet-ring data-channel command.....	295
show protection-group ethernet-ring interface command.....	297
show protection-group ethernet-ring node-state command.....	300
show protection-group ethernet-ring statistics command.....	303
show protection-group ethernet-ring vlan command.....	306
single-mode fiber cable.....	338
source address filtering Fast Ethernet interfaces.....	13, 14
Gigabit Ethernet interfaces.....	13, 14
source-address-filter statement.....	103
usage guidelines.....	14
source-filtering statement.....	104
usage guidelines.....	13
specifications for fiber-optic, table.....	339
speed statement Ethernet.....	105
usage guidelines.....	20
stacked VLAN-tag framing VLAN ID list.....	119
state (tracing flag).....	20
static address resolution protocol.....	345
statistic error Fast Ethernet interfaces.....	349
statistics Fast Ethernet interfaces .....	337
resetting.....	347
Gigabit Ethernet interfaces .....	337
resetting.....	347
status Fast Ethernet interfaces.....	330, 343
Gigabit Ethernet interfaces .....	343
status description, table Fast Ethernet interfaces.....	331
Gigabit Ethernet interfaces.....	331
status extensive Fast Ethernet interfaces.....	333
Gigabit Ethernet interfaces .....	333
status for specific interface Fast Ethernet.....	332
Gigabit Ethernet .....	332
support, technical See technical support	
swap statement Gigabit Ethernet IQ interfaces.....	106
swap-push statement Gigabit Ethernet IQ interfaces.....	106
swap-swap statement Gigabit Ethernet IQ interfaces.....	107
switch-options statement.....	107
switch-port statement access switching.....	108
syntax conventions.....	xv
<b>T</b>	
tag-protocol-id statement TPID to rewrite.....	110
TPIDs expected to be sent or received.....	109
technical support contacting JTAC.....	xvii
timer (tracing flag) Ethernet interface speed.....	20
trace operations VRRP .....	20
traceoptions statement VRRP usage guidelines.....	20
traceroute ethernet.....	318
traceroute ethernet command.....	318
transmit light level.....	339

Tri-Rate Ethernet copper interfaces	
speed.....	20

## U

unit statement.....	111
uPIM Ethernet interfaces.....	11

## V

Virtual Router Redundancy Protocol	See VRRP
VLAN tagging.....	118
vlan-id statement	
rewriting at ingress or egress.....	117
vlan-tagging statement.....	118
vlan-tags statement	
stacked VLAN tags.....	119
VRRP	
configuration statements.....	48
trace operations.....	20
tracing flag.....	20

## W

wavelength statement.....	121
weighted random early detection.....	22
WRED.....	22

